

National Nanotechnology Investment in the FY 2006 Budget Request

M.C. Roco,¹

Fellow, American Society of Mechanical Engineers International

The emerging fields of nanoscale science, engineering, and technology—the ability to work at the molecular level, atom by atom, to create large structures with fundamentally new properties and functions—are leading to unprecedented understanding and control over the basic building blocks and properties of all natural and man-made things. The FY 2006 funding request for nanoscale science, engineering and technology (in brief, *nanotechnology*) research and development (R&D) in eleven federal departments and independent agencies is summarized in Table I-10. This investment is known as the National Nanotechnology Initiative (NNI).² Other eleven agencies and departments participate in kind and as partners in NNI. The vision of the NNI is a future in which the ability to understand and control matter on the nanoscale leads to a revolution in technology and industry. The four goals of the NNI are as follows:

1. *Maintain a world-class research and development program aimed at realizing the full potential of nanotechnology*
2. *Facilitate transfer of new technologies into products for economic growth, jobs, and other public benefit*
3. *Develop educational resources, a skilled workforce, and the supporting infrastructure and tools to advance nanotechnology*
4. *Support responsible development of nanotechnology*

The supported R&D is grouped in seven program component areas (PCAs): (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; and (7) Societal dimensions (including: environmental, health, and safety implications of nanotechnology development and risk assessment of such impacts; education; and research on the ethical, legal, and social implications of nanotechnology.)

¹ The author is Senior Advisor to the National Science Foundation, and Chair of NSTC's Subcommittee on Nanoscale Science, Engineering and Technology (NSET). The views expressed in this paper are not necessarily those of NSF or NSET.

² See the NNI's website <http://nano.gov>

Funding is provided on competitive basis with other programs and within NNI. The Congress approved in November 2003 and the President signed on December 3, 2004 the “21st Century Nanotechnology R&D Act” (Public Law 108-153) with funding recommendations for five agencies (NSF, DOE, NASA, NIST and EPA) for fiscal years 2004-2008 and beyond. The NSTC’s Nanoscale Science, Engineering and Technology (NSET) Subcommittee coordinates the plans, budgets, programs, and reviews for NNI. NSET coordinates 22 federal departments and independent agencies in FY 2006, up from six at the beginning of the initiative in FY 2001. The President’s Council of Advisors on Science and Technology (PCAST) was assigned as the National Nanotechnology Advisory Panel (NNAP) called by the Act indicated above. NSET has published its long-term strategic plan beginning with FY 2006 on December 2004³.

SUMMARY FOR ALL AGENCIES

Priorities in FY 2006: The FY 2006 President’s request (published in February 2005) of about \$1,054 million for federal investment in nanoscale science, engineering and technology, is a 6.3 percent increase over the corresponding FY 2005 request of \$988 million (published in February 2004), but lower than the estimated FY 2005 NNI budget. One may note that the actual budget expenditures for nanotechnology have exceeded the annual President’s requests in all previous years of NNI since FY 2001. The FY 2006 budget increases are at NSF, NIH, and USDA. The budget decreases in the same request at DOD, DOE, and NASA may be explained by the reassignment of applied nanotechnology projects to the respective areas of relevance (at DOD and NASA), by rescheduling several projects (at DOE), and Congressionally-directed funding for nanotechnology in FY 2004 and FY 2005 (at DOD), as well as by the overall budget constrains in FY 2006. Roughly 65 percent of the funding proposed under the NNI supports academic research, about 25% to government R&D laboratories, and 10% to industry (where small businesses is about 7%).

The initiative focuses on long-term research on understanding the manipulation of matter at the atomic and molecular levels, leading to an unprecedented ability to create nanostructured materials and systems for advanced products such as new classes of devices as small as molecules and machines as small as human cells. Applications areas include continued improvement in electronics for information technology; higher-performance, lower-maintenance materials and design for manufacturing, defense, transportation, space, and environment; accelerated, biotechnical applications in medicine, health care, and agriculture; and extending the limits of sustainable development. In FY 2006, priority in R&D funding will be given to: (1) advance the knowledge frontiers of

³ The NNI Strategic Plan, NSET, Washington, D.C., December 2004

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nanoscale phenomena and processes to an extent that systematic control over matter at the nanoscale could be achieved; (2) research to enable design of hierarchically structured materials and efficient nanomanufacturing from the molecular scale; (3) increased research focus on active nanostructures and complex nanosystems; (4) nano-biosystems and medicine; (5) silicon nanoelectronics and beyond; (6) development of instrumentation, metrology and standards; (7) environmental, health and safety issues, including development of instrumentation for environmental and toxicity studies; (8) the education and training of the new generation or workers for the future industries; (9) addressing ethical and other social issues raised by the development of nanotechnology; (10) establish and operate major scientific user facilities with advanced instrumentation; and (11) partnerships to enhance industrial participation in the nanotechnology revolution. The convergence of nanotechnology with information technology, modern biology and social sciences will reinvigorate discoveries and innovation in almost all areas of the economy. Areas of growth are nanotechnology research for nanoscale systems and their manufacturing, energy conversion, agriculture and forestry products. The detailed NNI priorities per PCA and agency are under evaluation following as series of NSET sponsored workshops⁴.

Collaborative activities: The National Science and Technology Council (NSTC) Subcommittee on Nanoscale Science, Engineering and Technology (NSET) will coordinate joint activities that create synergies between the individual agencies in a variety of topics and modalities of collaboration. The coordination will identify the most promising research directions; fund complementary/synergistic fields of research that are critical for the advancement of the nanoscience and engineering field; develop a balanced infrastructure (portfolio of programs, development of new specific tools, instrumentation, simulation infrastructure, standards for nanoscale); correlate funding activities for centers and networks of excellence; cost-share high cost R&D activities; develop a broad workforce trained in the many aspects necessary to nanotechnology; study the diverse, complex implications on society such as effect of nanostructured material manufacturing on environment and effect of nanodevices on health; and avoid unnecessary duplication of efforts. The coordination also will address NNI management issues, interaction with nanotechnology regional alliances, and international activities. The National Nanotechnology Coordinating office (NNCO) is the secretarial office of NSET for this purpose. Several NSET working groups (Nanomaterials Environmental and Health Issues, Industry Liaison, Nanomanufacturing, and Public Interactions) provide support for partnerships. Examples of specific coordination efforts are: Nanomanufacturing (main partners NSF, DOD and NIST); Environmental issues (EPA, NIOSH, NSF, and USDA); infrastructure development (such as among R&D centers -NSECs, NNIN, NCN, and centers and networks with DOE, DOD, NASA,

⁴ Details are in NNI Supplement to the President's FY 2006 Budget, Washington, D.C., March 2005.

NIH and NIST); Standards development (NIST, all other agencies); Modeling and simulation and nanoelectronics (DOD, NASA and NSF); and Interdisciplinary research at the intersection of nanotechnology, biotechnology and information technology.

NATIONAL SCIENCE FOUNDATION (NSF)

The FY 2005 request is about \$338 million, a \$39 million over FY 2005 request and \$4 million over FY 2005 Congressional appropriation (see Table 1).

Table 1. NSF Directorate Budgets for Nanoscale Science and Engineering (in millions of dollars)

NSF Directorate	FY 2004	FY 2005	FY 2006
	Actual	Plan	Request
Biological Sciences	5.31	47.00	49.00
Computer and Information Science & Engineering	17.56	18.48	12.00
Engineering	108.88	127.77	127.77
Geosciences	7.94	7.94	9.00
Mathematical and Physical Sciences	111.48	132.14	141.54
Social, Behavioral and Economic Sciences	2.59	1.56	1.56
Office of International Science and Engineering	0.00	0.26	0.00
Subtotal, Research and Related Activities	253.76	335.15	340.87
Education and Human Resources	2.29	3.07	2.90
Total, Nanoscale Science and Engineering	\$256.05	\$338.22	\$343.77

The Nanoscale Science and Engineering (NSE) Group coordinates the NNI activities. Each directorate has two representatives in the NSE Group. The Chair of the Group is the NSF representative in NSET, and its current chair.⁵ The NSF investment will be expanded to develop and strengthen critical fields and to establish the science and engineering infrastructure and workforce needed to exploit the opportunities presented by new capabilities. Support will be focused on interdisciplinary research and education teams, national science and engineering centers, exploratory research and education projects, and education for high schools and public outreach.

⁵ The FY 2005 program solicitations can be found at <http://www.nsf.gov/nano> (Nanoscale Science and Engineering, NSF 04-043; and Nanoscale Science and Engineering Education, NSF 05-543) including exploratory, interdisciplinary teams and centers for research and education.

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NSF supports fundamental knowledge creation across all disciplinary principles at the nanoscale. Three new networks to be announced at the end of FY 2005, will establish their operation in FY 2006: Center for Hierarchical Nanomanufacturing, Center for Nanotechnology in Society, and Center for Nanotechnology Informal Science Education. These networks, together with the existing ones (NNIN, NCN and Nanoscale Center for Learning and Teaching) will establish a research and education platform for nanotechnology at the national level, including open and remote access based on merit review, open access, and serve as clearinghouses for information. Research experience for undergraduate will be expanded at the Nanoscale Science and Engineering Centers.

An increased investment will be dedicated to research and education on:

- Active nanostructures, systems of nanosystems and molecular nanosystems. Research on nanoscale devices and system architecture, and their respective fabrication, will be emphasized;
- Converging science, engineering and technology from the nanoscale, and in particular at the nano-biology interface and nano-information interface;
- Long-term societal implications of nanotechnology in society, and public interaction.
- Programs and teaching materials supporting early educational experience related to nanotechnology, including for K-12
- Expand partnerships of academic researchers with industry, medical facilities and states through two programs, "Grand Opportunities for Academic Liaison with Industry" and "Partnerships for Innovation"

Long-term objectives include laying a foundation of fundamental research for NNI Grand Challenges; ensuring that U.S. institutions will have access to a full range of nano-facilities; enabling access to nanotechnology education for students in U.S. colleges and universities; and catalyzing the creation of new commercial markets that depend on three-dimensional nanostructures. This should result in the development of completely new technologies that contribute to improvements in health, advanced agriculture, conservation of materials and energy, and sustainability of the environment. This investment will be expanded in FY 2006 to develop and strengthen critical fields and to establish the science and engineering infrastructure and workforce needed to exploit the opportunities presented by these new capabilities, including nanoelectronics and nanobiotechnology. Converging technologies from the nanoscale will be included. In addition to single-investigator research, support will be focused on interdisciplinary research and education teams, national science and engineering centers, exploratory research and education projects, and education and training.

NSF's planned investment for Nanoscale Science and Engineering in FY 2006 will contribute to all NNI program component areas. The largest contribution will be to "Fundamental nanoscale phenomena and processes" (\$95 million).

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The investment on projects with primary purpose focus on societal dimensions of nanotechnology is about \$60 million. The education and training activities will be extended to undergraduate and K-12 education. The National Nanotechnology Infrastructure Network and the Network for Computational Nanotechnology will serve about 6,300 academic and industry users at their facilities.

DEPARTMENT OF DEFENSE (DOD)

The FY 2006 request is \$230 million, which is less than the FY 2005 request and the current plan (see Table I-10). The principal DOD participants in the NNI are the Directorate for Defense Research and Engineering (DDR&E), the Defense Advanced Research Projects Agency (DARPA), the Air Force, the Army and the Navy. DOD supports nanoscale science and technology in order to meet the national security mission. The DOD structures its S&T investment into basic research (“6.1”), applied research (“6.2”) and advanced technology development (“6.3”); the latter two focus on transitioning science discovery into innovative technology.

Army, Navy and Air Force investment in 6.2 and 6.3 programs will grow in an effort to accelerate the transition of nanoscience research into mature nanotechnologies for use in military systems. Navy investment in 6.1 programs will be distributed through discovery and invention programs, and will vary based on the potential impact of nanotechnology within a given science and technology topical area.

New DARPA programs exploiting nanotechnologies are expected in 2006; specific topics have yet to be identified, but those under development will continue to emphasize the application of nanotechnology in applications important to national defense, such as quantum computation and nanoelectronic devices. There has been significant growth in Congressionally-directed funding for nanotechnology in the DoD budget. The historical progression has been approximately \$80 million in 2003, approximately \$103 million in 2004, and approximately \$150 million in 2005. The Defense Threat Reduction Agency (DTRA) and the U.S. Army Medical Research and Materiel Command are evaluating nanotechnology as an investment area.

Nanoscience shows great promise for arrays of inexpensive, integrated, miniaturized sensors for chemical / biological / radiological / explosive (CBRE) agents, for nanostructures enabling protection against agents, and for nanostructures that neutralize agents. The recent terrorist events motivate accelerated insertion of innovative technologies to improve the national security

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posture relative to CBRE. DOD will play a major role in this multiagency effort.⁶

DEPARTMENT OF ENERGY (DOE)

In FY 2006, the total request is \$207 million, including for defense programs (see Table I-10). This is a slight decrease of \$3 million over the FY 2005 current plan. Fundamental research to understand the properties of materials at the nanoscale would be increased in three areas: synthesis and processing of materials at the nanoscale, condensed matter physics, and catalysis. In addition, the FY 2006 request includes a larger investment for all five centers (Nanoscale Science Research Centers, NSRC). All of the NSRCs are user facilities that are available to the entire R&D community, with time and staff support allocated on the basis of merit-reviewed proposals. Throughout 2006, NSRC investment emphasis will transition from the construction and development phase to operations. The first NSRC, the Center for Nanophase Materials Science at the Oak Ridge National Laboratory, will commence full operations, and three other NSRCs will formally begin initial user operations as their dedicated buildings are completed and further instruments are installed.

Basic research on nanoscale phenomena and processes, and on nanomaterials, in support of the hydrogen economy will be increased. Funding levels for fundamental scientific research into nanoscale phenomena, nanomaterials, and other aspects of nanotechnology through grants to universities in 2006 request remain similar to those in 2005.

HHS: NATIONAL INSTITUTES OF HEALTH (NIH) AND NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

The NIH FY 2006 request is \$144 million, \$55 million over the FY 2005 request and \$2 million over the FY 2005 current plan. NIH would receive nanoscience and nanotechnology grant applications under existing and renewed programs. These programs are managed individually by the Institutes and Centers, with peer review conducted for the most part by the NIH Center for Scientific Review. Overall nanotechnology program coordination occurs through the NIH Bioengineering Consortium (BECON).⁷ The web site including the NIH roadmap initiatives is <http://nihroadmap.nih.gov/>.

⁶ The DOD nanotechnology budgets and programs are identified at <http://nano.gov> or <http://www.nanosra.nrl.navy.mil>.

⁷ The NIH nanoscience program announcements are available from www.nano.gov/nihnano.doc and http://grants.nih.gov/grants/becon/becon_funding.htm

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NIH's priority for nanotechnology research continues to be to create novel diagnostic and therapeutic approaches and devices, and new research capabilities to understand fundamental biomedical mechanisms, leading to improved health of the population and to reduced suffering from disease and disability.

Plans for 2006 include continuation of a program announcement for university/research institution-based basic research (PAR-03-045, Nanoscience and Nanotechnology in Biology and Medicine) and a special SBIR program (PA-02-125, Bioengineering Nanotechnology Initiative). NIH places a high priority on new ideas developed by individuals and groups of investigators, and small businesses, to generate new concepts, methods, devices, and products using nanotechnology approaches.

Studies of biocompatibility are integral to many NIH-supported studies. For example, research to develop new nanotechnology-based imaging agents or restorative implants routinely include animal studies on the distribution, processing and excretion of these materials, and monitor for adverse effects that may occur during and after treatment. The following new programs will increase in FY 2006:

- NIH Nanomedicine Roadmap, NIH-wide, with planned initial funding of \$6million in 2005 and expansion in 2006 to \$12 million annually.
- Programs of Excellence in Nanotechnology, National Heart Lung and Blood Institute (NHLBI), with planned initial funding of \$6 million in 2005 and expansion in 2006 to \$12 million annually. NCI Alliance for Nanotechnology in Cancer, National Cancer Institute, with planned initial funding of \$32 million in 2005 and a request in 2006 for \$40 million.

The NIOSH FY 2006 request is \$3 million, unchanged from the previous year. The Institute will finalize the establishment of a Center of Excellence for Nanotechnology Research, with the role of coordinating nanotechnology-related activities across the Institute and addressing critical occupational health issues. NIOSH will continue to develop partnerships with stakeholders and other organizations to enable the translation of agency activities into appropriate workplace practices.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

The FY 2006 NASA NNI request is approximately \$32 million, one million over the FY 2005 request, but \$13 million under the FY 2005 current plan (see Table I-10). In addition to the both Basic Nanoscience and Nanotechnology Research, NASA plans to invest in various application areas. The Basic NASA Nanoscience Program comprises Bio-Molecular Systems Research, which is a joint NASA/NCI (National Cancer Institute) Initiative. The OAT Program integrates Nanotechnology development in three areas: (1) Materials and

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Structures, (2) Nanoelectronics and Computing, and (3) Sensors and Spacecraft Components. A major focus at NASA is to advance and exploit the zone of convergence between nanotechnology, biotechnology, and information technology. Areas to be emphasized include: ultrahigh strength and multi-functional materials; high density, low power electronics; ultra-small and sensitive sensors; and highly miniaturized spacecraft systems (from MEMS to NEMS, nanoelectromechanical systems).

The NASA programs have been under review and revisions in the last year as result of the revised mission of the agency.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

The FY 2004 request is \$75 million, a \$16 million increase from the FY 2005 request and unchanged as compared to the FY 2005 current plan (see Table I-10). Projects in the following areas will be funded: molecular electronics; quantum computing; nanomagnetodynamics; nanotribology; and autonomous atom assembly. Approximately half of the total allocated funds will be used to continue current internal efforts in several of these areas and half will be used to leverage existing efforts with external partners. The funds are distributed, using a competitive process, across the NIST Laboratories for enabling infrastructural measurement, standards, and data for nanomagnetics, nanocharacterization, and new information technologies.

New nanomanufacturing and nanofabrication programs were inaugurated in FY05 to support, at an enhanced level, research into nanoimprint lithography, particle metrology and other manufacturing metrology techniques. These programs also support development and delivery of measurement and infrastructural technologies to provide traceable metrology, process-control, and quality assurance for nanoscale manufacturing. Funding was also increased for research on measurements of nanomechanical properties and on nanotube/nanoparticle metrology, and for efforts to produce nanoelectronics and nanophotonics devices.

The National Nanomanufacturing and Nanometrology Facility (N³F) opened in Gaithersburg, MD, in 2005. The N³F was developed at NIST to support the development of new infrastructural metrology and standards for U.S. nanotechnology efforts through centralized access to NIST's unique nanometrology and nanofabrication resources, including the facilities of the Advanced Measurement Laboratory and NIST's nanometrology experts.

In order to leverage internal efforts, NIST will develop stronger strategic alliances and collaborations with universities, businesses, and other government agencies that possess leading expertise in nanotechnology. NIST plans to direct half of the new nanotechnology funding to these external organizations to

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conduct much of the specific work required to meet the goals of this initiative and avoid developing costly, complex in-house capabilities that may only be used once. NIST has a large range of collaborations with industry.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

FY 2006 research is expected to be similar to FY 2004 at approximately \$5 million. EPA's research is organized around the risk assessment/risk management paradigm. Research on human health and environmental effects, exposure, and risk assessment is combined to inform decisions on risk management. Research on environmental applications and implications of nanotechnology can be addressed within this framework. Nanotechnology may offer the promise of improved characterization of environmental problems, significantly reduced environmental impacts from "cleaner" manufacturing approaches, and reduced material and energy use. The potential impacts of nanoparticles from different applications on human health and the environment will be an area of focus.

EPA will continue to focus the majority of its research in 2006, as in 2005, on health and environmental implications of nanomaterials.

US DEPARTMENT OF AGRICULTURE (USDA)

The FY 2005 request is approximately \$11 million, about \$8 million over the FY 2005 current plan. USDA conducts its research both extramurally through the partnership between the Cooperative State Research, Education, and Extension Service (CSREES), the Land Grant Universities (LGUs) and SBIR, and in-house at Agriculture Research Service (ARS) national laboratories. The CSREES also provides leadership and financial supports in education and outreach in all the states and territories of the U.S. through the LGUs.

The USDA nanotechnology program will further expand in 2006 through its Nanotechnology Research Initiative for extramural competitive research and education grants. R&D efforts will contribute to the NNI program component areas, with a central theme of exploiting the novel properties of nanoscale biological structures derived from important agricultural materials. The development of nanotechnology-based sensors for application in the food industry and agriculture is also a priority, and will similarly expand.

DEPARTMENT OF HOMELAND SECURITY (DHS)

The FY 2006 research request remains unchanged, at approximately \$1 million, for the Transportation Security Administration (TSA) to address one of the agency's most critical missions today: ensuring the security of our nation's air

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transportation system by improving the detection of explosives and chemical/biological weapons. R&D programs aim to detect explosives and hazardous chemicals at the nanometer level and to characterize the interactions of explosives on material surfaces at this scale. Further research will yield sensor technologies that are cheaper and lighter yet far more sensitive, selective, and reliable than current systems.

DEPARTMENT OF JUSTICE (DOJ)

In FY 2006 the budget request is steady at \$2 million. The DOJ National Institute of Justice (NIJ) has two separate projects areas that incorporate nanotechnology—DNA Research (\$1 million) and Development and Chemical and Biological Defense (\$1 million). The DNA Research and Development program will continue basic research as well as the demonstration of chip-based or micro-device technologies to analyze DNA in forensic applications. Nanotechnology has or will be a significant part of the device under development that will eventually be integrated into the current crime laboratory processes and protocols to analyze forensic DNA samples. The Chemical and Biological Defense program is developing a wearable, low-cost device to provide warning of exposure to unanticipated chemical and biological hazards in sufficient time for its wearer to take effective protective measures. The current approach relies on an enzymatic reaction. It is based on vapor exposure of an immobilized enzyme surface. Evolving nanotechnology may be used to address limitations of the enzymatic approach.

Federal agencies and departments with R&D budgets dedicated to nanotechnology research and development
Department of Agriculture (USDA) Department of Defense (DoD) Department of Energy (DOE) Department of Homeland Security (DHS) Department of Justice (DOJ) Environmental Protection Agency (EPA) National Aeronautics and Space Administration (NASA) National Institute of Standards and Technology (NIST, Department of Commerce) National Institute of Occupational Safety and Health (NIOSH, Department of Health and Human Services) National Institutes of Health (NIH, Department of Health and Human Services) National Science Foundation (NSF)
Other participating agencies and departments
Bureau of Industry and Security (BIS, Department of Commerce) Consumer Product Safety Commission (CPSC) Department of State (DOS) Department of Transportation (DOT) Department of the Treasury (DOTreas) Food and Drug Administration (FDA, Department of Health and Human Services) International Trade Commission (ITC) Intelligence Technology Innovation Center, representing the Intelligence Community (IC) Nuclear Regulatory Commission (NRC) Technology Administration (TA, Department of Commerce) U.S. Patent and Trademark Office (USPTO, Department of Commerce)

Table I-10a. List of Federal Departments and Agencies Participating in the NNI

Federal Department or Agency	FY 2004 Actual (\$M)	FY 2005 Estimate C.P. (\$M)	FY 2006 Request (\$M)
National Science Foundation	256	338	344
Department of Defense	394 ²	407 ¹	230
Department of Energy	202	210	207
HHS (National Institutes of Health)	106	142	144
DOC (NIST)	77	75	75
NASA	47	45	32
Department of Agriculture	2	3	11
Environmental Protection Agency	5	5	5
HHS (NIOSH)	-	3	3
Department of Justice	2	2	2
Department of Homeland Security	1	1	1
TOTAL	1092²	1231¹	1054

¹ In FY 2005 - includes \$257 million for DOD discretionary R&D and approximately \$150 million for Congressionally-directed funding for nanotechnology in the DOD budget; ² In FY 2004 - includes \$291 million for DOD discretionary R&D and \$103 million for Congressionally-directed funding.

Table I-10b. Agency Participation and Level of Funding in the NNI

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Table I-10c. Key NNI R&D user facilities

Center Name	Institution
<i>NSF</i>	
National Nanofabrication Infrastructure Network (NNIN) – 13 nodes	Cornell University – central node
Network for Computational Nanotechnology (NCN) – 7 nodes	Purdue University – central node
<i>DOE</i>	
Center for Functional Nanomaterials	Brookhaven National Laboratory
Center for Integrated Nanotechnologies	Sandia NL and Los Almos NL
Center for Nanophase Materials Sciences	Oak Ridge National Laboratory
Center for Nanoscale Materials	Argonne National Laboratory
Molecular Foundry	Lawrence Berkeley National Laboratory