

# *The Study Process at the U.S. National Academies*

*Michael H. Moloney, Ph.D*

*U.S. National Research Council  
Board on Physics and Astronomy*

***Workshop on Quality of Quality Assurance.***

***Striving for Highest Standards in Ex-post Evaluation***

***Vienna, 6 - 7 October 2008***

***Third workshop of the ESF Member Forum on Evaluation of  
Funding Schemes and Research Programmes***



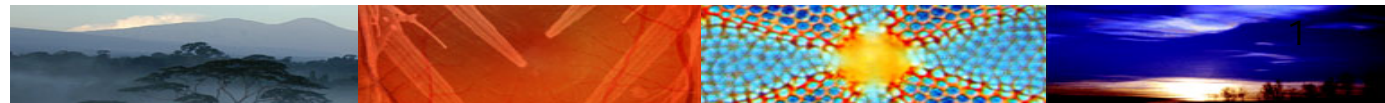
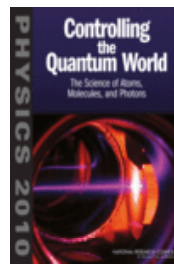
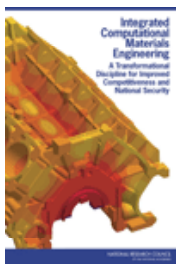
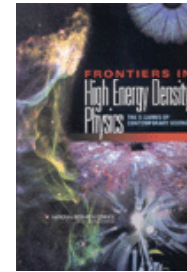
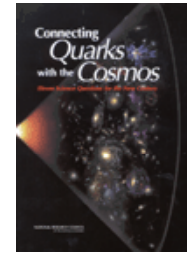
# My portfolio of studies

## Active Studies:

- Assessing Corrosion Education
- Astro2010: Decadal Survey of Astronomy and Astrophysics
- Understanding the Impact of Selling the Helium Reserve

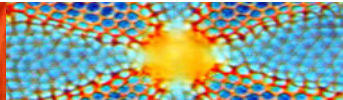
## Completed and Published

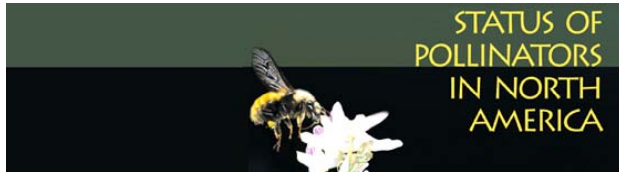
- Committee on Integrated Computational Materials Engineering (2008)
- Committee on Technologies to Deter Currency Counterfeiting (2007)
- Plasma 2010: Decadal Survey of Plasma Science (2007)
- A Matter of Size: Triennial Review of the NNI (2006)
- Controlling the Quantum World: The Science of Atoms, Molecules and Photons (2006)
- Analyzing the U.S. Content of Imports and the Foreign Content of Exports (2006)
- Midsize Facilities: The Infrastructure for Materials Research (2006)
- Globalization of Materials R&D: Time for a National Strategy (2005)
- Burning Plasma: Bringing a Star to Earth (2004)
- Frontiers in High Energy Density Physics: The X-Games of Contemporary Science (2003)
- Connecting Quarks with the Cosmos: Eleven Science Questions for the New Century (2003)
- Funding Smithsonian Research (2003)
- Materials and Society: From Research to Manufacturing -- Report of a Workshop (2003)
- Frontiers in High Energy Density Physics (2002)
- Atoms, Molecules, and Light: AMO Science Enabling the Future (2002)



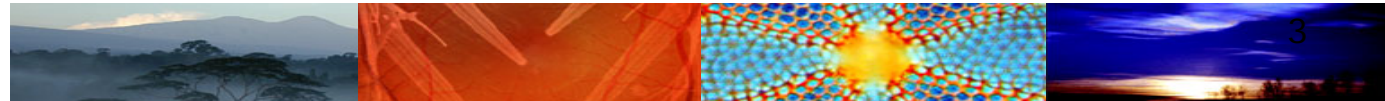


- ❑ The National Academy of Science (NAS) was established on March 3 1863 by Act of Congress, signed into law by President Lincoln in the midst of the Civil War.
- ❑ NAS was established to "investigate, examine, experiment, and report upon any subject of science or art" whenever called upon to do so by any department of the government.
- ❑ First study carried out by Committee on Weights, Measures, and Coinage which recommended  
"the metrical system of weights and measures, though not without defects, is all things considered, the best in use."





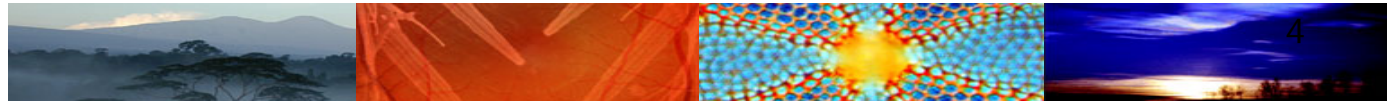
- ❑ In 1916 at the request of President Wilson, the National Research Council (NRC) was established by the NAS to recruit specialists from the larger scientific and technological communities to participate in the furthering knowledge and advising the federal government
- ❑ National Academy of Engineering (NAE) was established in 1964 and the Institute of Medicine in 1970.
- ❑ The NRC serves as the principal operating arm of the NAS and NAE in providing services to the government, the public, & the scientific & engineering communities. IOM program activities to follow NRC policy and procedures
- ❑ Together these are the National Academies.





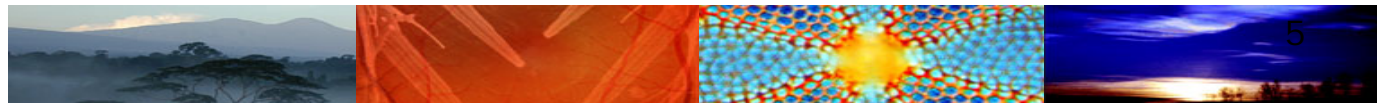
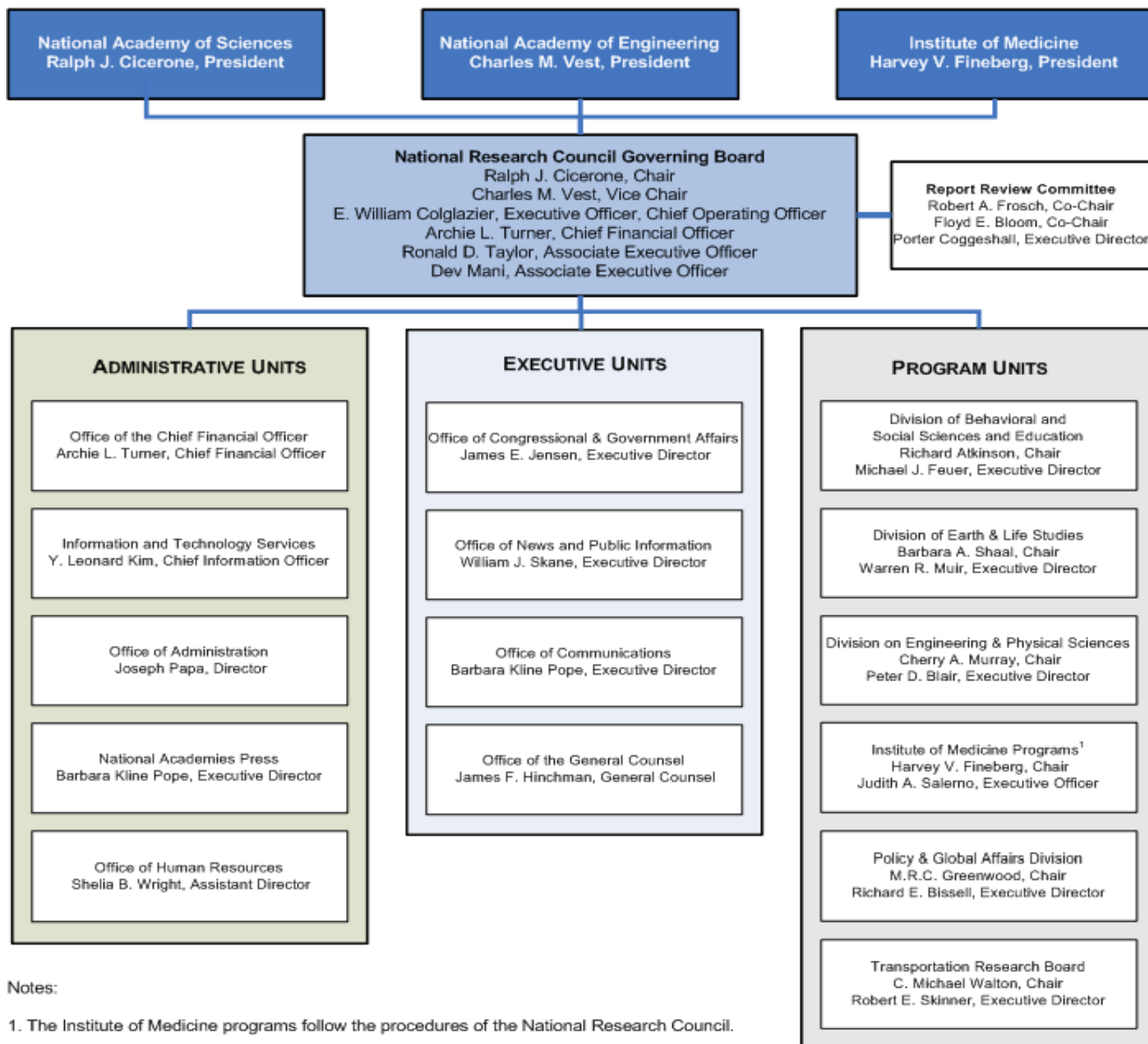
# NAS, NAE, and IOM Membership December 31, 2007

- ❑ NAS: 2,070 members (77 emeritus)  
381 foreign associates
- ❑ NAE 2,169 members (236 emeritus)  
185 foreign associates
- ❑ IOM 1604 members (72 emeritus)  
84 foreign associates



# NATIONAL RESEARCH COUNCIL

January 2008



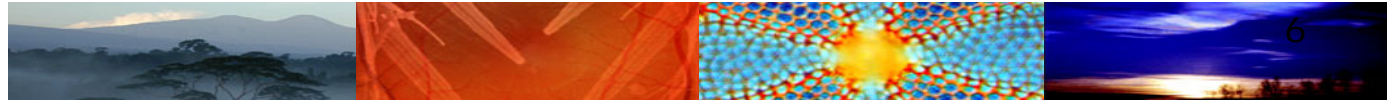
# NRC GOVERNING BOARD

## □ MEMBERSHIP

- NRC Chair (*NAS President*), votes only to break ties
- 5 NAS Council Members (*NAS Vice-President plus 4*)
- 5 NAE Council Members (*NAE President, Vice-President, plus 3*)
- 2 IOM Council Members (*IOM President plus 1*)

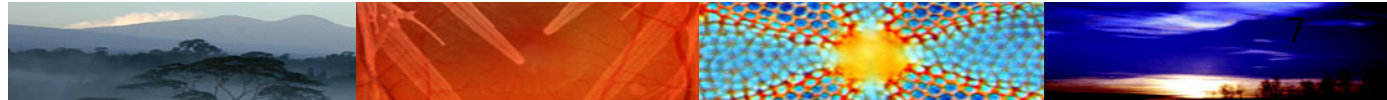
## *COMMITTEES*

- *Governing Board Executive Committee*
- *Committee on Classified and Controlled/Restricted Activities*
- *Budget and Finance Committee*
- *Program and Planning Committee*
- *Committee on International Programs*
- *Operations and Personnel Committee*



## NRC MAJOR PROGRAM UNITS

- ❑ DBASSE      Division on Behavioral and Social Sciences and Education
- ❑ DELS        Division on Earth and Life Studies
- ❑ DEPS        Division on Engineering and Physical Sciences    ❑❑√
- ❑ IOM         Institute of Medicine Programs
- ❑ PGAD        Policy and Global Affairs Division
- ❑ TRB         Transportation Research Board

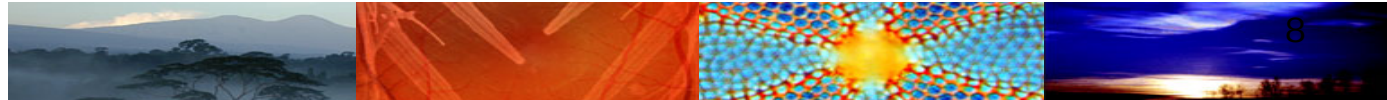




# STANDING BOARDS AND COMMITTEES

## *Some Examples*

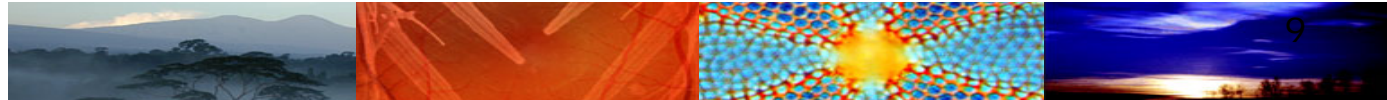
- ❑ DBASSE Board on Science Education
- ❑ DELS Board on Life Sciences
- ❑ DEPS Board on Physics and Astronomy ✓
- ❑ IOM Board on Global Health
- ❑ PGAD Board on Science, Technology, and Economic Policy
- ❑ TRB Studies and Special Programs



## STANDING BOARDS AND COMMITTEES

*Some Examples (continued)*

- DBASSE Committee on National Statistics
- DELS Climate Research Committee
- DEPS Committee on Astronomy & Astrophysics
- IOM Committee on Military Nutrition Research
- PGAD Committee on Science, Technology, & Law
- TRB Subcommittee for NRC Oversight



# NRC METHODS OF OPERATION

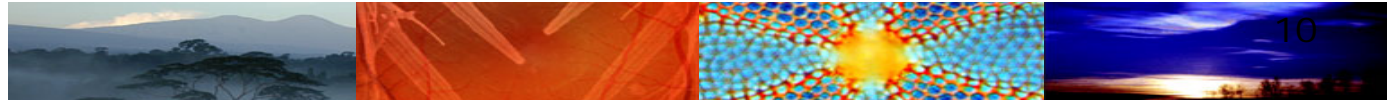
## CONSENSUS STUDIES (Ad-Hoc Committees)

### CONVENING ACTIVITIES

- Workshops / Roundtables

### OPERATIONAL PROGRAMS

- Fellowships and Associateships
- Research/Surveys
- Education and Training
- Data Banks



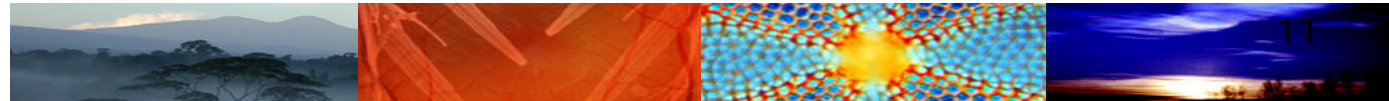
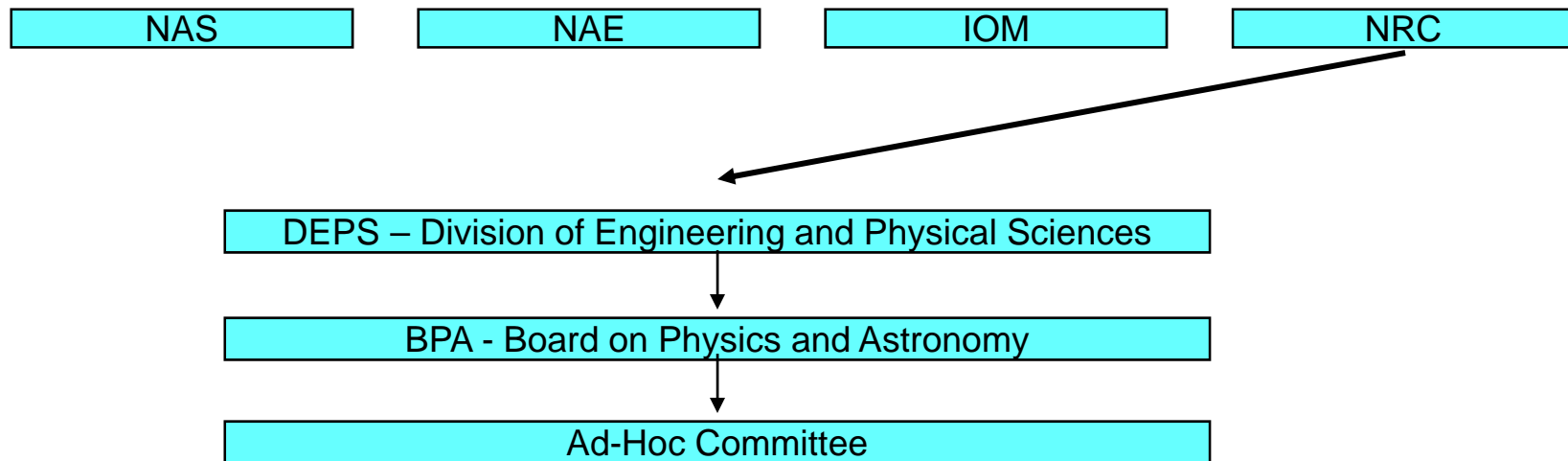
# Where do Ad-Hoc Committee Consensus Studies reside within the National Academies and the National Research Council?

## THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

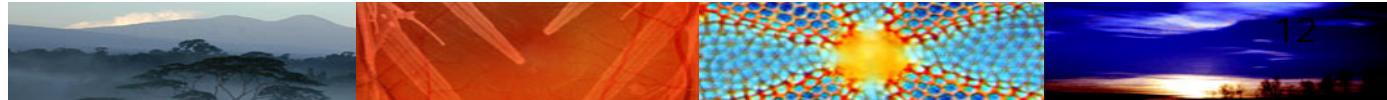
The nation turns to the National Academies—National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council—for independent, objective advice on issues that affect people's lives worldwide.

[www.national-academies.org](http://www.national-academies.org)



# UNIQUE STRENGTHS

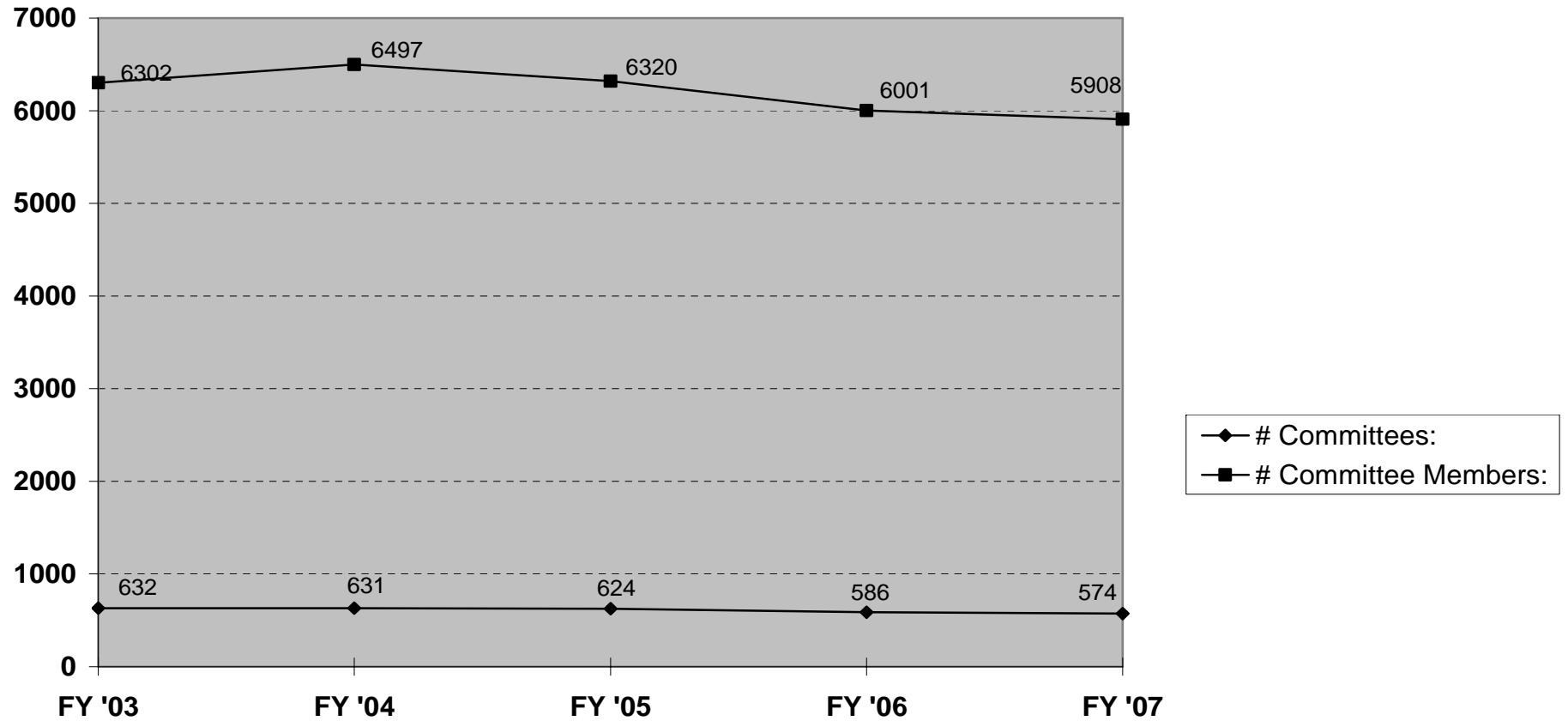
- Stature of the academies' memberships
- Ability to get the very best to serve
- "Pro Bono" nature of committee service
- Special relationship with government
- Quality assurance and control procedures
- Reputation for independence and objectivity





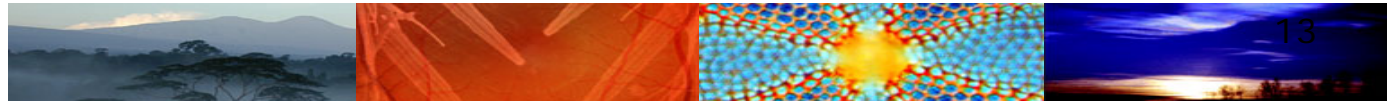
# NUMBER OF NRC/IOM COMMITTEES AND COMMITTEE MEMBERS \*

FOR THE PERIOD JANUARY 1, 2003 THROUGH DECEMBER 31, 2007



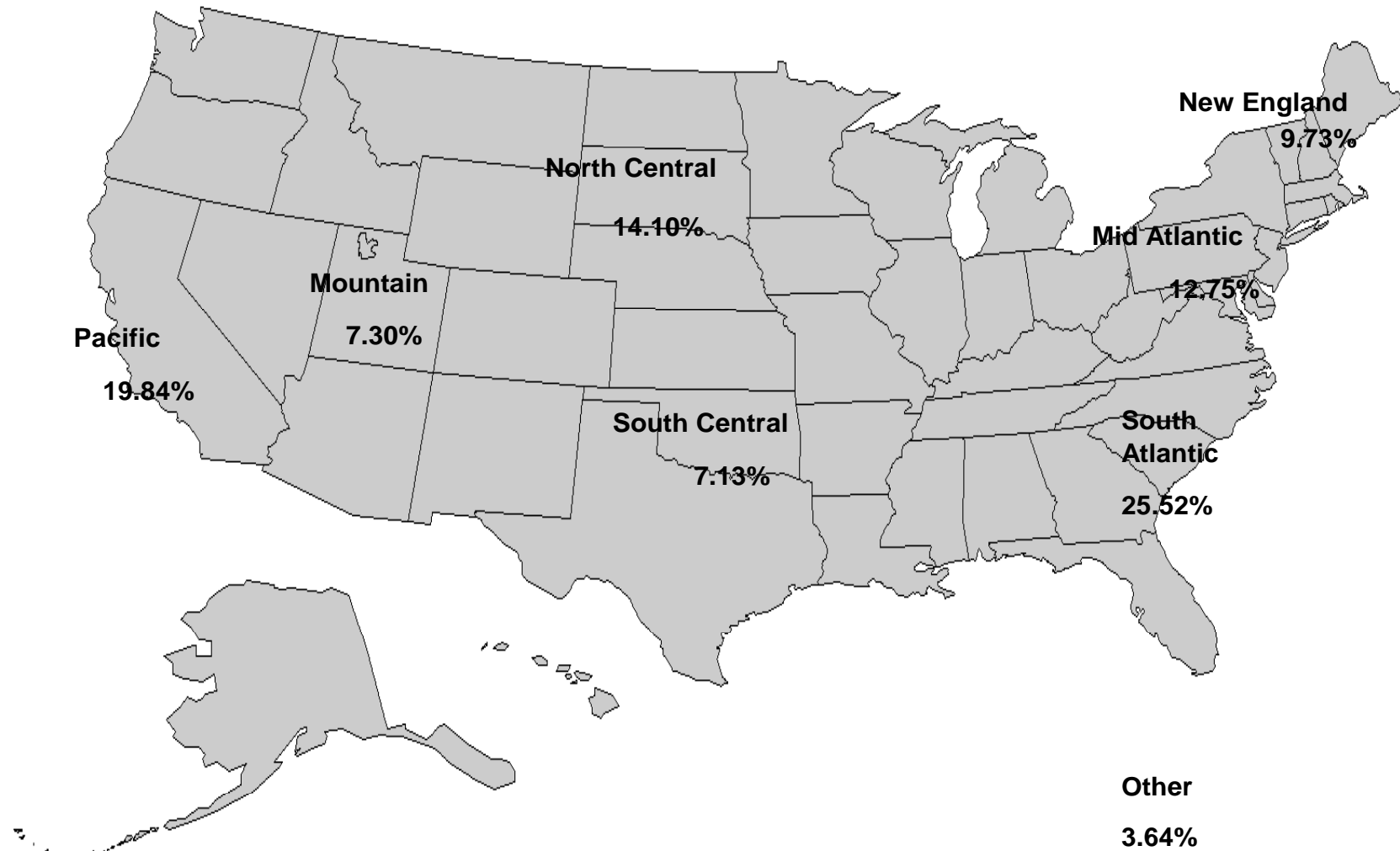
\*Excludes Liaison Representatives, PGA's associateship and fellowship panels, and TRB's technical activities.

SOURCE: CMIS



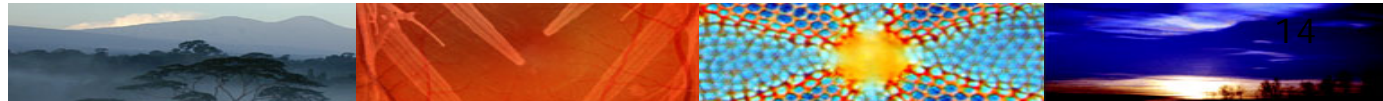
# GEOGRAPHICAL DISTRIBUTION OF NRC/IOM COMMITTEE MEMBERS

FOR THE PERIOD JANUARY 1, 2007 THROUGH DECEMBER 31, 2007



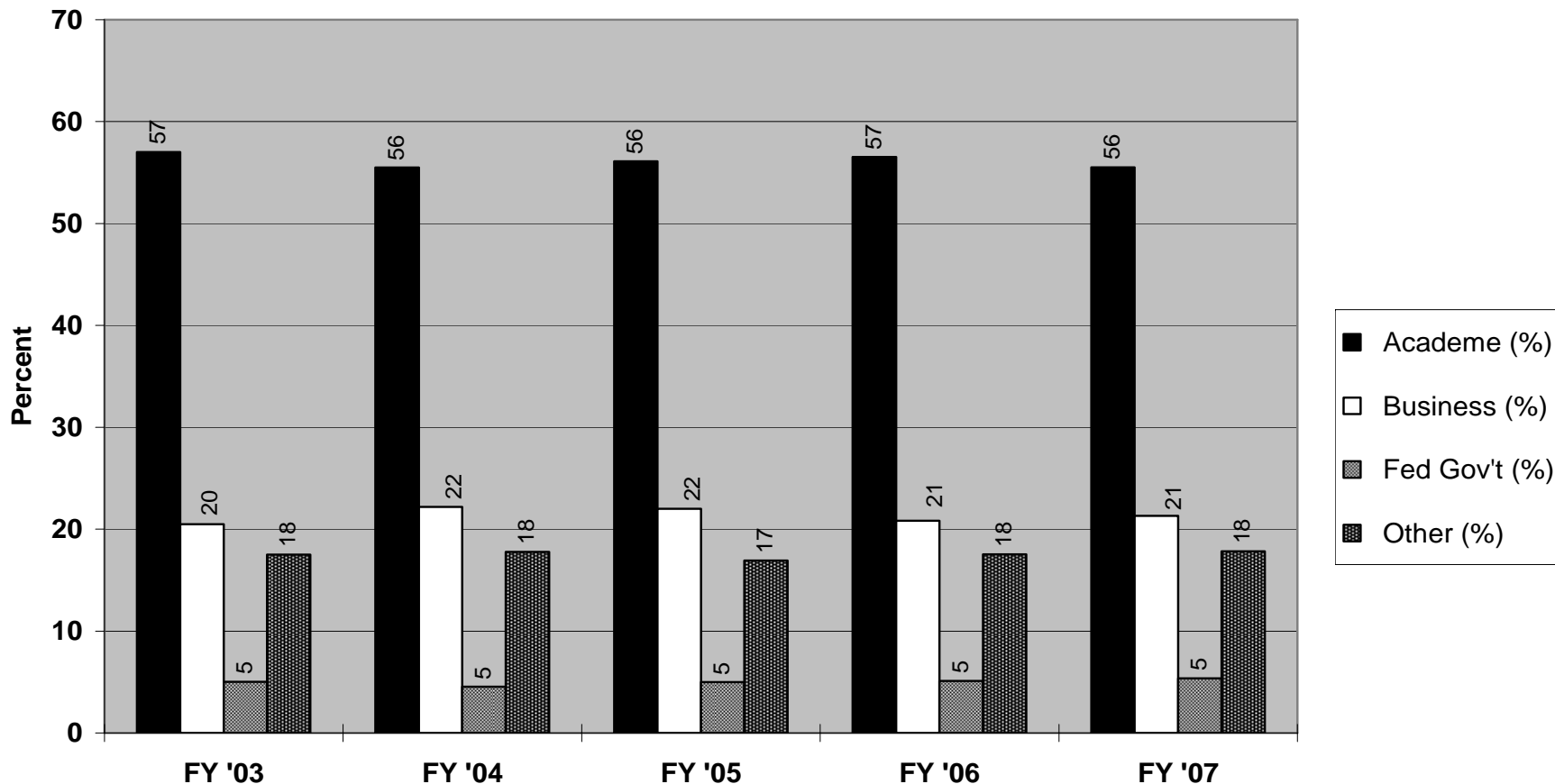
NOTE: Excludes Liaison Representatives, PGA's associateship and fellowship panels, and TRB's technical activities.

SOURCE: CMIS



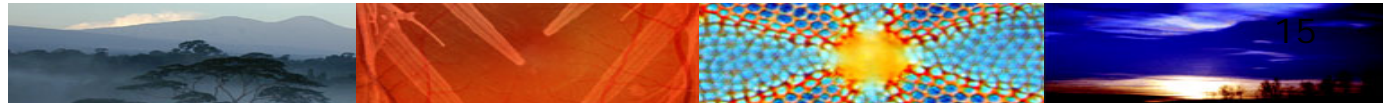
## NRC/IOM COMMITTEE MEMBERSHIP SECTOR AFFILIATION \*

FOR THE PERIOD JANUARY 1, 2003 THROUGH DECEMBER 31, 2007



\*Excludes Liaison Representatives, PGA's associateship and fellowship panels, and TRB's technical activities.

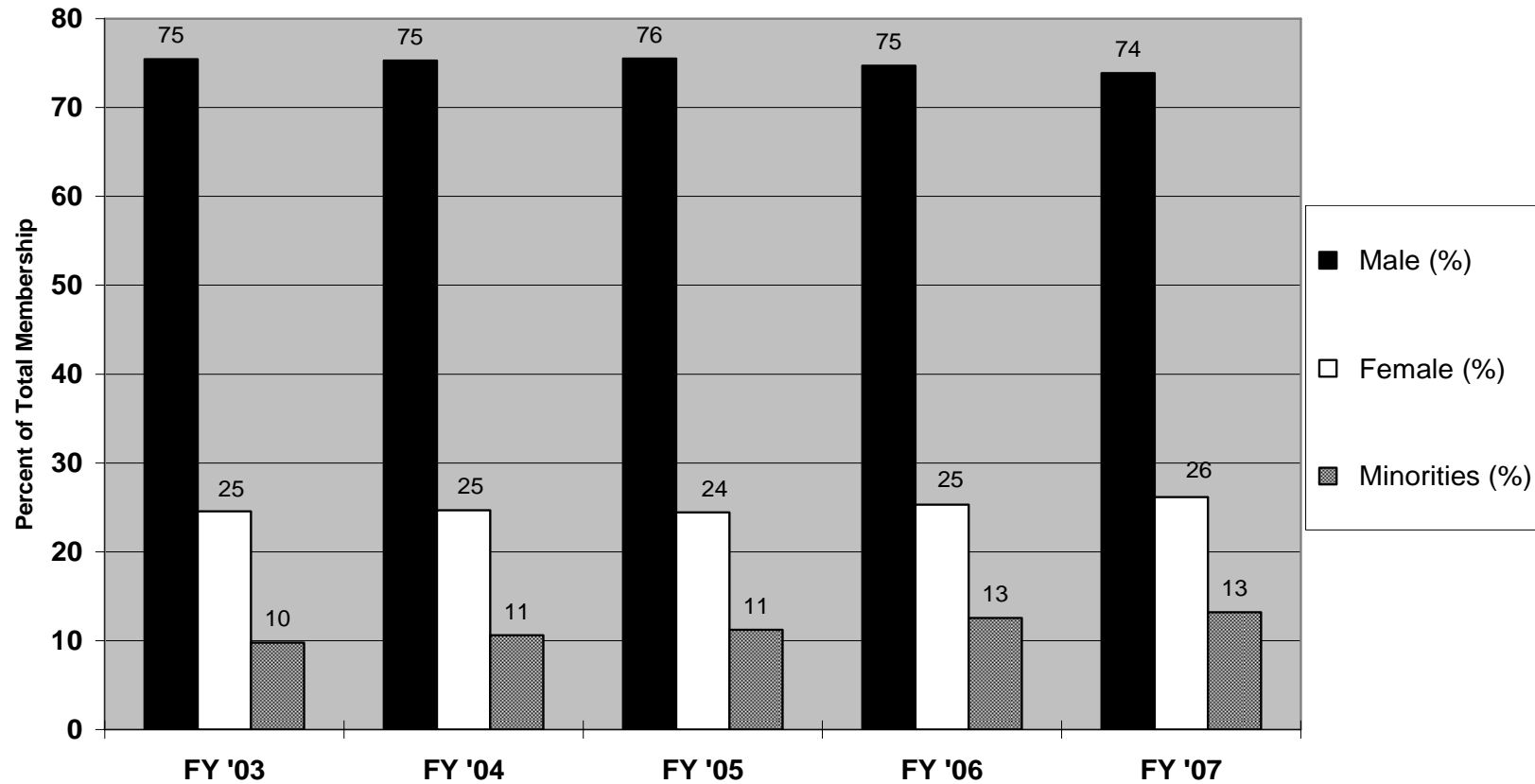
SOURCE: CMIS



## NRC/IOM COMMITTEE MEMBERSHIP

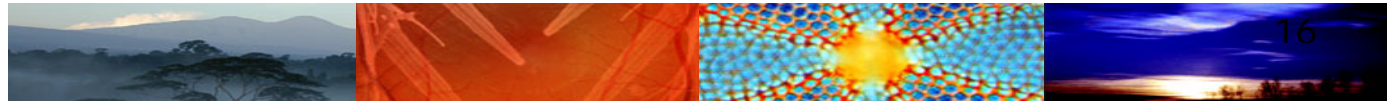
### MALE/FEMALE/MINORITY PARTICIPATION \*

FOR THE PERIOD JANUARY 1, 2003 THROUGH DECEMBER 31, 2007

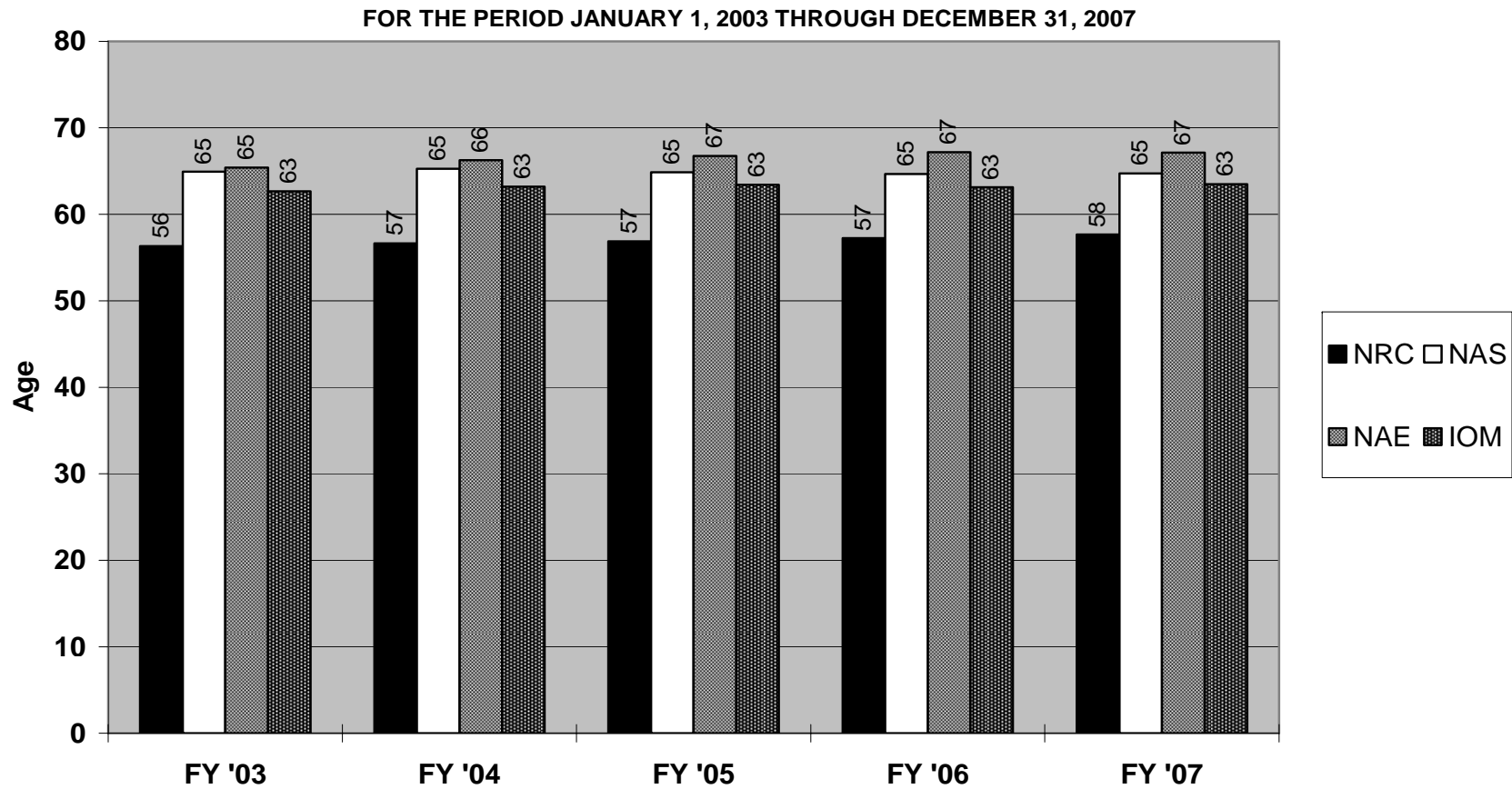


\*Excludes Liaison Representatives, PGA's associateship and fellowship panels, and TRB's technical activities.

SOURCE: CMIS

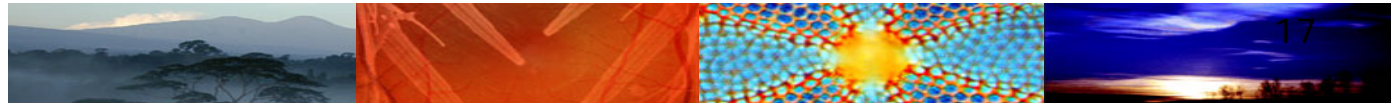


**AVERAGE AGE OF PARTICIPANTS IN NRC/IOM COMMITTEES  
AND AVERAGE AGE OF NAS/NAE/IOM MEMBERS SERVING ON NRC/IOM COMMITTEES \***



\*Excludes Liaison Representatives, PGA's associateship and fellowship panels, and TRB's technical activities.

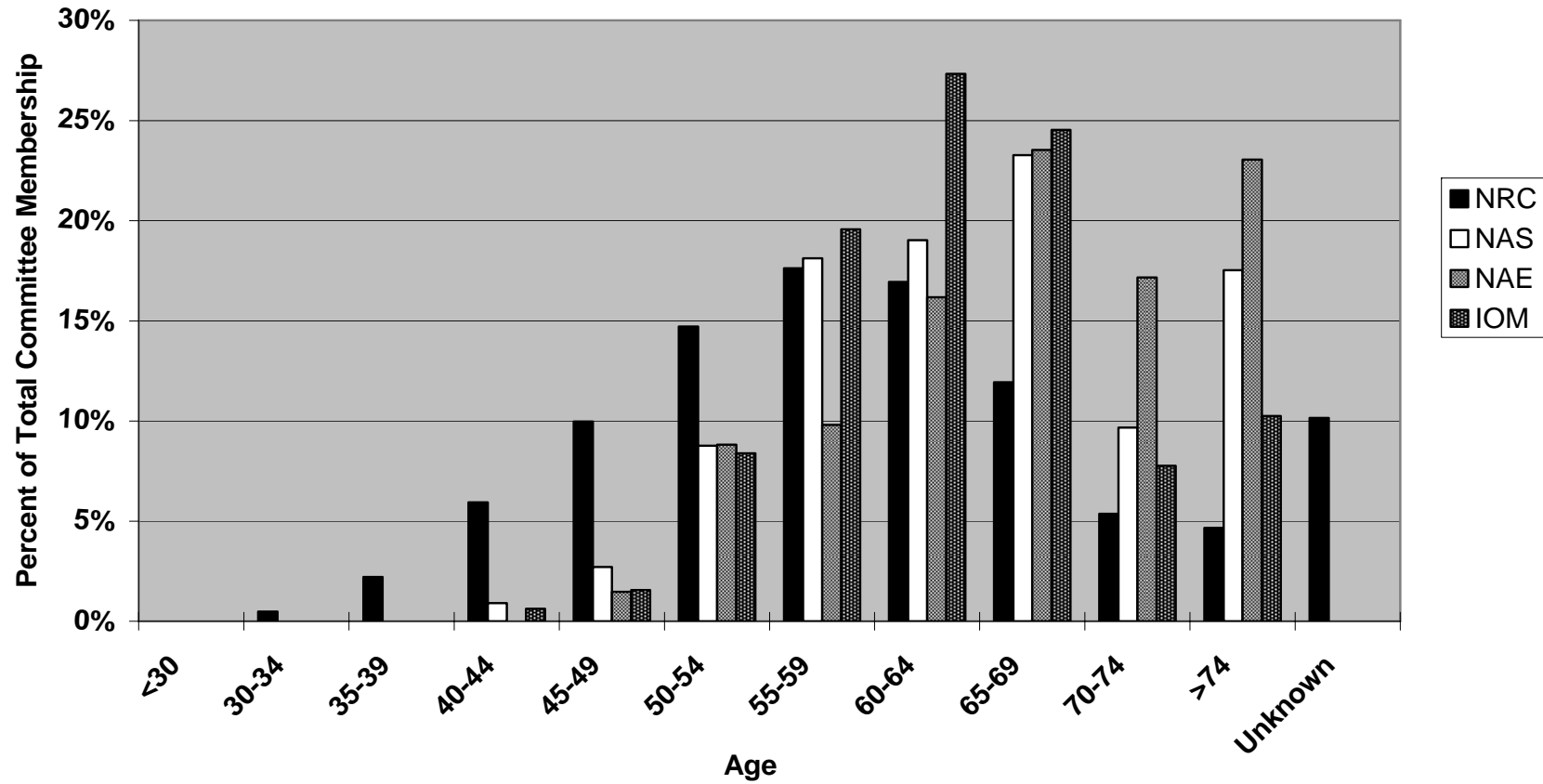
SOURCE: CMIS





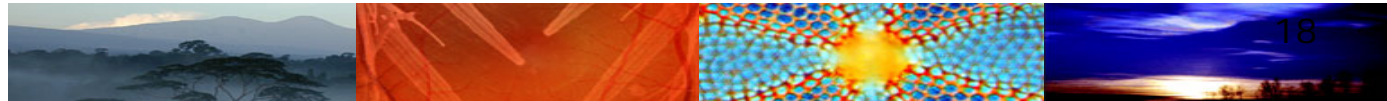
**DISTRIBUTION BY AGE OF PARTICIPANTS IN NRC/IOM COMMITTEES  
AND DISTRIBUTION BY AGE OF NAS/NAE/IOM MEMBERS SERVING ON NRC/IOM COMMITTEES**

FOR THE PERIOD JANUARY 1, 2007 THROUGH DECEMBER 31, 2007



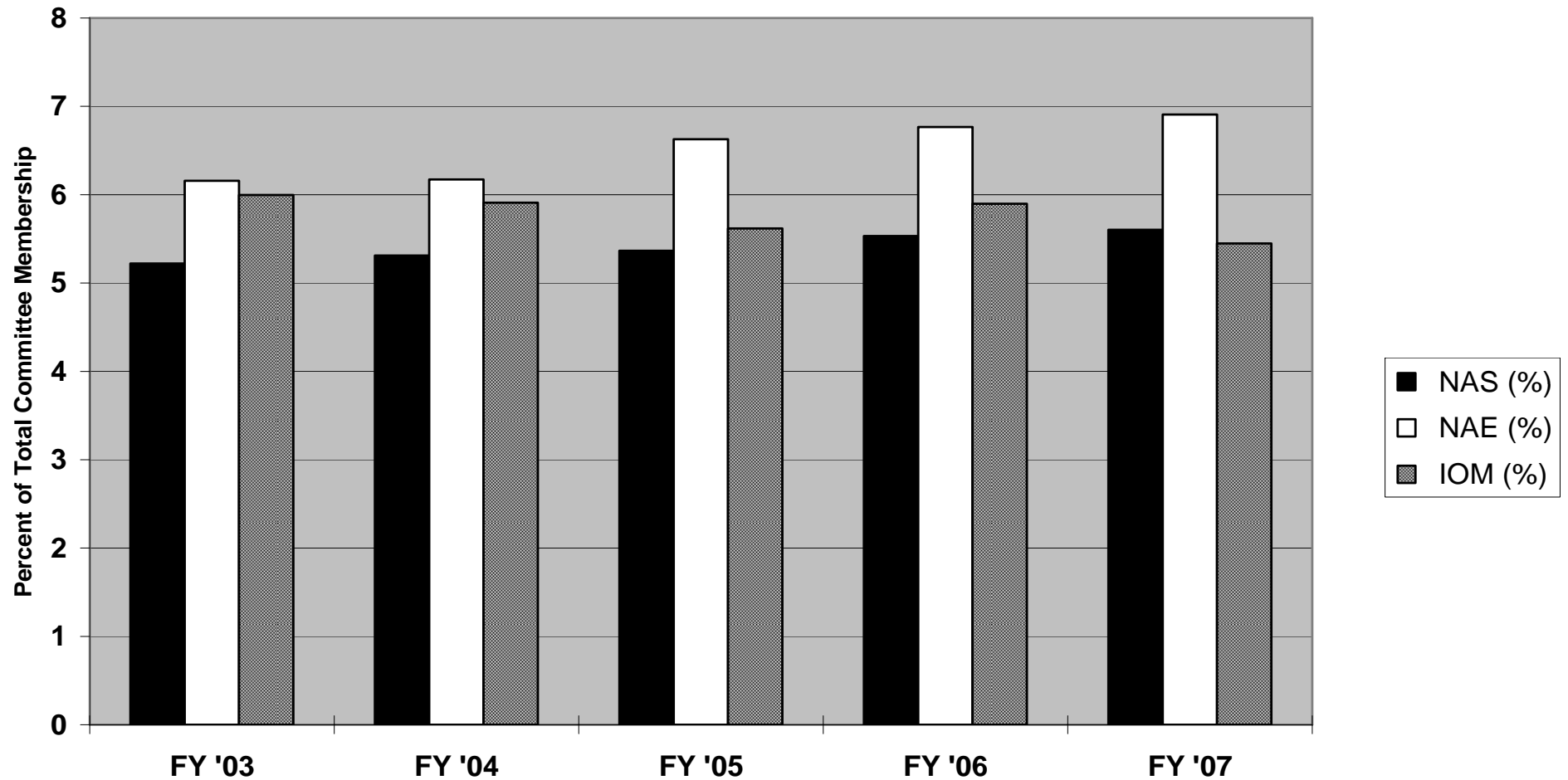
NOTE: Excludes Liaison Representatives, PGA's associateship and fellowship panels, and TRB's technical activities.

SOURCE: CMIS

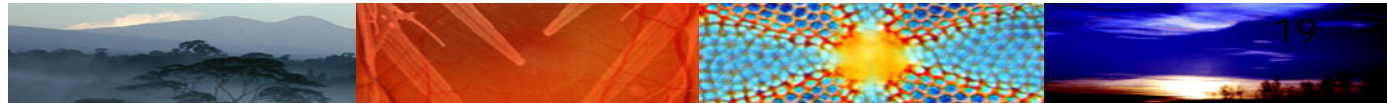


## NAS/NAE/IOM MEMBERS AS A PERCENT OF NRC/IOM COMMITTEE MEMBERSHIP \*

FOR THE PERIOD JANUARY 1, 2003 THROUGH DECEMBER 31, 2007

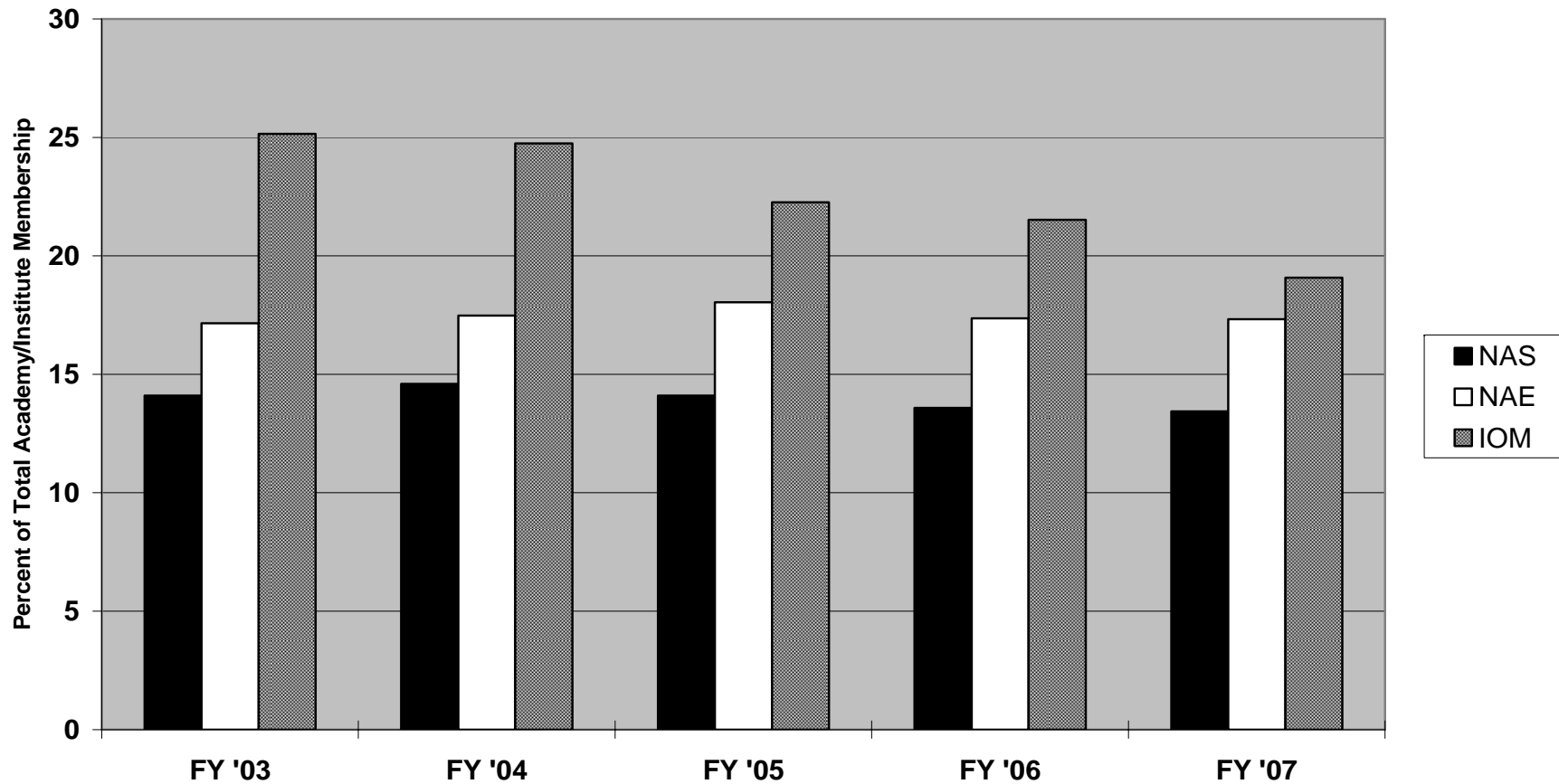


\*Excludes Liaison Representatives, PGA's associateship and fellowship panels, and TRB's technical activities.



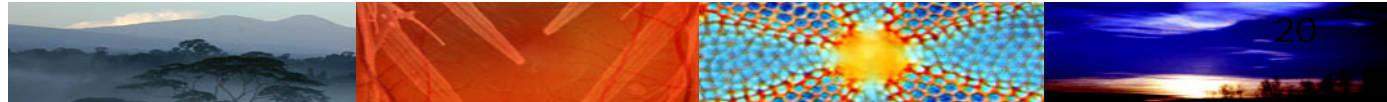
## PARTICIPATION ON NRC/IOM COMMITTEES BY NAS/NAE/IOM MEMBERS \*

FOR THE PERIOD JANUARY 1, 2003 THROUGH DECEMBER 31, 2007

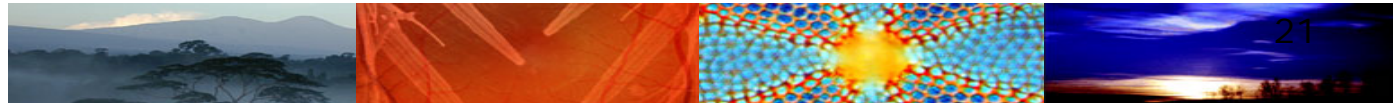


\*Excludes Liaison Representatives, PGA's associateship and fellowship panels, and TRB's technical activities.

SOURCE: CMIS



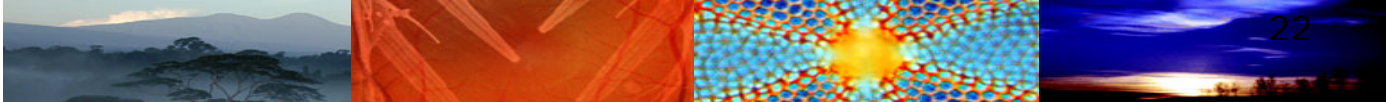
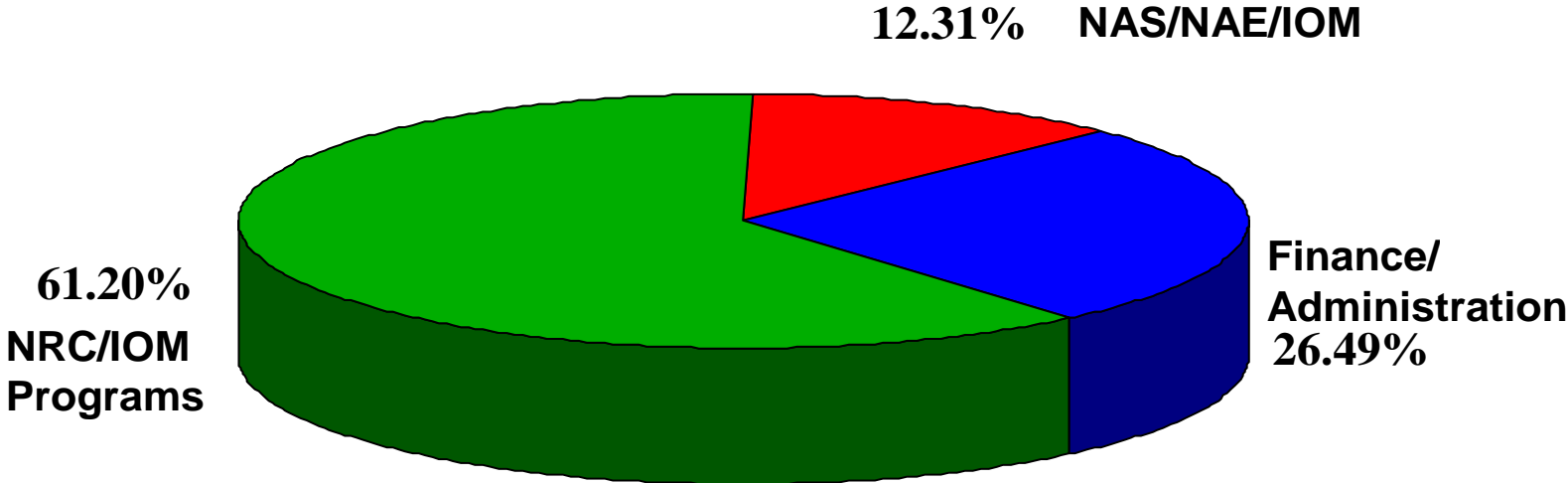
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are needed to see this picture.



# DISTRIBUTION OF STAFF BY FUNCTION

## April 2008

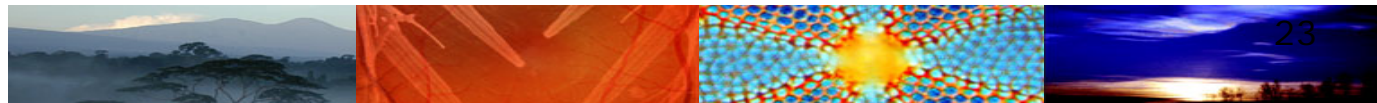
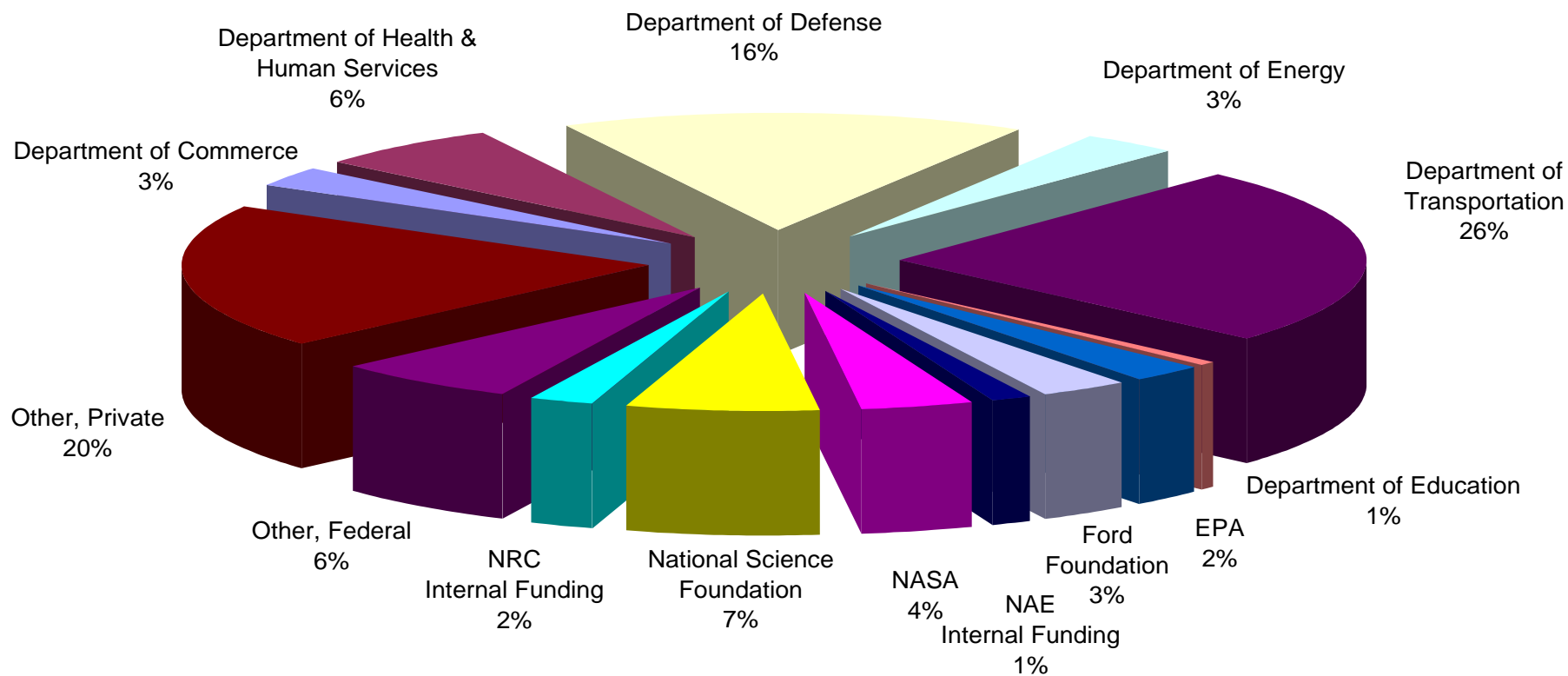
Total Staff of 1121



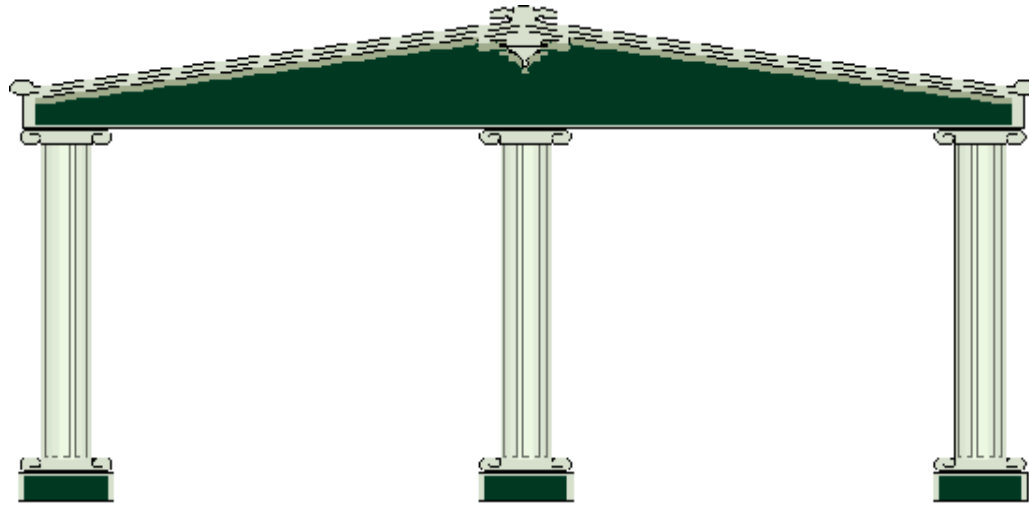


# PROGRAM SUPPORT BY SOURCE FOR FY2007

Total Actual Expenditures of \$242.7 million



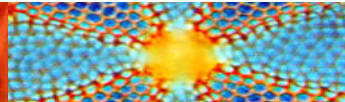
# PRINCIPLES OF THE NRC



Independence

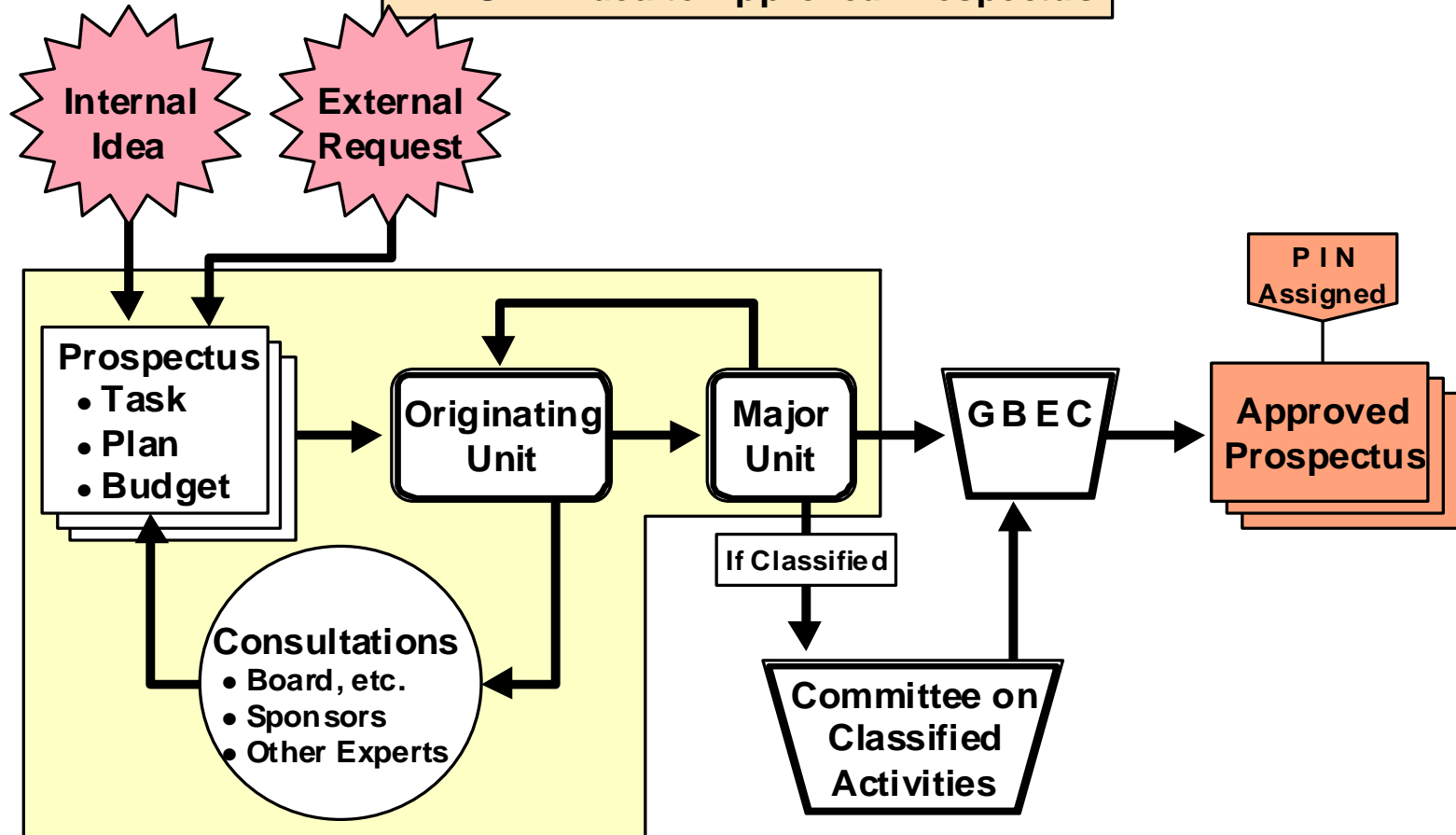
Balance

Objectivity



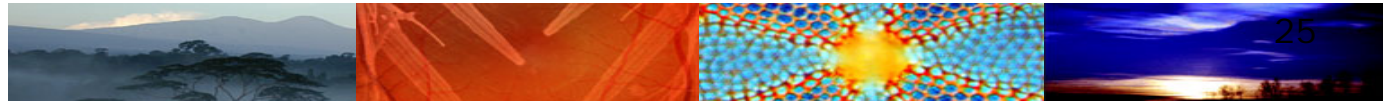
# An NRC/IOM Project: The Process from Beginning to End

## PHASE 1: Idea to Approved Prospectus



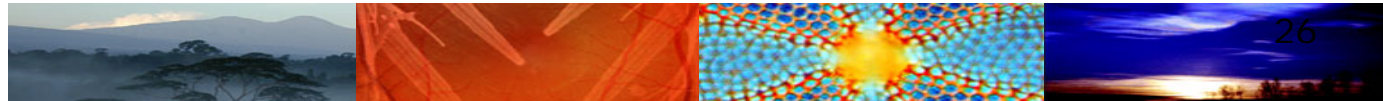
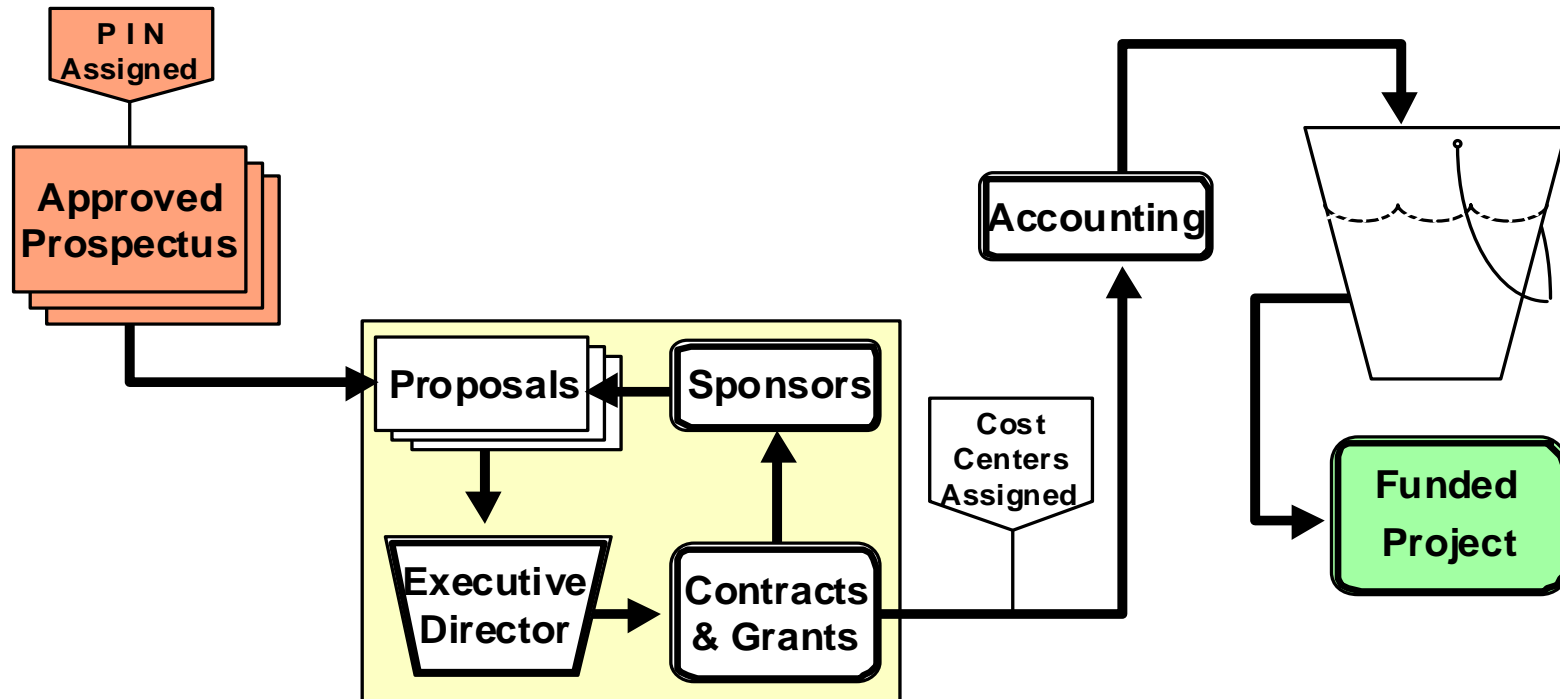
★ GBEC: Governing Board Executive Committee

★ PIN: Project Identification Number



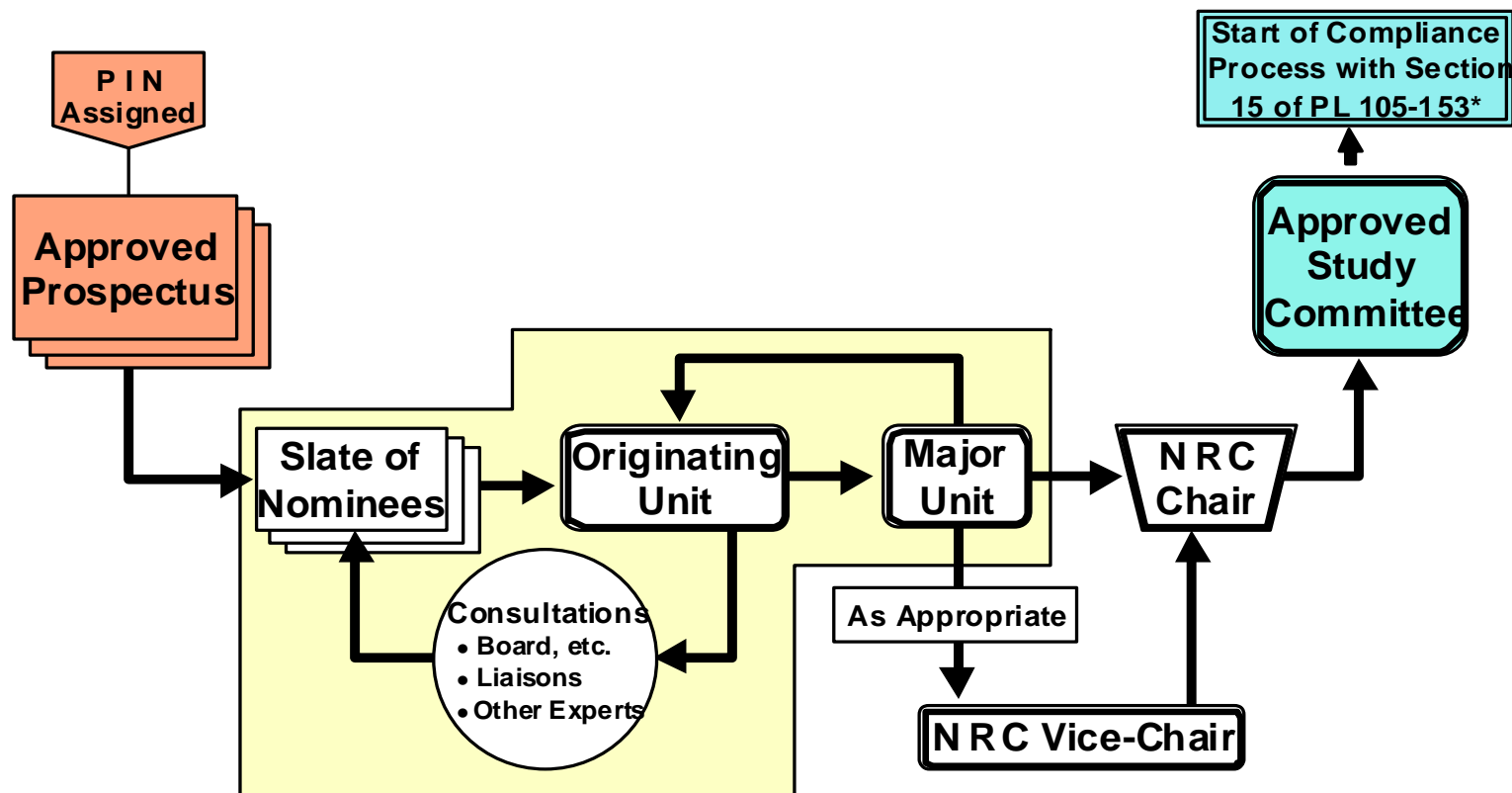
# An NRC/IOM Project: The Process from Beginning to End

## PHASE 2: Approved Prospectus to Funded Project

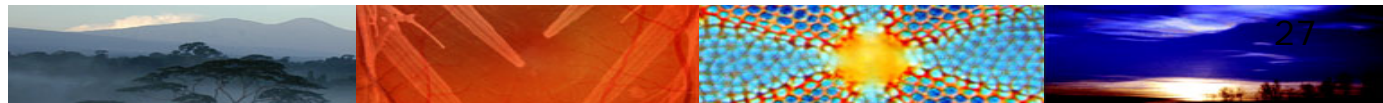


# An NRC/IOM Project: The Process from Beginning to End

## PHASE 3: Approved Prospectus to Approved Committee



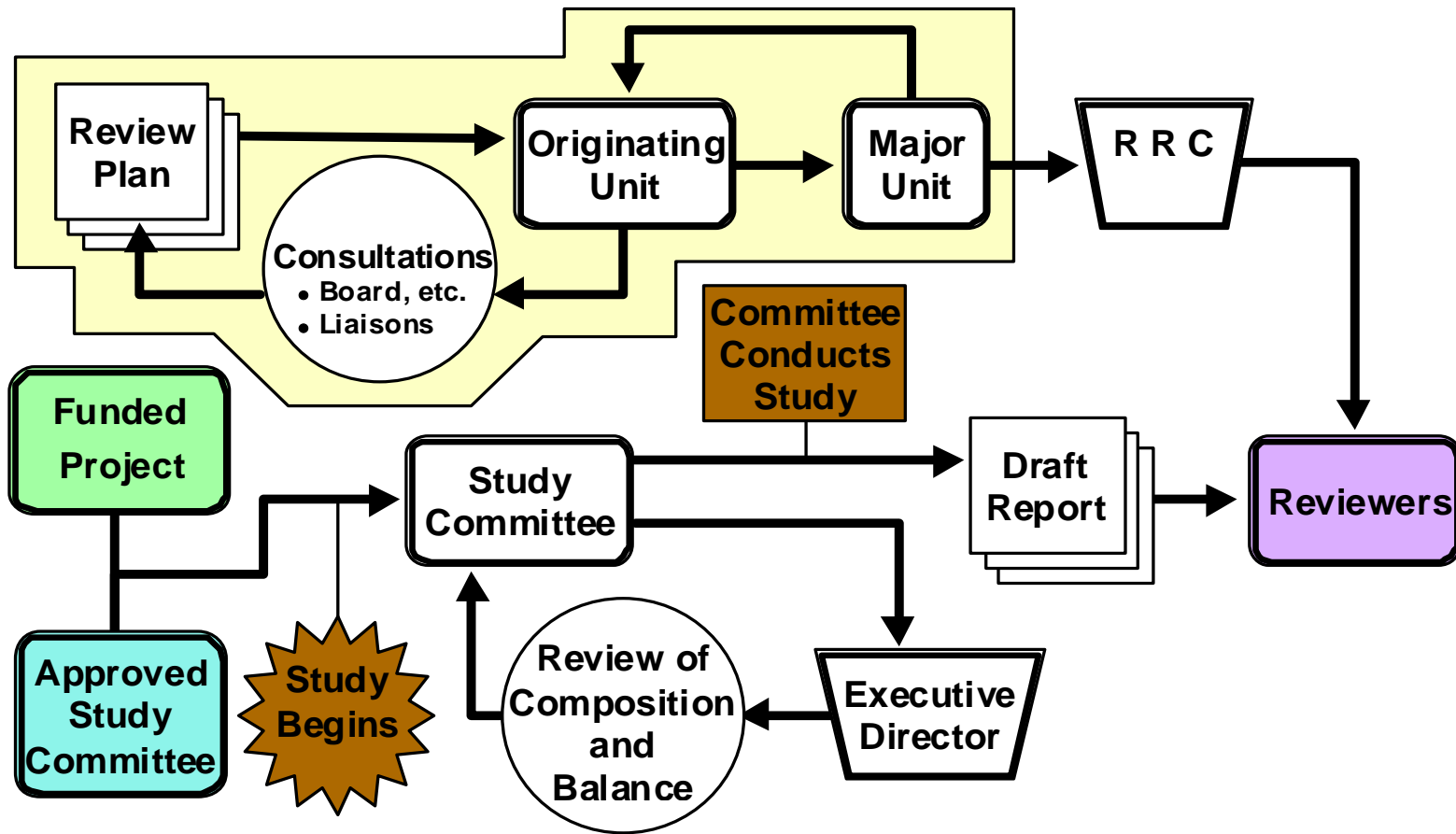
\* PL 105-153: Federal Advisory Committee Act Amendments of 1997  
Compliance Process ends with the publication and release of the NRC/IOM Report



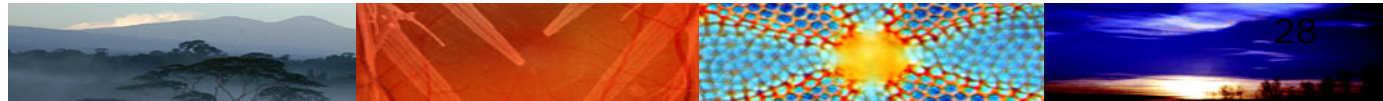


# An NRC/IOM Project: The Process from Beginning to End

## PHASE 4: Funded Project / Approved Committee to Review

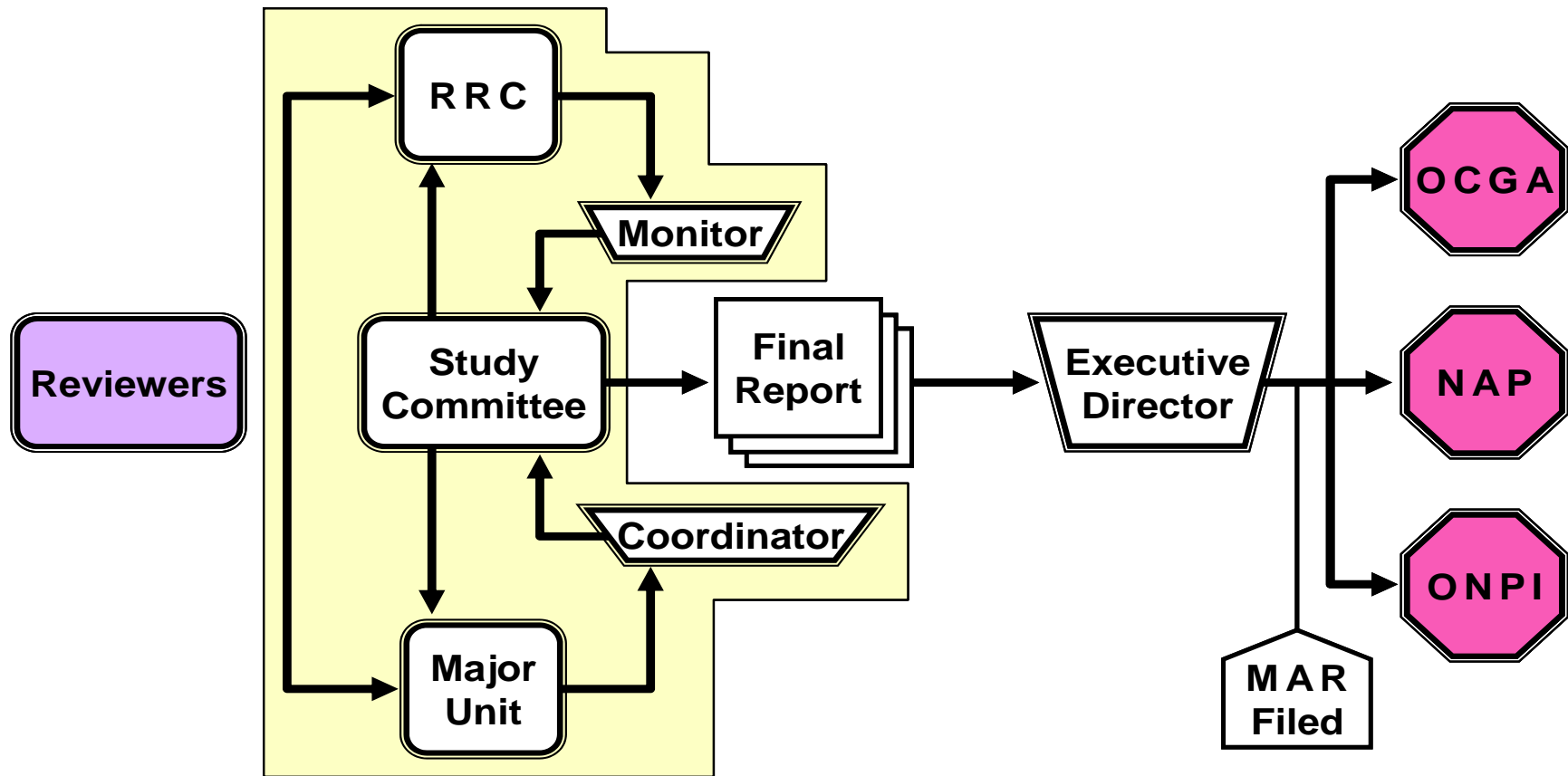


★RRC: Report Review Committee



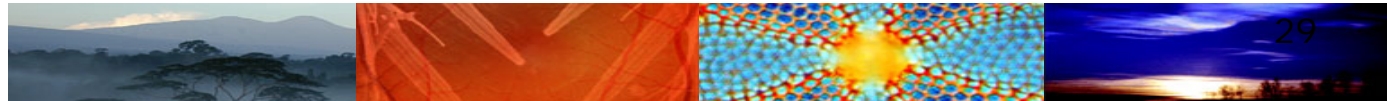
# An NRC/IOM Project: The Process from Beginning to End

## PHASE 5: Review to Dissemination



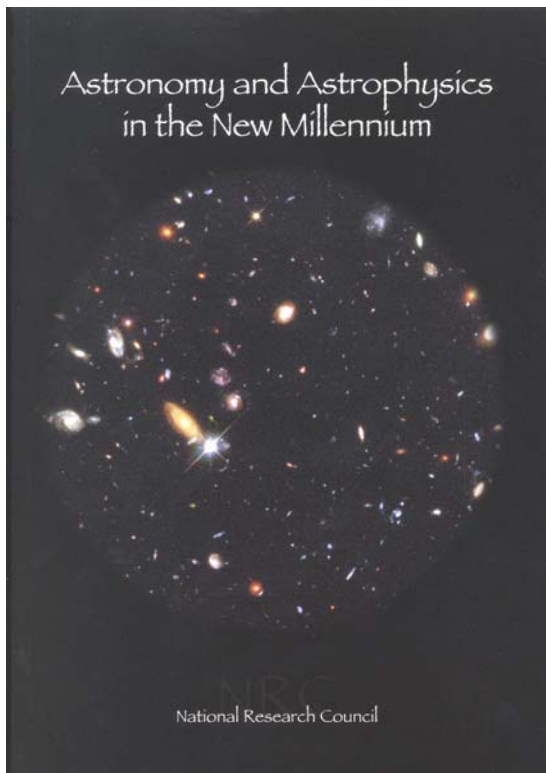
★ MAR: Manuscript Approval Record  
★ NAP: National Academy Press

★ OCGA: Office of Congressional & Government Affairs  
★ ONPI: Office of News & Public Information

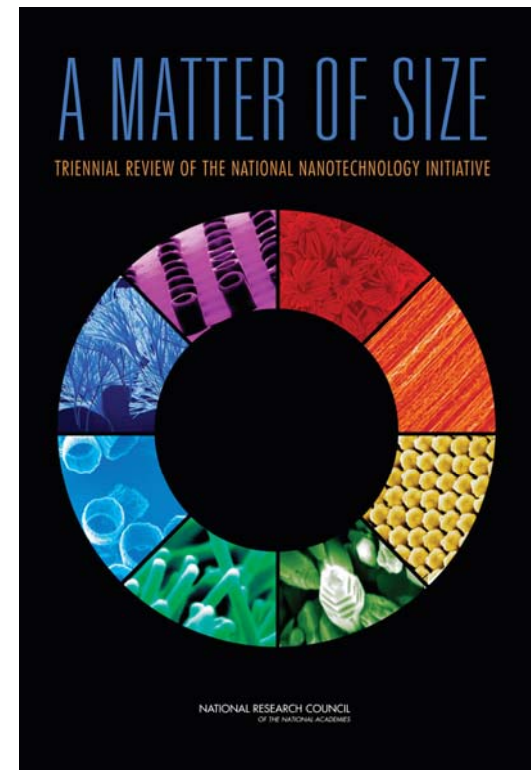


## Two Examples of NRC Studies

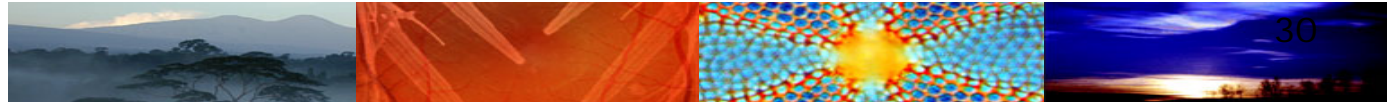
- Decadal Survey in Astronomy and Astrophysics
- Review of the U.S. National Nanotechnology Initiative



Sponsored by NASA and NSF

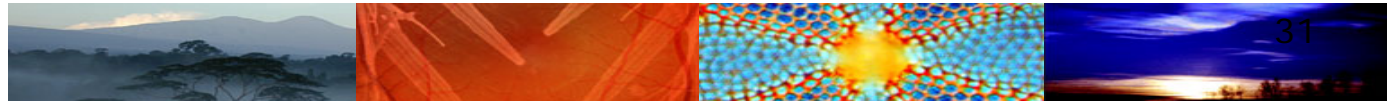


Sponsored by NSF



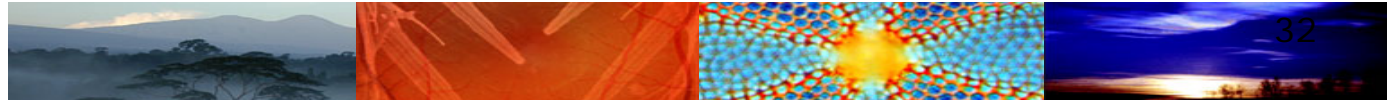
# *Decadal Survey in Astronomy and Astrophysics*

- New Decadal Survey is getting underway: Astro2010.
- Previous survey published in 2001, *Astronomy and Astrophysics in the New Millennium*.  
[http://www.nap.edu/catalog.php?record\\_id=9839](http://www.nap.edu/catalog.php?record_id=9839)
- Bottom-up, community driven study process that assesses science opportunities and recommend priorities for federal investment in astronomy and astrophysics.
- The Astro2010 survey will be completed by a survey committee, supported by a series of panels. The committee's charge is:
  - o to survey the field of space- and ground-based astronomy and astrophysics, recommending priorities for the most important scientific and technical activities of the decade 2010-2020.
  - o to carry out an assessment of activities in astronomy and astrophysics, including both new and previously identified concepts, and to prepare a concise report that will be addressed to the agencies supporting the field, the Congressional committees with jurisdiction over those agencies, and the scientific community.



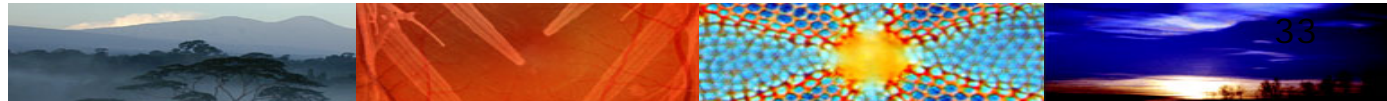
## *Decadal Survey in Astronomy and Astrophysics (contd.)*

- Survey Committee is comprised of leaders in the U.S. Astronomy and Astrophysics community, along with some “outsiders.”
- The 2001 survey was completed with the input of 9 themed panels that advocated for particular priorities to the Survey Committee. The panels were established as separate NRC activities that produced their own reports.
- Panels were:
  - o Panel on Astronomy Education and Policy
  - o Panel on Benefits to the Nation
  - o Panel on Optical and Infrared Astronomy from the Ground
  - o Panel on High-Energy Astrophysics from Space
  - o Panel on Particle, Nuclear, and Gravitational-Wave Astrophysics
  - o Panel on Radio and Submillimeter-Wave Astronomy
  - o Panel on Solar Astronomy
  - o Panel on Theory, Computation, and Data Exploration
  - o Panel on Ultraviolet, Optical, and Infrared Astronomy from Space
- Study process also included numerous “town meetings” at professional society conferences and other venues around the U.S.
- The Survey Committee acted in a quasi-judicial role to come up with the final prioritized list of programs to be pursued.



## *Looking forward to Astro2010*

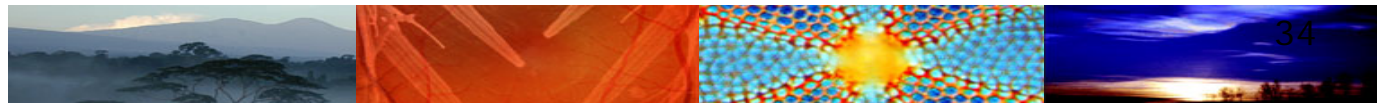
- A similar approach will be used this time with even greater community involvement.
- Expect over 300 members of the U.S. astronomy community will be involved.
- International involvement is also expected.
- Engaged the community in the planning of the study. Town meetings were held on the margins of professional society meetings. The NRC's Board on Physics and Astronomy and Space Studies Board solicited input from a broad community of folks in the astronomy and science policy areas.
- Over 80 nominations were received from over 300 members of the astronomy community for the position of Chair of the Survey Committee. Suggestions have also been solicited for the survey committee and the chair positions.
- The appointment of the Survey Committee is underway and the survey will be underway by the end of the year.
- The report is expected to be released in the summer of 2010.





# Review of the U.S. NNI

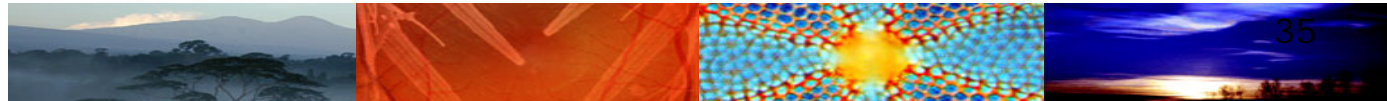
- NNI is a \$1.5bn initiative involving 25 federal agencies and departments.
- In its authorization of the NNI, the U.S. Congress mandated a triennial review to be carried out by the National Research Council.
- The first triennial report was released in 2006 after a 2 year study.  
[http://books.nap.edu/catalog.php?record\\_id=11752](http://books.nap.edu/catalog.php?record_id=11752)
- The charge for this study was complex, in keeping with the complexity of an initiative involving research programs at about a dozen agencies.
- NNI is a coordination mechanism rather than a program, as such its review poses some challenges. What metrics can be used? Is data gathered uniformly across agencies? Are impacts measured?





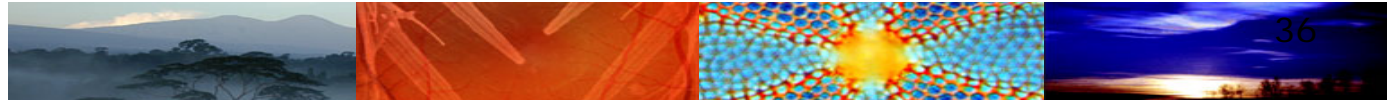
## *Review of the U.S. NNI (contd.)*

- The study was an evaluation of the NNI that also considers the current economic impact of nanotechnology and benchmarks the international standing of U.S. nanoscale research and development (R&D). In addition, the report addressed the responsible development of nanotechnology and comments on the feasibility of molecular self-assembly for manufacturing.
- The breadth of the study required a multidisciplinary committee that included:
  - o Nano-researchers from physics, chemistry, biomedical sciences, materials science, etc.
  - o Economists that understand the impact of research on the economy.
  - o Industry representatives knowledgeable about the commercialization of technology.
  - o Experts in risk assessment and ethics.
  - o Experts in molecular self assembly and manufacturing.
  - o Public Policy experts.
- The study was organized around a series of workshops where segments of the research, government, and industry communities associated with nanotechnology were invited to give presentations to the committee and take part in discussion panels.
- All these workshops were open to the public as required by the legislation covering the operation of the NRC (Federal Advisory Committee Act, Sec.15).



## *Review of the U.S. NNI (contd.)*

- The workshops were:
  - o MOLECULAR SELF-ASSEMBLY FOR MANUFACTURING OF MATERIALS AND DEVICES AT THE MOLECULAR SCALE
  - o RESPONSIBLE DEVELOPMENT OF NANOTECHNOLOGY
  - o TECHNOLOGY TRANSFER AND ECONOMIC IMPACTS
  - o PROGRAM MANAGEMENT AND SCIENTIFIC ACCOMPLISHMENTS
- In addition the committee interviewed leaders of industry, and gathered data on the research been undertaken under NNI programs.
- The committee also gathered data on investments (public and private) in countries and regions outside the U.S. in nanotechnology. Also data were gathered on publications and patents.
- The committee considered all the data in closed committee meetings were the conclusions and recommendations were formulated and a consensus was established among the committee.
- The report was written by committee members with the assistance of NRC staff.
- The review was completed and the report released.



## *Key Take Away Messages*

The success of NRC studies are founded on:

- The reputation of the NAS, NAE, and IOM.
- The independence of the process (conflict of interest and bias process).
- The rigor of the review procedures.
- The corps of volunteers in the research and other communities who give their time to provide advice to the nation.

For more information see

<http://www.nationalacademies.org/studycommitteprocess.pdf>

<http://www.nationalacademies.org/about/history.html>

<http://www.nationalacademies.org/president/>

