INDEPENDENT ADVICE AND SERIOUS SOLUTIONS ONLINE FROM THE NATIONAL ACADEMIES

http://www.nationalacademies.org/

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

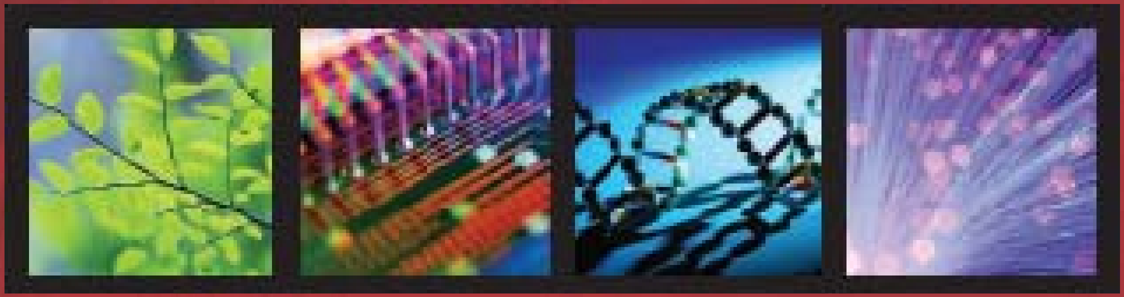
THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

Insight into the Operations of

The National Academies

Erik Svedberg, NMMB Senior Staff Officer



THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

National Academy of Sciences
National Academy of Engineering
Institute of Medicine
National Research Council

NSF Ceramics PI Workshop 07/29/2011

OVERVIEW OF THE NATIONAL ACADEMIES AND THE NATIONAL RESEARCH COUNCIL

THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

Four organizations comprise the Academies:

the National Academy of Sciences,
the National Academy of Engineering,
the Institute of Medicine and
the National Research Council.

Known collectively as the National Academies,

Our organization produces groundbreaking reports that have helped shape sound policies, inform public opinion, and advance the pursuit of science, engineering, and medicine.

THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

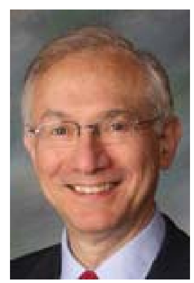
NATIONAL ACADEMY OF SCIENCES

Ralph J. Cicerone is President of the National Academy of Sciences and Chair of the National Research Council.

NATIONAL ACADEMY OF ENGINEERING
OF THE NATIONAL ACADEMIES

Charles M. Vest is President of the NAE

INSTITUTE OF MEDICINE
OF THE NATIONAL ACADEMIES



Harvey V. Fineberg is President of the Institute of Medicine.

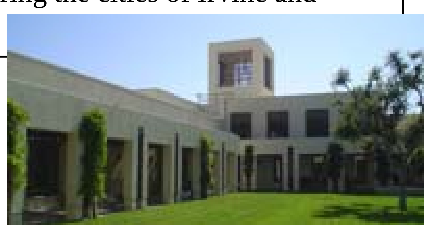
NRC The National Research Council

National Academy of Sciences Building (CLOSED FOR RESTORATION UNTIL 2012)
2100 C St., N.W.
This historic building hosts the NAS, NAE, and IOM Annual Meetings, and various symposia, lectures, and cultural events and art exhibits that are open to the public. Visitors can see the Albert Einstein Memorial and explore the building's interesting art and architectural features during normal business hours.

Keck Center of the National Academies
500 Fifth St., N.W.
Opened in 2002, the Keck Center houses more than 1,000 employees and is a popular site for public meetings. The National Academies Press Bookstore is on the first floor.

Marian Koshland Science Museum of the National Academy of Sciences
Sixth and E streets, N.W.
The Koshland Science Museum engages the general public in an exploration of the current scientific issues that affect their lives. The museum's state-of-the-art exhibits, public events, and educational programs provide information that stimulates discussion and offers insight into how science supports decision-making.

Arnold and Mabel Beckman Center of the National Academies
100 Academy Drive, Irvine
The Arnold and Mabel Beckman Center The award-winning conference center is situated on seven acres bordering the cities of Irvine and Newport Beach.



J. Erik Jonsson Conference Center
314 Quissett Ave., Woods Hole
Located on Cape Cod, the J. Erik Jonsson Conference Center is a historic year-round conference facility that hosts the Distinctive Voices Series @ the Jonsson Center and welcomes a variety of scientific, educational, and corporate meetings. The property boasts magnificent views of Quissett Harbor and Buzzards Bay and can accommodate groups ranging in size from five to 100.

THE NATIONAL ACADEMIES

Dr. Leroy E. Hood: [NAS / NAE / IOM]

Frances Arnold accepts the 2011 Draper Prize, Pim Stemmer accepts the Draper Prize, Leroy Hood accepts the Russ Prize, Ed Crawley accepts the Gordon Prize

THE NATIONAL ACADEMIES

The National Academy of Sciences (NAS) is organized into six broadly defined Classes, further divided into 31 disciplinary Sections. The current organization of Classes and Sections is shown below.

Class I: Physical and Mathematical Sciences

Section 11: Mathematics
Section 12: Astronomy
Section 13: Physics
Section 14: Chemistry
Section 15: Geology
Section 16: Geophysics

Class II: Biological Sciences

Section 21: Biochemistry
Section 22: Cellular and Developmental Biology
Section 23: Physiology and Pharmacology
Section 24: Cellular and Molecular Neuroscience
Section 25: Plant Biology
Section 26: Genetics
Section 27: Evolutionary Biology
Section 28: Systems Neuroscience
Section 29: Biophysics and Computational Biology

Class III: Engineering and Applied Sciences

Section 31: Engineering Sciences
Section 32: Applied Mathematical Sciences
Section 33: Applied Physical Sciences
Section 34: Computer and Information Sciences

Class IV: Biomedical Sciences

Section 41: Medical Genetics, Hematology, and Oncology
Section 42: Medical Physiology and Metabolism
Section 43: Immunology
Section 44: Microbial Biology

Class V: Behavioral and Social Sciences

Section 51: Anthropology
Section 52: Psychology
Section 53: Social and Political Sciences
Section 54: Economic Sciences

Class VI: Applied Biological, Agricultural, and Environmental Sciences

Section 61: Animal, Nutritional, and Applied Microbial Sciences
Section 62: Plant, Soil, and Microbial Sciences
Section 63: Environmental Sciences and Ecology
Section 64: Human Environmental Sciences

The National Academy of Engineering (NAE) is organized in twelve sections representing broad engineering categories; the names and scopes of these sections are below. Members are required to select a primary section affiliation, and may also choose a secondary affiliation.

01 - Aerospace Engineering

02 - Bioengineering

03 - Chemical Engineering

04 - Civil Engineering

05 - Computer Science & Engineering

06 - Electric Power/Energy Systems Engineering

07 - Electronics Engineering

08 - Industrial, Manufacturing & Operational Systems Engineering

09 - Materials Engineering

10 - Mechanical Engineering

11 - Earth Resources Engineering

12 - Special Fields & Interdisciplinary Engineering

THE NATIONAL ACADEMIES

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Section 27: Evolutionary Biology
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Section 52: Psychology
Section 53: Social and Political Sciences
Section 54: Economic Sciences

Class VI: Applied Biological, Agricultural, and Environmental Sciences

Section 61: Animal, Nutritional, and Applied Microbial Sciences
Section 62: Plant, Soil, and Microbial Sciences
Section 63: Environmental Sciences and Ecology
Section 64: Human Environmental Sciences

The National Academy of Engineering (NAE) is organized in twelve sections representing broad engineering categories; the names and scopes of these sections are below. Members are required to select a primary section affiliation, and may also choose a secondary affiliation.

01 - Aerospace Engineering

02 - Bioengineering

03 - Chemical Engineering

04 - Civil Engineering

05 - Computer Science & Engineering

06 - Electric Power/Energy Systems Engineering

07 - Electronics Engineering

08 - Industrial, Manufacturing & Operational Systems Engineering

09 - Materials Engineering

10 - Mechanical Engineering

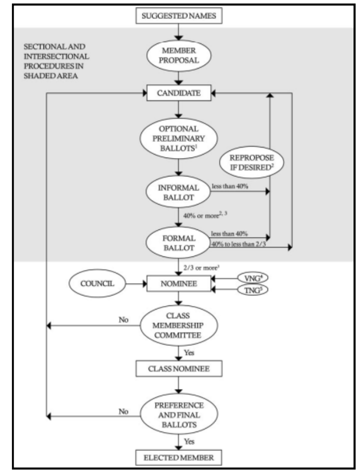
11 - Earth Resources Engineering

12 - Special Fields & Interdisciplinary Engineering

Election to the National Academy of Sciences: Pathways to membership

THE NATIONAL ACADEMIES

Every spring, in late April or early May, the National Academy of Sciences (NAS) elects new members. Membership in the NAS is a widely recognized sign of excellence in scientific research, but most scientists are not familiar with the process by which members are elected.



The election's successive ballots have become more complicated over time, in part reflecting the rapid expansion of scientific fields. The complexity reflects a consensus process designed to ensure that an individual, or small group of individuals, cannot have an undue influence on the election.

www.pnas.orgcgidoi10.1073pnas.0503457102 PNAS **May 24, 2005 vol. 102 no. 21 7405–7406**

Bruce Alberts, *President, National Academy of Sciences*
Kenneth R. Fulton, *Executive Director, National Academy of Sciences, and Publisher, PNAS*

Consideration of a candidate begins with his or her nomination.

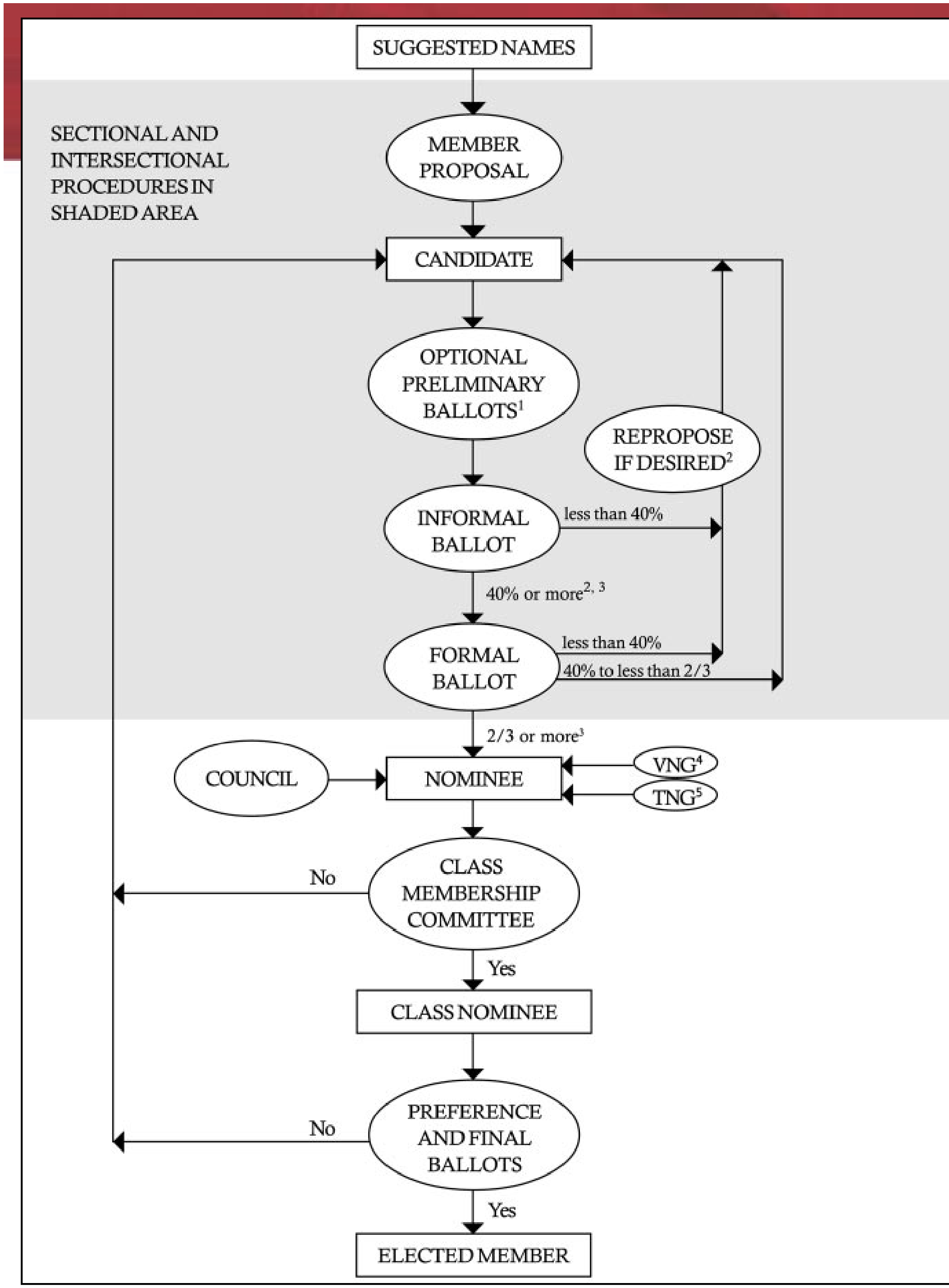
Although many names are suggested informally, a formal nomination can be submitted only by an Academy member.

Each nomination includes a brief curriculum vitae plus a 250-word statement of the nominee's scientific accomplishments— the basis for election—and a list of not more than 12 publications.

The latter limit helps to focus on the quality of a nominee's work, rather than the number of publications.

Once a nomination has been prepared, it is sent to the chair of one of the Academy's 31 discipline based Sections, e.g., chemistry, cellular and developmental biology, or mathematics.

(for a complete list, see www.nas.edu/sections)



THE NATIONAL ACADEMIES

Flow chart of the member nomination and election process.

1, Optional, as specified by Sectional procedures;

2, subject to modification by Sectional procedures;

3, an intersectional candidate must receive at least 25% on each Section’s Informal Ballot to advance to Formal Ballot and at least 50% of total Formal Ballot vote to become a Nominee;

4, Voluntary Nominating Group (VNG);

5, Temporary Nominating Group (TNG), which conducts informal and formal ballots subject to the same rules as Sections.

NAS, NAE, and IOM Membership December 31, 2010

- NAS:
  - 2,136 members (75 emeritus)
  - 400 foreign associates
  - 31 sections in 6 classes
- NAE
  - 2,224 members (227 emeritus)
  - 193 foreign associates
  - 12 sections
- IOM
  - 1,722 members (77 emeritus)
  - 97 foreign associates
  - 12 sections

History of the National Academies

History of the National Academies

The National Academy of Sciences was born in the travail of the Civil War. The Act of Incorporation, signed by President Lincoln on March 3, 1863, established service to the nation as its dominant purpose.

Over the years, the National Academy of Sciences has broadened its services to the government.

In 1916 the Academy established the National Research Council at the request of President Wilson to recruit specialists from the larger scientific and technological communities to participate in that work.

Under the authority of its charter, the National Academy of Sciences established the National Academy of Engineering in 1964 and the Institute of Medicine in 1970.

THE NATIONAL ACADEMIES

THE NATIONAL RESEARCH COUNCIL (NRC)

- Serves as the principal operating arm of the NAS and the National Academy of Engineering (NAE) in providing services to the government, the public, & the scientific & engineering communities

- Administered jointly by the NAS & NAE and the Institute of Medicine (IOM)

Today

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

NRC The National Research Council

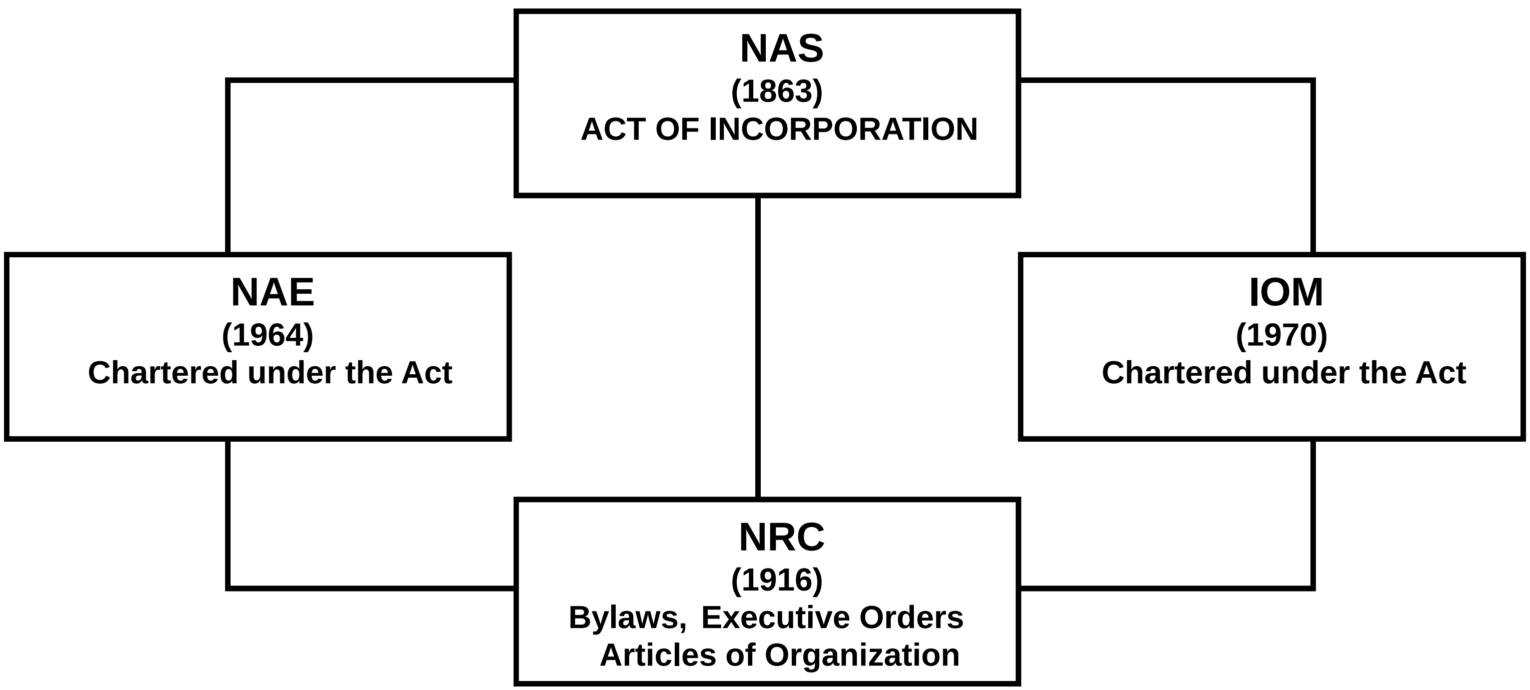
The mission of the NRC is to improve government decision making and public policy, increase public education and understanding, and promote the acquisition and dissemination of knowledge in matters involving science, engineering, technology, and health.

The NRC is committed to providing elected leaders, policy makers, and the public with expert advice based on sound scientific evidence. The NRC does not receive direct federal appropriations for its work. Individual projects are funded by federal agencies, foundations, other governmental and private sources, and the institution's endowment.

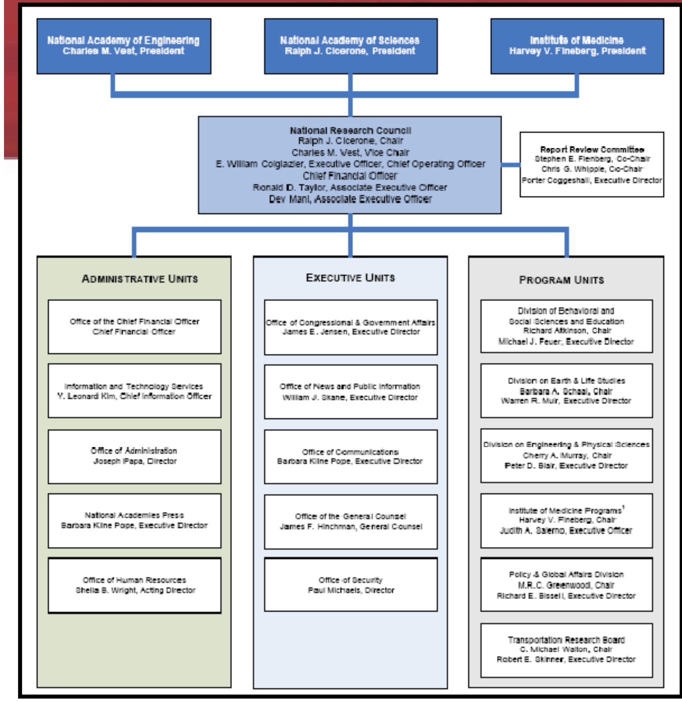
The work is made possible by 6,000 of the world's top scientists, engineers, and other professionals who volunteer their time to serve on committees and participate in activities.

THE NATIONAL ACADEMIES

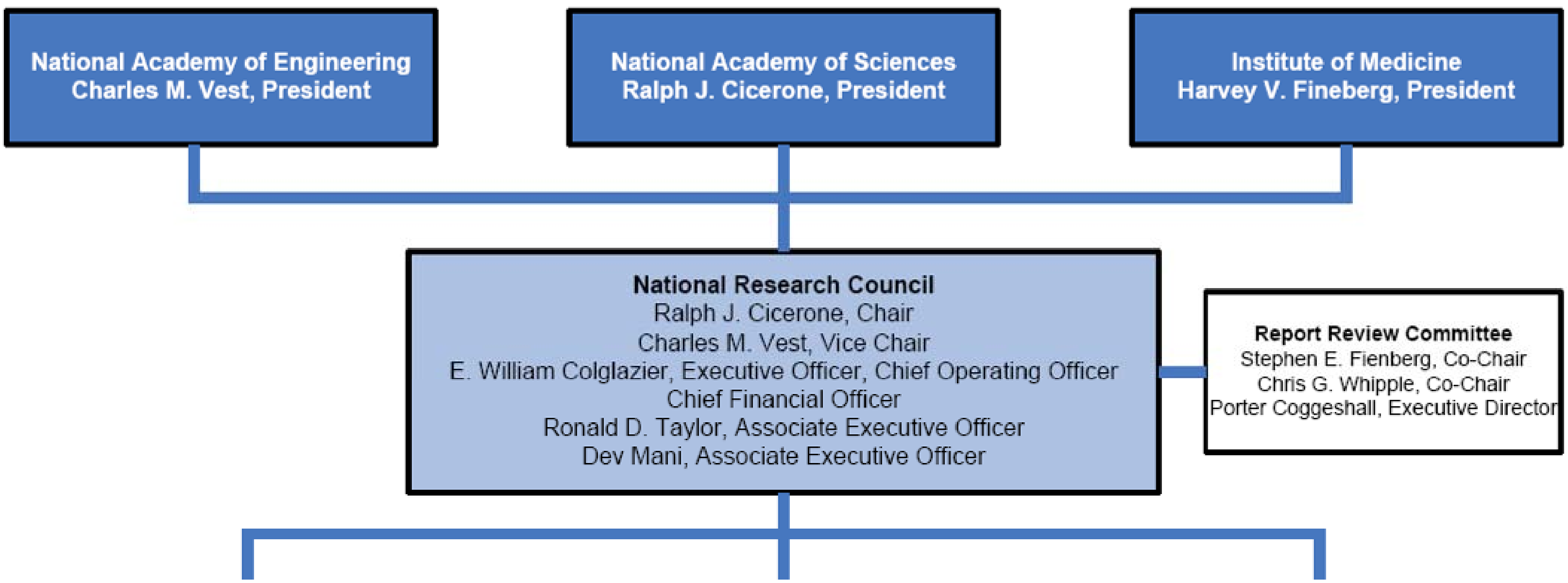
THE NAS, NAE, IOM & NRC



THE NATIONAL ACADEMIES



The NAS, NAE, IOM, and Research Council do not receive direct appropriations from the federal government, although many of our activities are mandated and funded by Congress and federal agencies. Our work extends well beyond fulfilling federal government requests, however. Foundations, state governments, the private sector, and philanthropy from individuals enable us to address critical issues on behalf of the nation.



THE NATIONAL ACADEMIES

Administrative Units

- Office of the Chief Financial Officer
  Chief Financial Officer
- Information and Technology Services
  Y. Leonard Kim, Chief Information Officer
- Office of Administration
  Joseph Papa, Director
- National Academies Press
  Barbara Kline Pope, Executive Director
- Office of Human Resources
  Shelia B. Wright, Acting Director

Executive Units

- Office of Congressional & Government Affairs
  James E. Jensen, Executive Director
- Office of News and Public Information
  William J. Skane, Executive Director
- Office of Communications
  Barbara Kline Pope, Executive Director
- Office of the General Counsel
  James F. Hinchman, General Counsel
- Office of Security
  Paul Michaels, Director

Program Units

- Division of Behavioral and Social Sciences and Education
  Richard Atkinson, Chair
  Michael J. Feuer, Executive Director
- Division on Earth & Life Studies
  Barbara A. Schaal, Chair
  Warren R. Muir, Executive Director
- Division on Engineering & Physical Sciences
  Cherry A. Murray, Chair
  Peter D. Blair, Executive Director
- Institute of Medicine Programs[1]
  Harvey V. Fineberg, Chair
  Judith A. Salerno, Executive Officer
- Policy & Global Affairs Division
  M.R.C. Greenwood, Chair
  Richard E. Bissell, Executive Director
- Transportation Research Board
  C. Michael Walton, Chair
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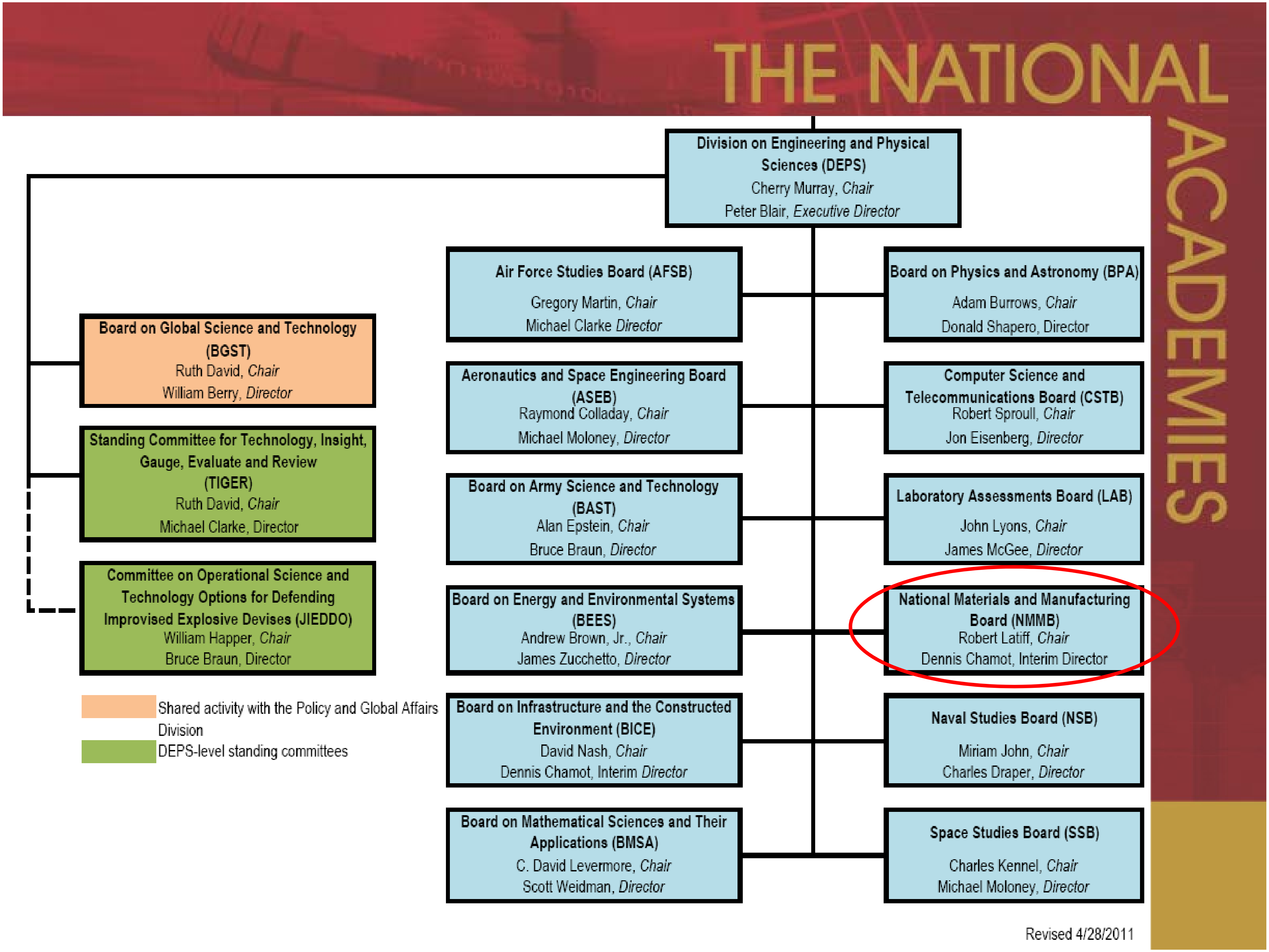
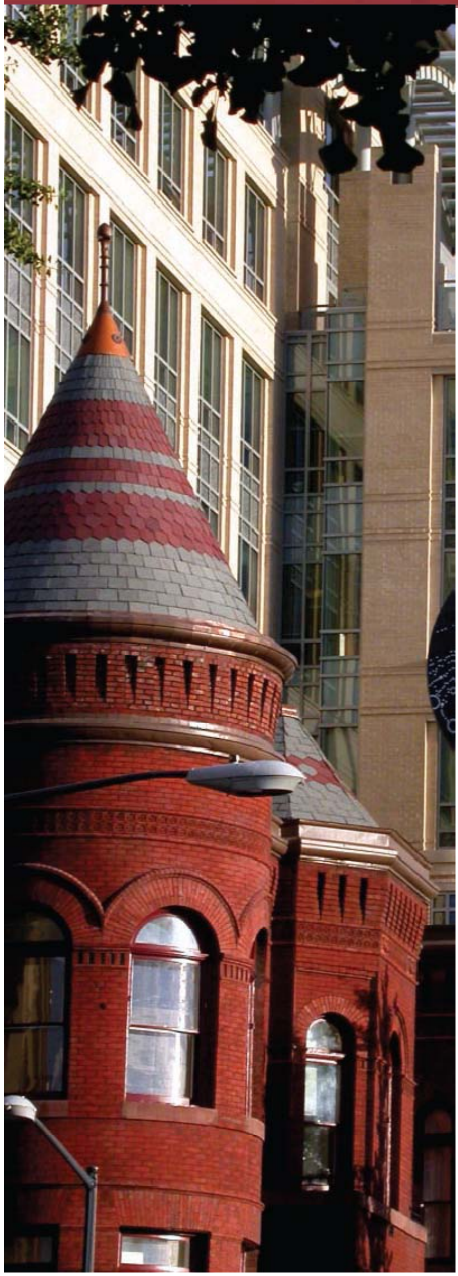

THE NATIONAL ACADEMIES
Division on Engineering and Physical Sciences (DEPS)
Cherry Murray, Chair
Peter Blair, Executive Director
Board on Global Science and Technology (BGST)
Ruth David, Chair
William Berry, Director
Standing Committee for Technology, Insight, Gauge, Evaluate and Review (TIGER)
Ruth David, Chair
Michael Clarke, Director
Committee on Operational Science and Technology Options for Defending Improvised Explosive Devises (JIEDDO)
William Happer, Chair
Bruce Braun, Director
Shared activity with the Policy and Global Affairs Division
DEPS-level standing committees
Air Force Studies Board (AFSB)
Gregory Martin, Chair
Michael Clarke Director
Aeronautics and Space Engineering Board (ASEB)
Raymond Colladay, Chair
Michael Moloney, Director
Board on Army Science and Technology (BAST)
Alan Epstein, Chair
Bruce Braun, Director
Board on Energy and Environmental Systems (BEES)
Andrew Brown, Jr., Chair
James Zucchetto, Director
Board on Infrastructure and the Constructed Environment (BICE)
David Nash, Chair
Dennis Chamot, Interim Director
Board on Mathematical Sciences and Their Applications (BMSA)
C. David Levermore, Chair
Scott Weidman, Director
Board on Physics and Astronomy (BPA)
Adam Burrows, Chair
Donald Shapero, Director
Computer Science and Telecommunications Board (CSTB)
Robert Sproull, Chair
Jon Eisenberg, Director
Laboratory Assessments Board (LAB)
John Lyons, Chair
James McGee, Director
National Materials and Manufacturing Board (NMMB)
Robert Latiff, Chair
Dennis Chamot, Interim Director
Naval Studies Board (NSB)
Miriam John, Chair
Charles Draper, Director
Space Studies Board (SSB)
Charles Kennel, Chair
Michael Moloney, Director
Revised 4/28/2011

THE NATIONAL ACADEMIES

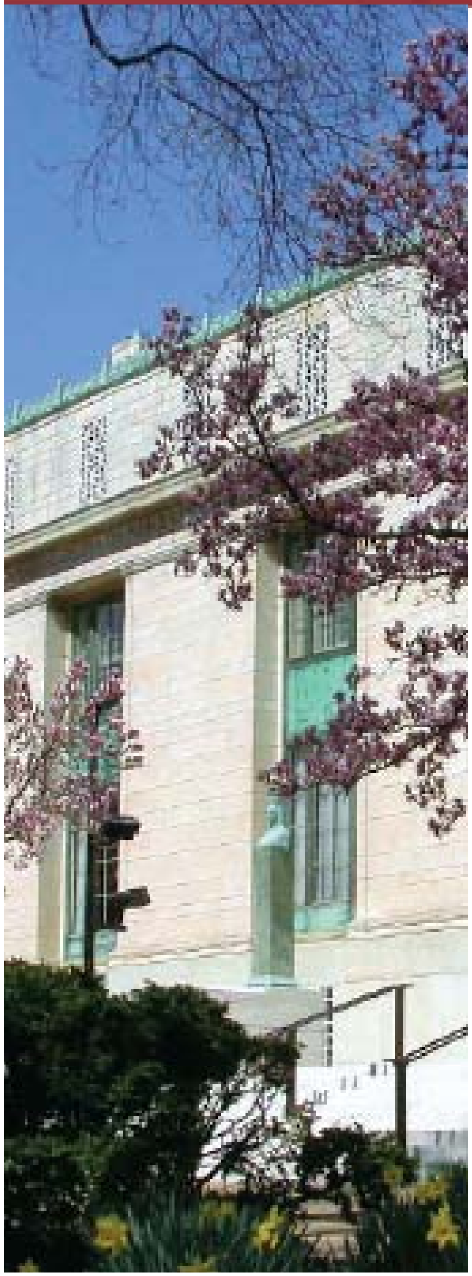


METHODS OF OPERATION

- CONSENSUS STUDIES
  - Balance and Composition of Committees
  - Report Review
- CONVENING ACTIVITIES
  - Workshops
  - Roundtables
- OPERATIONAL PROGRAMS
  - Fellowships and Associateships
  - Research/Surveys
  - Education and Training
  - Data Banks

UNIQUE STRENGTHS

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



SPECIAL CHARACTERISTICS

- Functions of NRC described in Executive Order 2859, as amended
- Noncompetitive contracting with government
- A private organization, not subject to the Freedom of Information Act but subject to Section 15 of the Federal Advisory Committee Act

Executive Order 2859

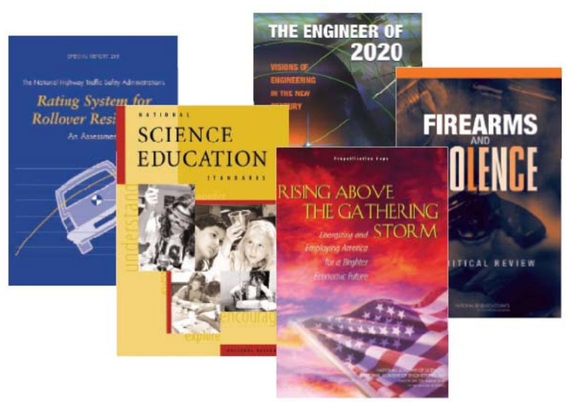
- **Amendment of Executive Order No. 2859 of May 11, 1918, Relating to the National Research Council (Executive Order No. 10668 of May 10, 1956)**
- "1. The functions of the Council shall be as follows:
- "(a) In general, to **stimulate research** in the mathematical, physical, and biological sciences, and in the application of these sciences to engineering, agriculture, medicine, and other useful arts, with the object of increasing knowledge, of strengthening the national defense, and of contributing in other ways to the public welfare.
- "(b) To **survey the broad possibilities of science**, to formulate comprehensive projects of research, and to develop effective means of utilizing the scientific and technical resources of the country for dealing with such projects.
- "(c) To **promote cooperation in research, at home and abroad**, in order to secure concentration of effort, minimize duplication, and stimulate progress; but in all cooperative undertakings to give encouragement to individual initiative, as fundamentally important to the advancement of science.
- "(d) To serve as a means of **bringing American and foreign investigators into active cooperation with the scientific and technical services of the Department of Defense and of the civil branches of the Government**.
- "(e) To direct the attention of scientific and technical investigators to the importance of military and industrial problems in connection with national defense, and to aid in the solution of these problems by organizing specific researches.
- "(f) To gather and collate scientific and technical information, at home and abroad, in cooperation with governmental and other agencies, and to render such information available to duly accredited persons.

http://www7.nationalacademies.org/ocga/other/Amendment_to_executive_order_2859.asp

FACA

Academies are exempt from all but Sec. 15; for most committees:

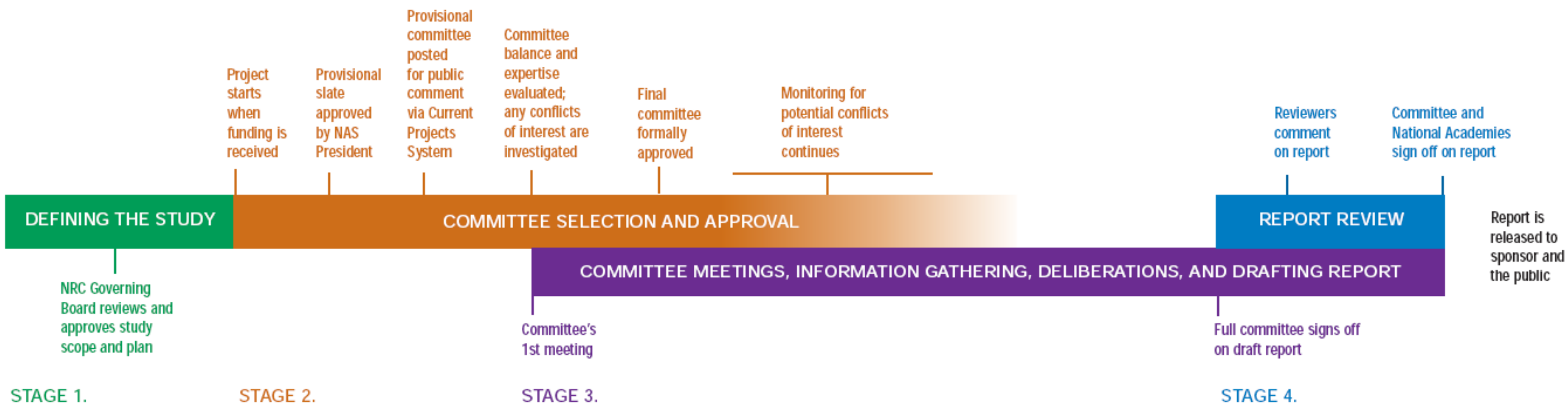
- appointments, meeting notices will be posted on the Web
- principal report reviewers will be identified after the report is completed
- written materials provided by outsiders will be publicly available (except classified or proprietary material)



STEPS TAKEN TO ENSURE INDEPENDENCE AND OBJECTIVITY

The reports of the National Academies are viewed as being valuable and credible because of the institution’s reputation for providing independent, objective, and non-partisan advice with high standards of scientific and technical quality. Checks and balances are applied at every step in the study process to protect the integrity of the reports and to maintain public confidence in them. The study process can be broken down into four major stages:

1) defining the study,
2) committee selection and approval,
3) committee meetings, information gathering, deliberations, and drafting of the report, and
4) report review.



THE NATIONAL ACADEMIES

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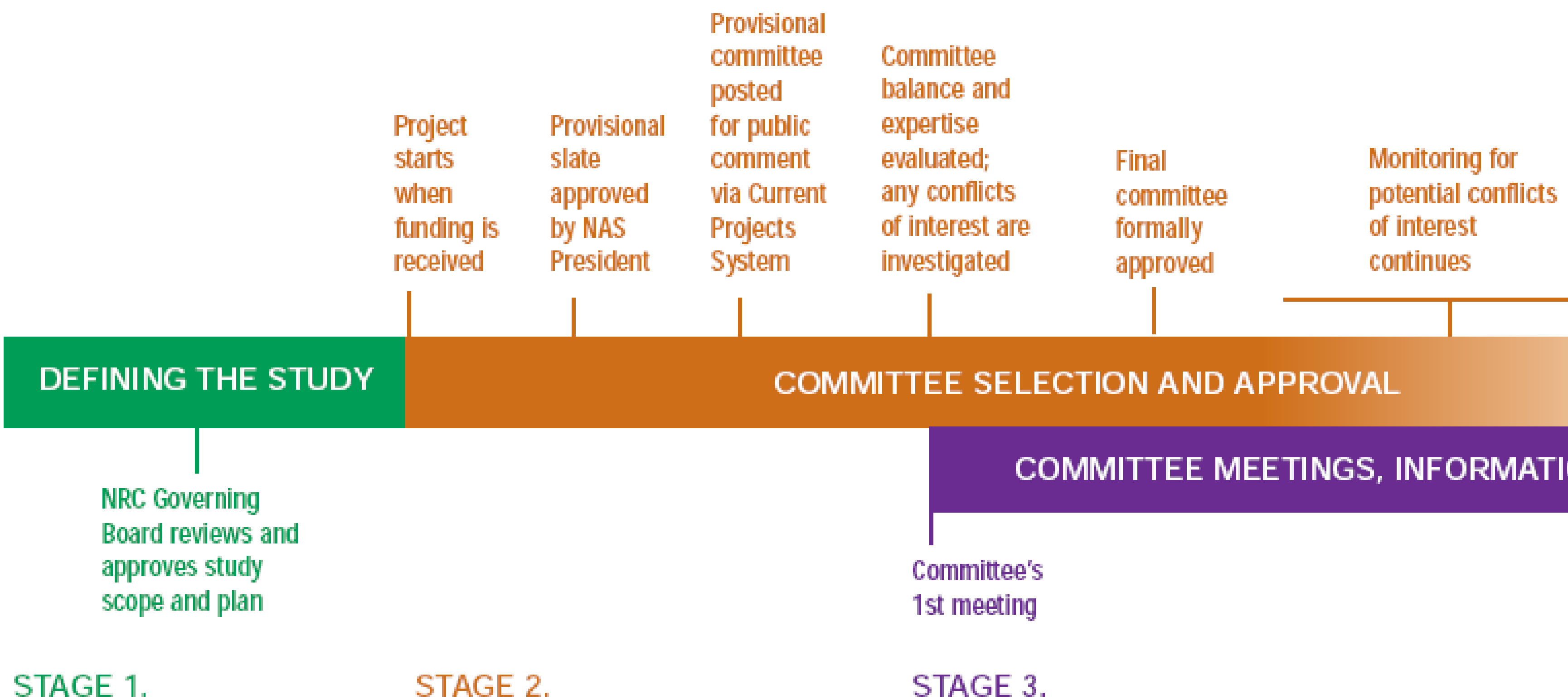

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Conflict of Interest

POINT OF VIEW IS DIFFERENT FROM CONFLICT OF INTEREST

A point of view or bias is not necessarily a conflict of interest. Committee members are expected to have points of view, and the National Academies attempt to balance these points of view in a way deemed appropriate for the task. Committee members are asked to consider respectfully the viewpoints of other members, to reflect their own views rather than be a representative of any organization, and to base their scientific findings and conclusions on the evidence. Each committee member has the right to issue a dissenting opinion to the report if he or she disagrees with the consensus of the other members.

THE NATIONAL ACADEMIES

THE NATIONAL ACADEMIES PRESS

- Publish ~ 185 new reports every year
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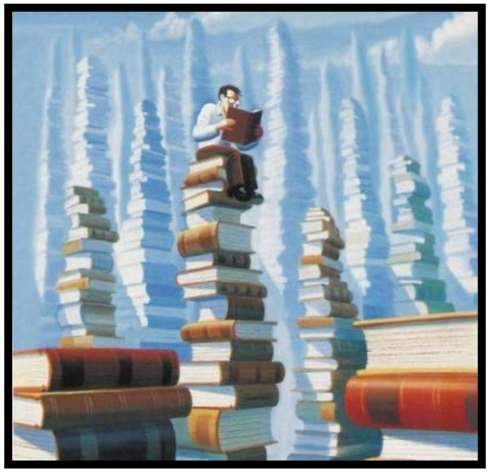
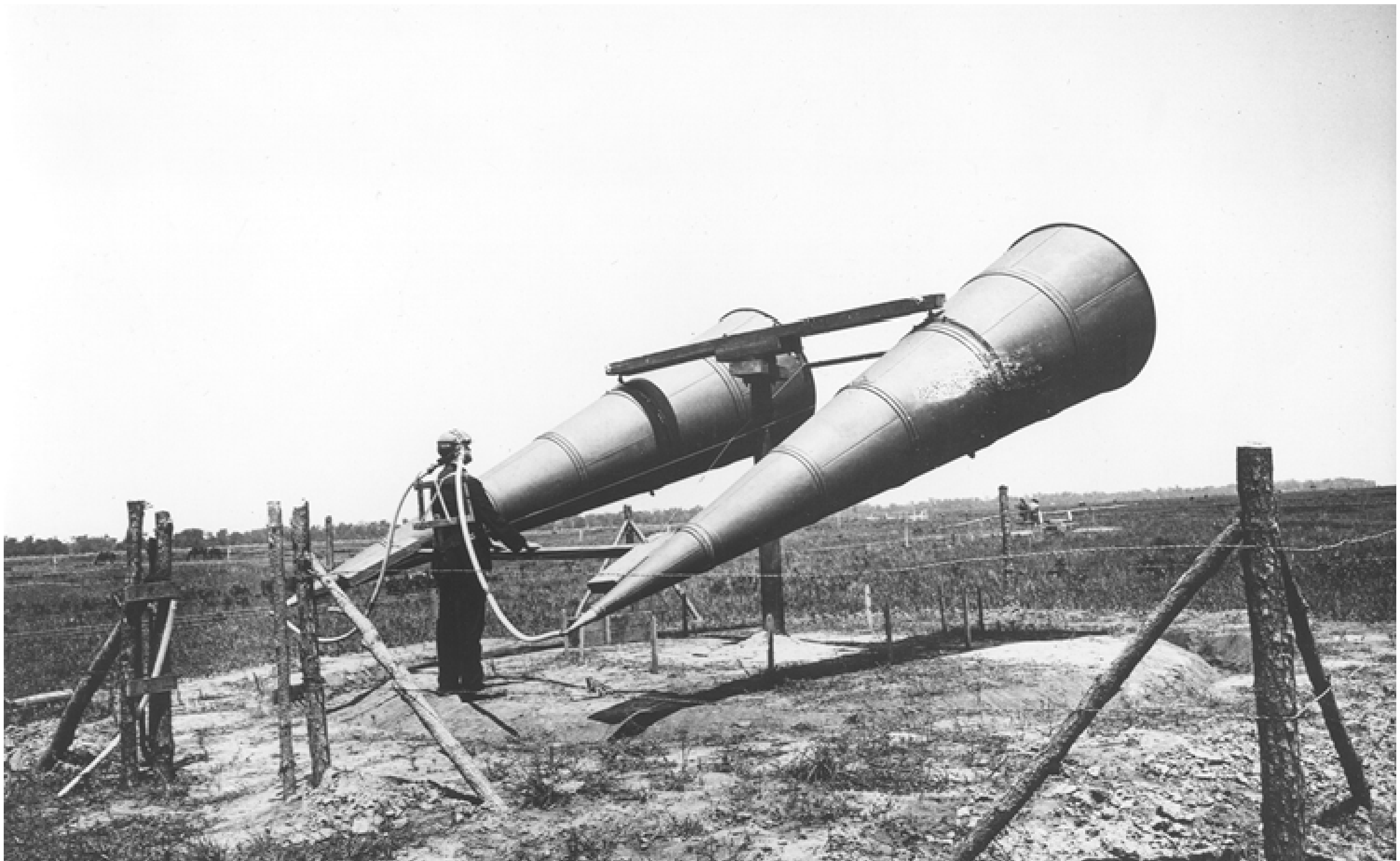




Listening horns, 18′ in length, used in World War I to locate invisible aircraft.

With some favouring a route across Nicaragua and others advocating the purchase of the French interests in Panama. Eventually, in June 1902, the U.S. Senate voted in favor of pursuing the Panamanian option.

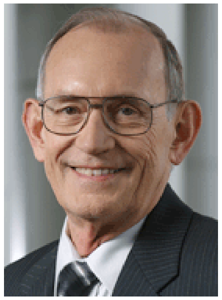
THE NATIONAL ACADEMIES

NATIONAL MATERIALS AND MANUFACTURING BOARD

Vision

The mission and vision of the board is to provide objective, independent assessments of the current state of materials and manufacturing research- including at the atomic, molecular, and nano scales - and the applications of new and existing materials in innovative ways, including pilot-scale and large-scale manufacturing, the design of new devices, and disposal.

Chair Maj. Gen.
Robert H. Latiff



Paul Peercy [NAE]
U. Wisconsin-Madison

Valerie Browning
Consultant

George (Rusty)
Gray, II LANL

Vincent Russo
Aerospace Tech. Assoc.

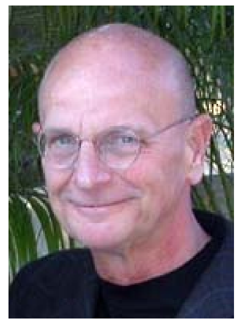
Robert Pfahl, Jr.
InEMI

Nabil Nasr
Rochester Inst. of Tech.

Vice-Chair
Denise Swink
Consultant

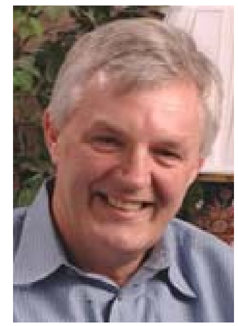
Robert E. Schafrik
GE

Paul Citron
Medtronic (ret.) [NAE]



Peter Bridenbaugh
Alcoa (ret.) [NAE]

Carol Handwerker
Purdue U.

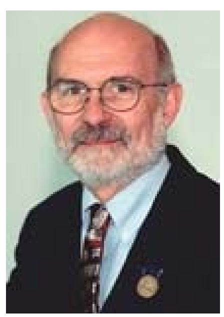


Haydn Wadley
UVA

Thomas Hartwick
Consultant

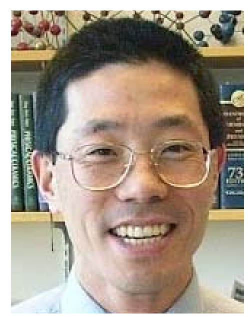
Michael McGrath
ANSER

Kenneth Sandhage
GIT



David Johnson, Jr.
Stevens Inst. Tech. [NAE]

Tomas King
ORNL



Yet-Ming Chiang
MIT [NAE]

Steven Wax
Consultant

Sundaresan Jayaraman
Georgia Inst. of Tech.

Holds Topical Workshops (as well as similar meetings which may be called research briefings, symposia, conferences, or forums) to increase visibility and awareness for materials science issues. These may be organized in as little as a month, may or may not include a proceedings or a summary report, or may use an appointed committee and produce a consensus report with NRC recommendations.

Performs Narrow-Focus Studies to answer a specific technical or policy question, or to provide a fast response to a pressing issue. This activity includes appointing a knowledgeable committee as well as some degree of research and other fact-finding to support the committee's findings. Full activity reporting is required, as well as a full-consensus report review. The standard timeframe for such a study is 6-12 months.

Performs In-Depth Studies to thoroughly address an overarching, multifaceted question with diligence and rigor. This activity includes appointing a distinguished committee as well as comprehensive research and analysis. Full activity reporting is required, as well as a full-consensus report review. The products of such an activity may also include interim reports, letter reports, and one or more 'open' meetings, similar to workshops. The standard timeframe for such a study is 12-18 months.

Facilitates Topical Roundtables to bring together policy makers, technical experts, and practitioners for discussion. The Roundtable may set any schedule for meetings or workshops, and produces no reports or recommendations. No activity reporting is required. Committee members are appointed by standard Academies procedure, except for government members who are appointed by virtue of their position title rather than their personal resume.

Assesses Technical Programs to provide advisory guidance to federal initiatives and organizations. This may be a one-time or on-going activity. Full activity reporting is required, as well as a full-consensus report review.

Empanels Standing Committees to maintain awareness of issues of continuing importance. Standing committees may issue letter reports or sponsor other NRC activities listed above. Committee members are appointed, and full activity reporting is required for all committee activities.

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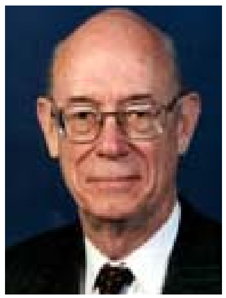
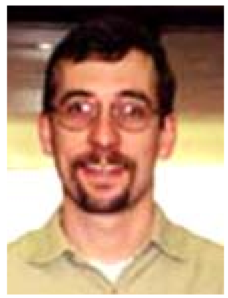


Michael, S. Hudson



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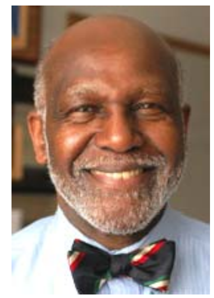

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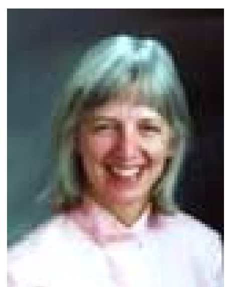
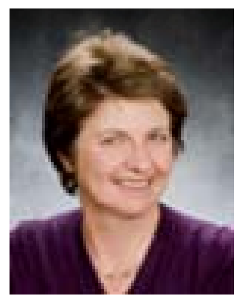


Judith Schneider



Sylvia M. Johnson

William L. Johnson

Daniel G. Backman

Statement of Task

The committee will:

•Examine whether current and planned U.S. R&D efforts in materials for aerospace propulsion are sufficient

- •(a) to meet U.S. military needs and
- •(b) to keep the U.S. on the leading edge of propulsion technology.

•Consider mechanisms for the timely insertion of materials in propulsion systems and, if necessary, how these mechanisms might be improved.

•Consider mechanisms in place that retain intellectual property (IP) securely and how IP might be secured in future R&D programs.

•Describe the general elements of an R&D strategy to develop materials for future military aerospace propulsion systems.

Major Finding of Study

The study finds that this lack of support for new materials development has impacted the university environment; structural materials education and research at U.S. universities have declined, and this decline in turn will threaten the viability of the domestic structural materials engineering workforce.

In order to maintain or regain the U.S. competitive advantage in the areas of propulsion materials and keep the United States on the leading edge of propulsion technology, there is a need to increase activities in new material development and competitive 6.2 component and 6.3 demonstrator programs related to material development and to pursue collaborative research activities within this very competitive global environment.

10 Elements of a Successful Research Effort in Propulsion Materials

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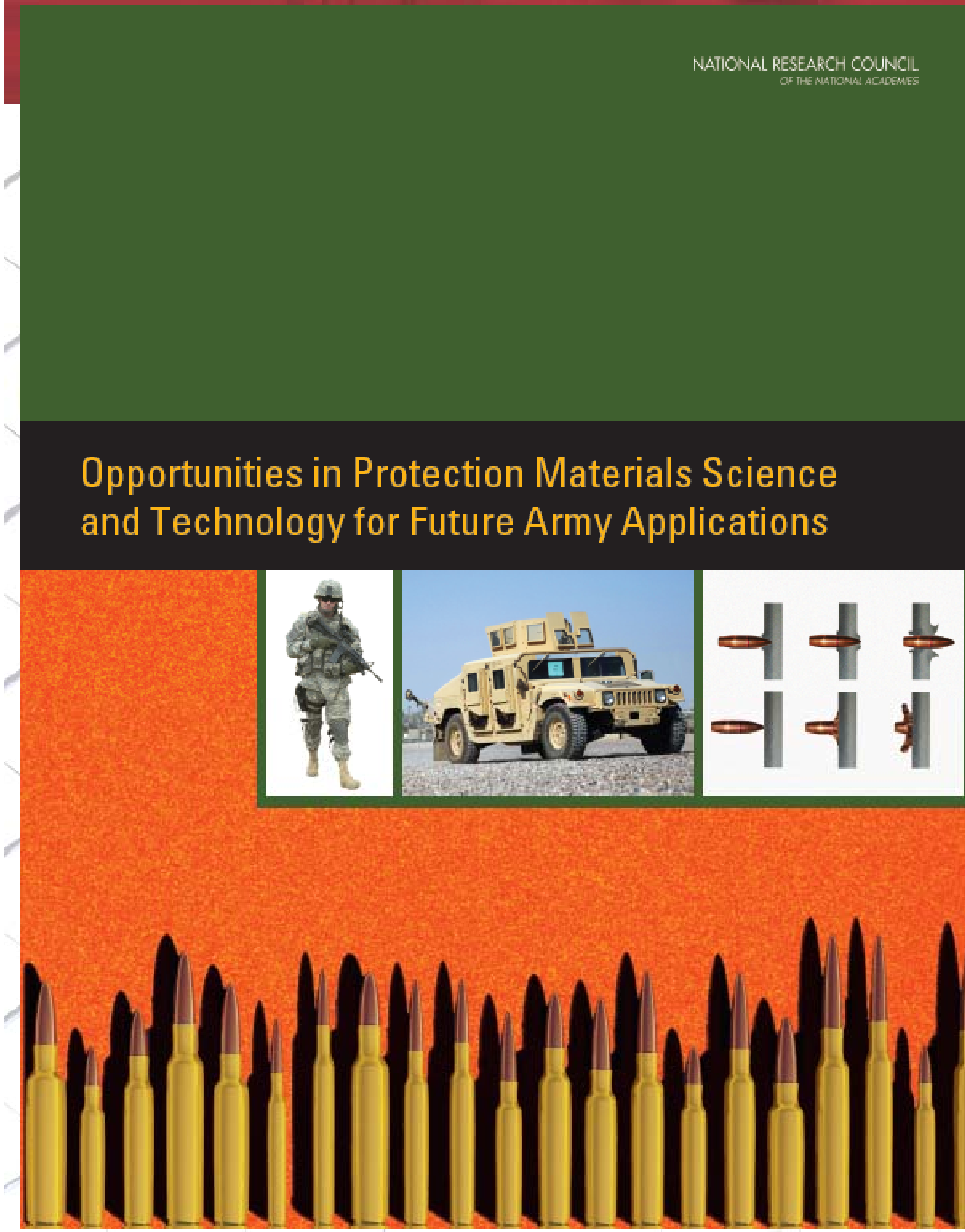
The following 10 elements are listed in an approximate order of importance; clearly, the importance of different elements can change with specific circumstances.

1. Annual reviews of the Air Force propulsion materials requirements, objectives, and execution plans to adjust for budget changes and the external environment.
2. Better integration of AFOSR programs into Air Force propulsion materials plans and more involvement of academia and industry in the development of the plans.
3. The development of a stable, long-term materials development program that covers basic research through manufacturing and has provision for materials insertion into test engines.
4. The development of a sufficiently robust, but most importantly, of a stable funding stream.
5. The continued development of Integrated Computational Materials Engineering (ICME) approaches that promise to shorten the materials development time.

10 Elements of a Successful Research Effort in Propulsion Materials

6. The implementation of a systems engineering approach to propulsion materials development that includes a risk management plan aimed at inserting materials considerations early in any engine development program.
7. The use of existing engines and demonstrators to expedite materials insertion and technology maturation.
8. The inclusion of academia in transition research and development (R&D) both to take advantage of talent and facilities that exist at selected universities around the country and to ensure the development of the required workforce.
9. The increased use of government-industry-academia partnerships to conduct pre-competitive R&D.
10. The integration of foreign technology development and research with U.S. efforts. Opportunities for collaborative fundamental research should be pursued.



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With Academy Press

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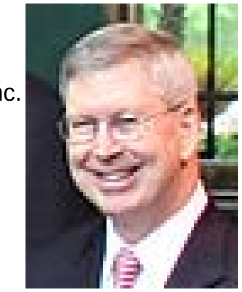
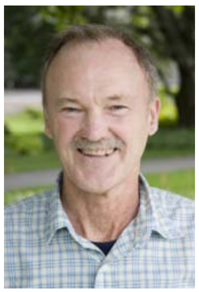


Opportunities in Protection Materials Science and Technology for Future Army Applications



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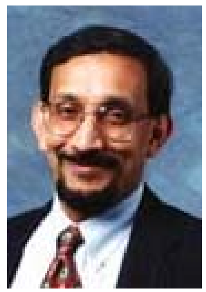

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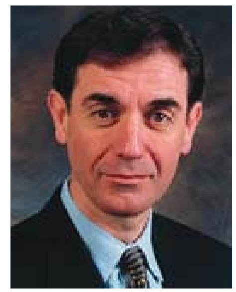

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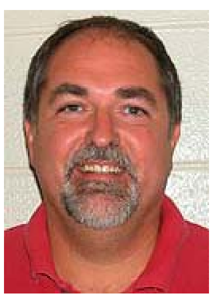

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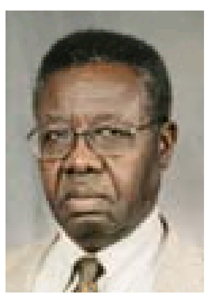

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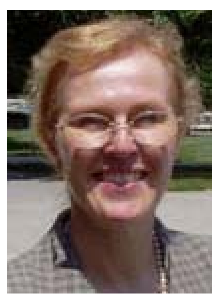

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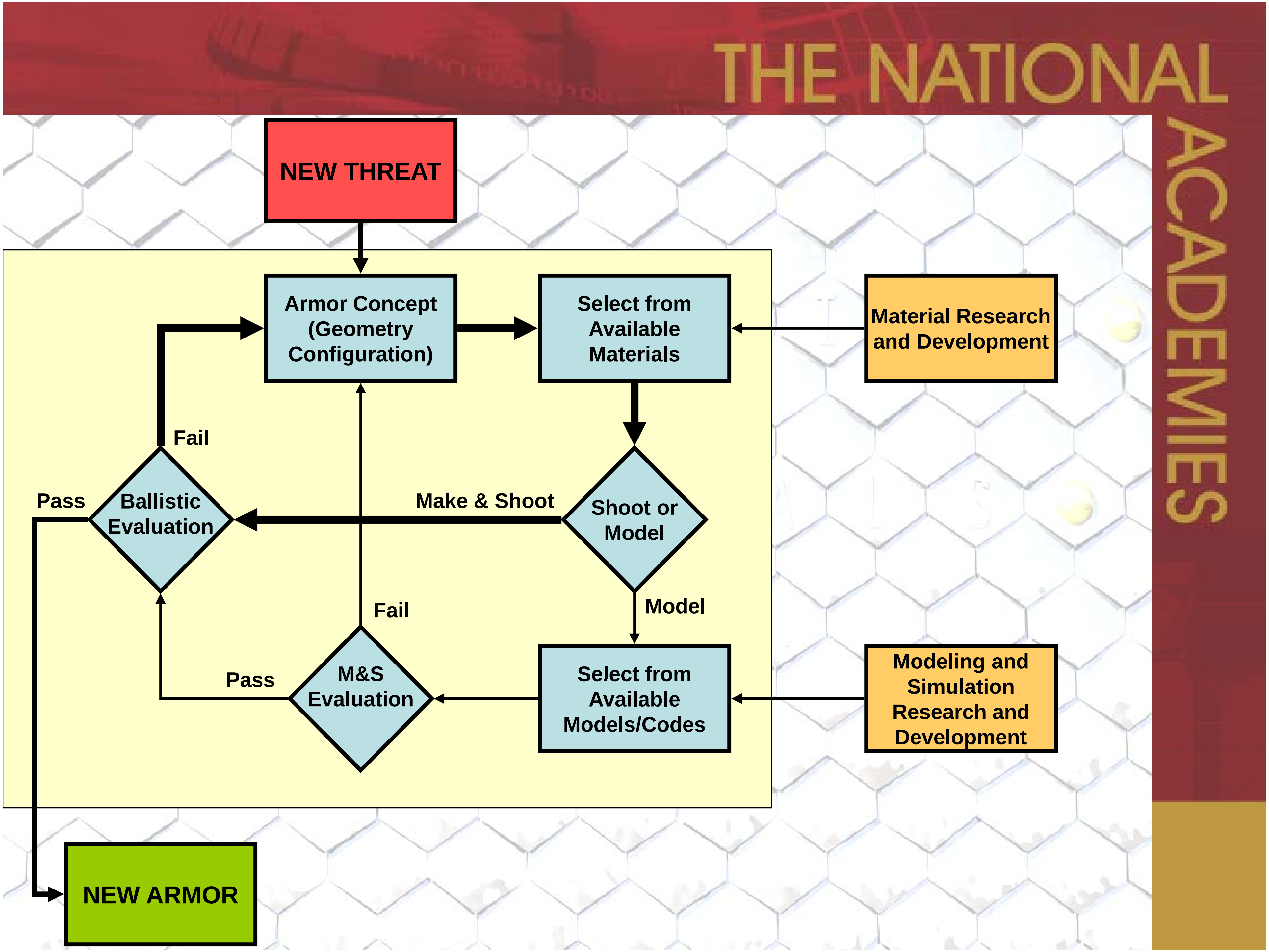
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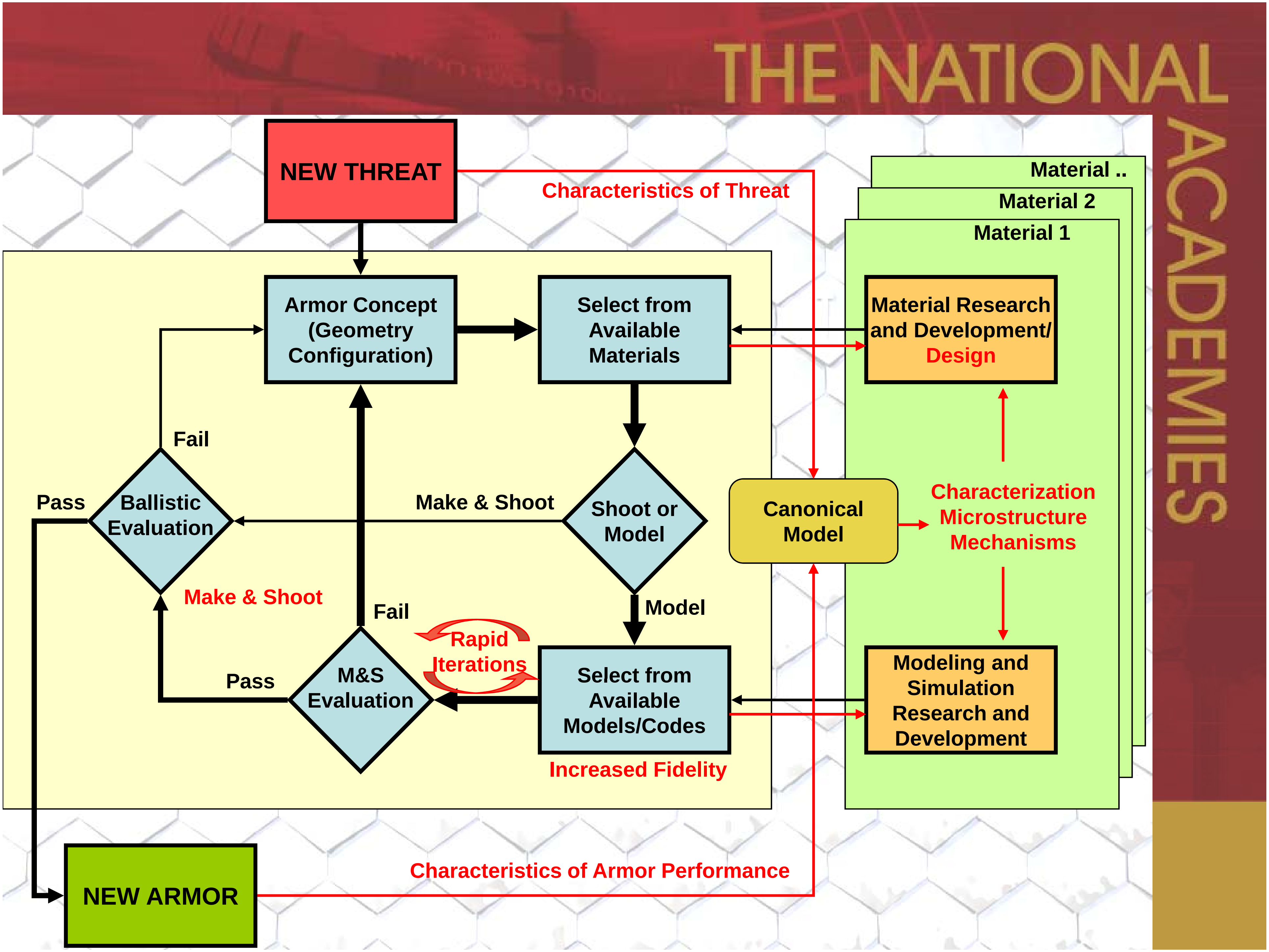
NEW THREAT
Armor Concept (Geometry Configuration)
Select from Available Materials
Material Research and Development
Fail
Pass
Ballistic Evaluation
Make & Shoot
Shoot or Model
Model
Fail
Pass
M&S Evaluation
Select from Available Models/Codes
Modeling and Simulation Research and Development
NEW ARMOR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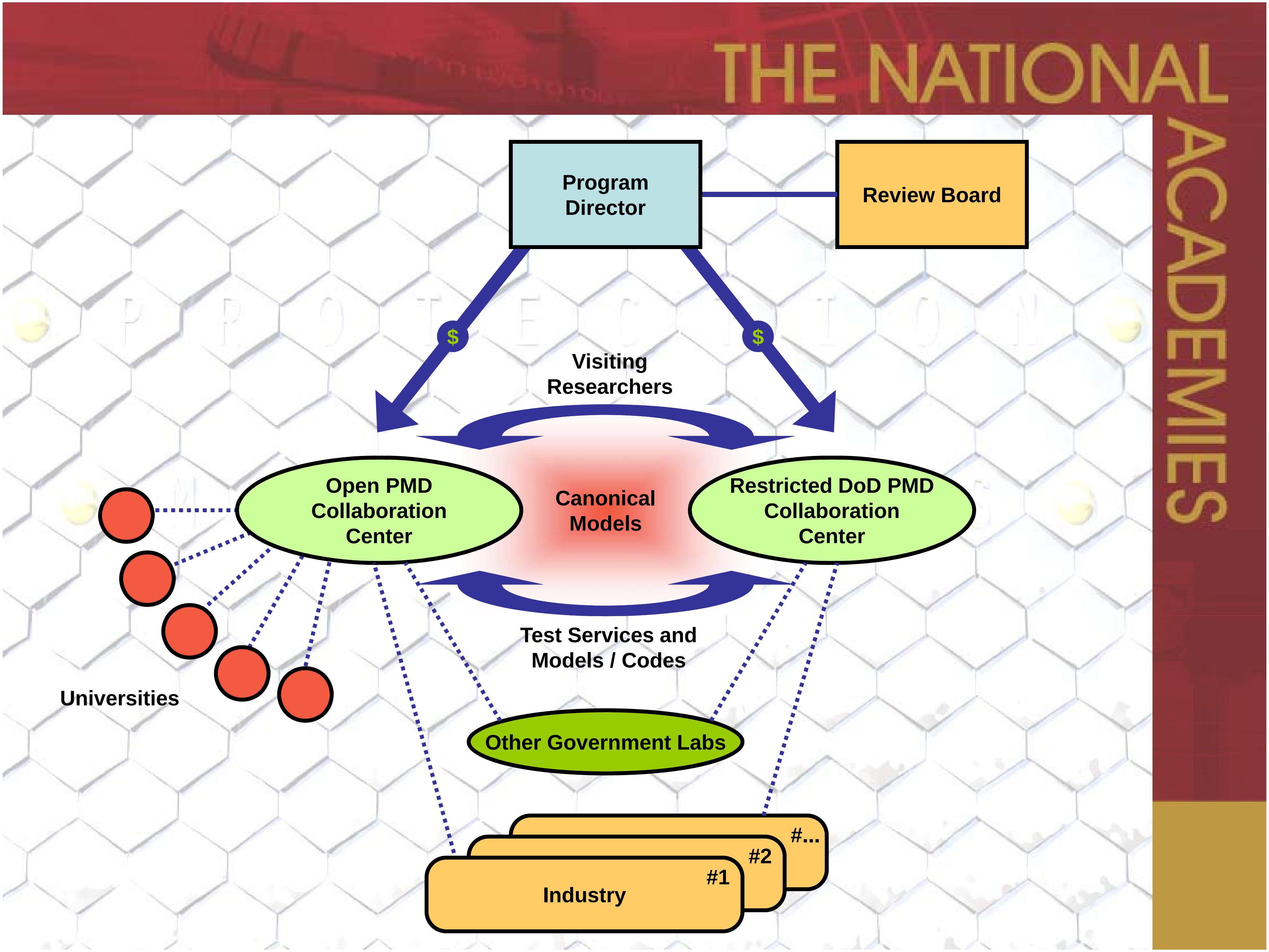
NEW THREAT
Characteristics of Threat
Material ..
Material 2
Material 1
Armor Concept (Geometry Configuration)
Select from Available Materials
Material Research and Development/ Design
Fail
Pass
Ballistic Evaluation
Make & Shoot
Shoot or Model
Canonical Model
Characterization Microstructure Mechanisms
Make & Shoot
Fail
Model
Rapid Iterations
Pass
M&S Evaluation
Select from Available Models/Codes
Modeling and Simulation Research and Development
Increased Fidelity
NEW ARMOR
Characteristics of Armor Performance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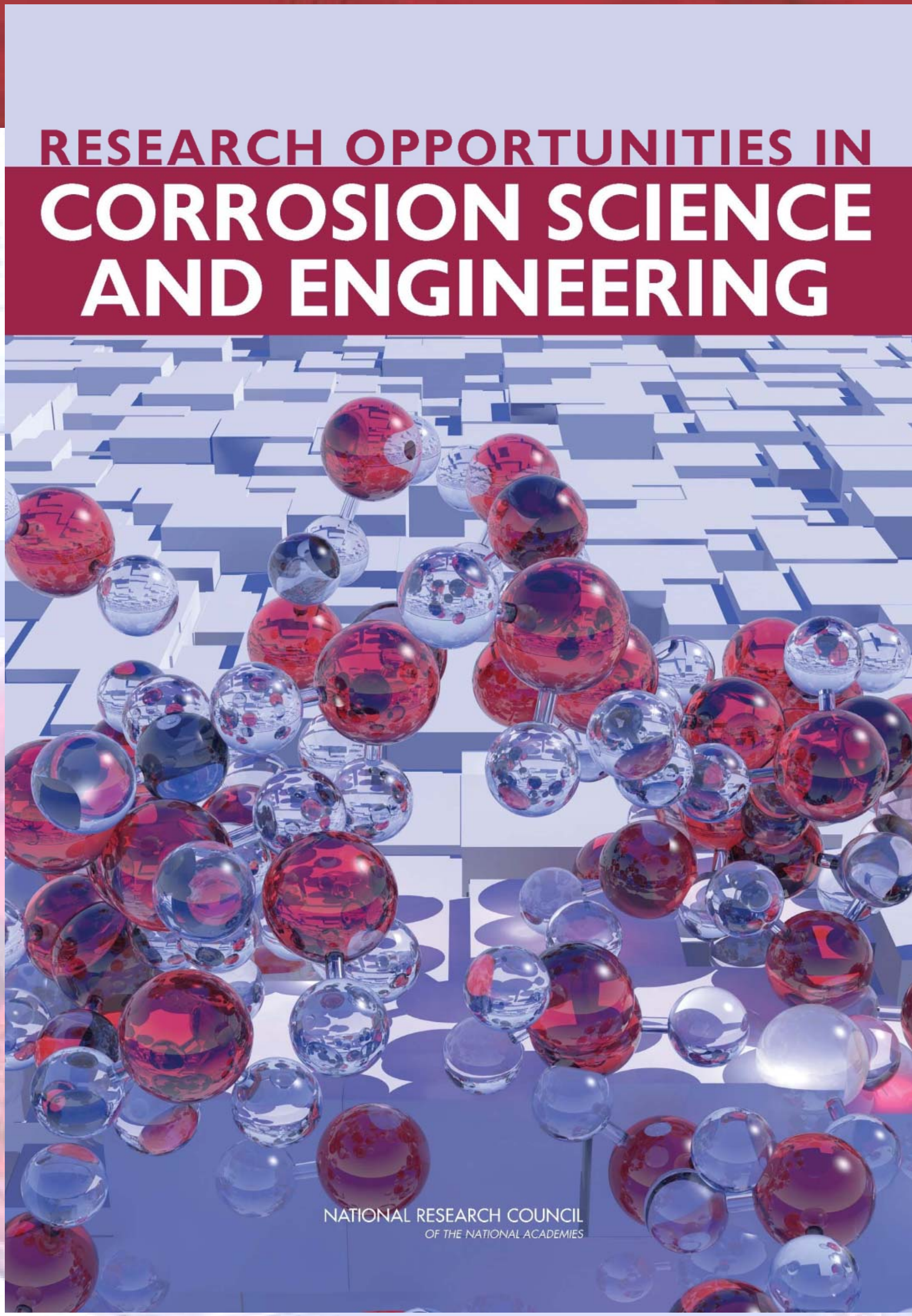

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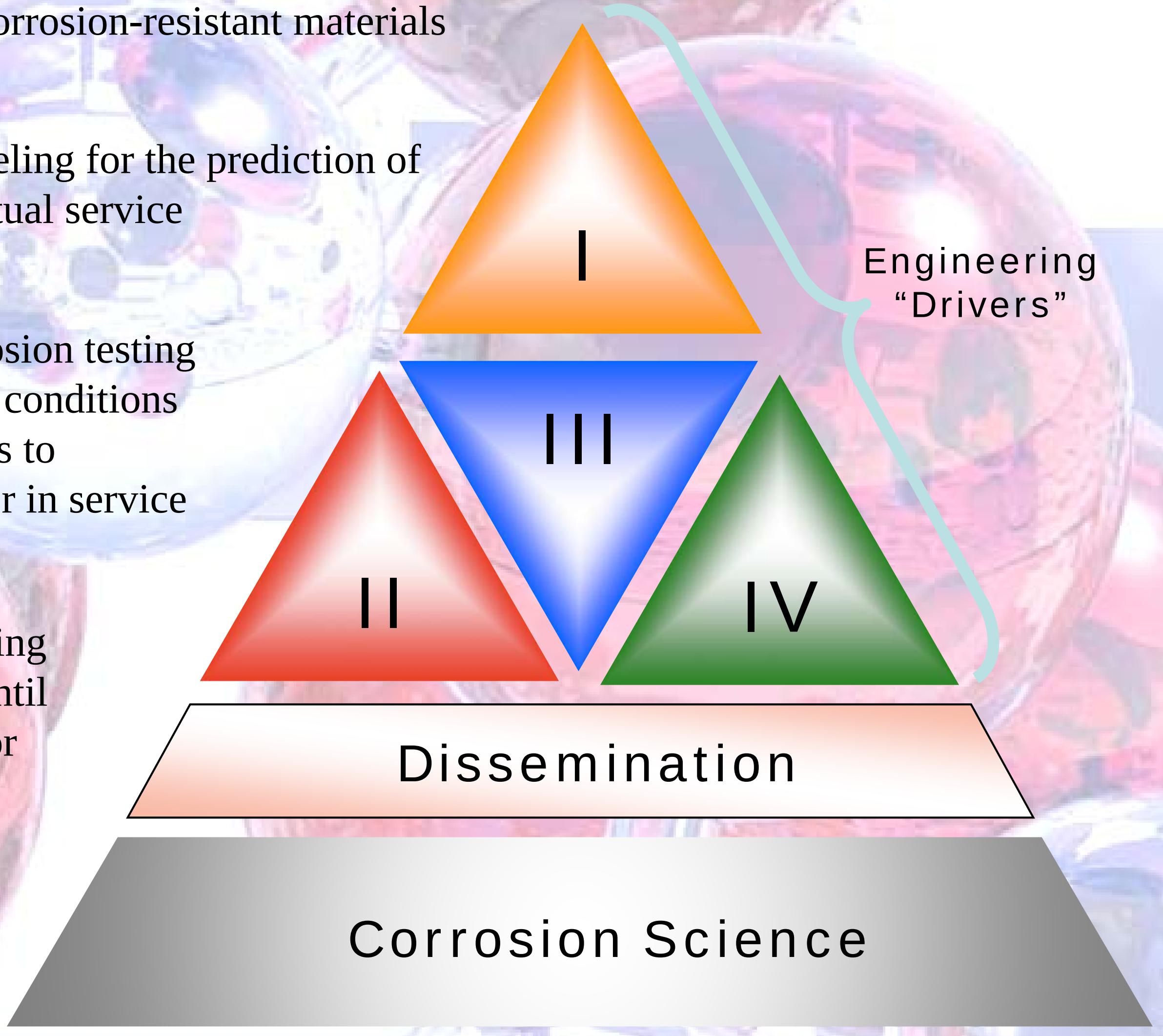
CGC I Development of cost effective, environmentally friendly corrosion-resistant materials and coatings.

CGC II High fidelity modeling for the prediction of corrosion degradation in actual service environments.

CGC III Accelerated corrosion testing under controlled laboratory conditions that quantitatively correlates to observed long term behavior in service environments.

CGC IV Accurate forecasting of remaining service time until major repair, replacement, or overhaul is necessary. i.e., corrosion prognosis.

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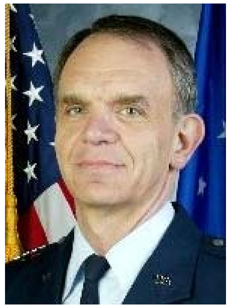

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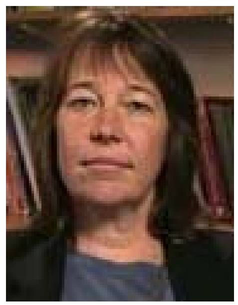

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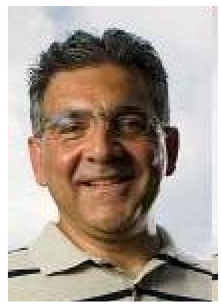

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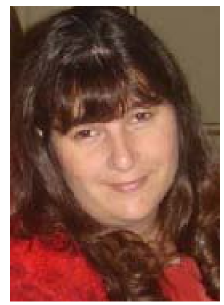

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Haydn Wadley
UVA

Thomas Hartwick
Consultant

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Meeting #2 March 31-April 1

Assessing the Criticality of Metals
Dr. Thomas E. Graedel, Professor of Industrial Ecology, Center for Industrial Ecology, Yale University
Q&A period

Break

The Rare Earth Crisis –
The Supply / Demand Situation for 2010-2015
Dr. Karl A. Gschneidner, *NAE*, Anson Marston Distinguished Professor and Senior Metallurgist, Ames Laboratory
Q&A period

OSTP's view on Defense related Materials, Manufacturing and Infrastructure issues
Mr. Philip E. Coyle III, Associate Director for National Security and International Affairs, Office of Science and Technology Policy
Q&A period

Lunch

An Industry Perspective on Plant Processes, Licenses, Permits, etc.
Mr. Andy Davis, Manager of Public Affairs, Molycorp, Inc.
Q&A period

Rare Earth Materials
Dr. Cyrus Wadia, Senior Policy Analyst - Renewable Energy, Office of Science and Technology Policy
Q&A period

Open Manufacturing
Dr. Leo Christodoulou, Director, Defense Sciences Office, Defense Advanced Research Projects Agency DARPA
Q&A period

Impact of Environmental Efforts in Consumer Electronics on Defense Electronics
Dr. Robert Pfahl, Vice President of Global Operations, International Electronics Manufacturing Initiative, Inc. (iNEMI)
Q&A period

Break

Critical materials, rare earths, and infrastructure systems
Dr. Sarah Slaughter, Associate Director for Buildings and Infrastructure, MIT Energy Initiative, Massachusetts Institute of Technology
Q&A period


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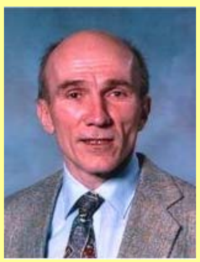
Harnessing Light II
Erik Svedberg, NMMB
Esvedberg@nas.edu

Harnessing Light:
Capitalizing on Optical Science Trends and Challenges for Future Research

Alan Willner
USC



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Exciting Technology

Rod Alferness
U. of California, Santa Barbara

Tom Baer
Appl. Phys., Stanford

Joseph Buck
Boulder Nonlinear Systems

Milton Chang
Incubic Management

Constance Chang-Hasnain
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Charles Falco
University of Arizona

Erica Fuchs
CMU

Waguih Ishak
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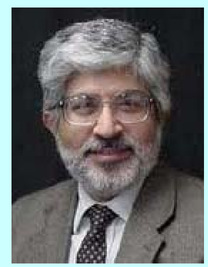

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David Miller
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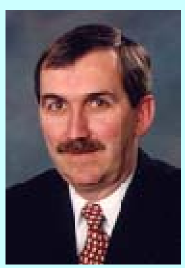

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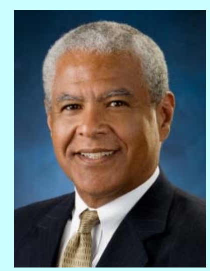

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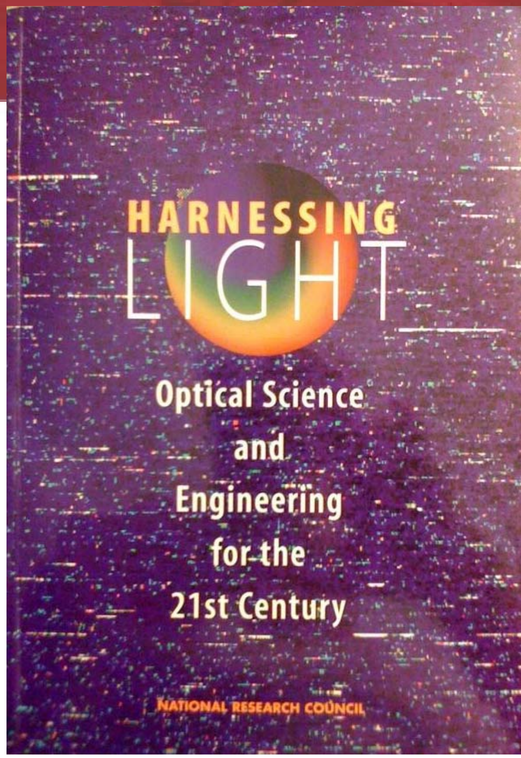

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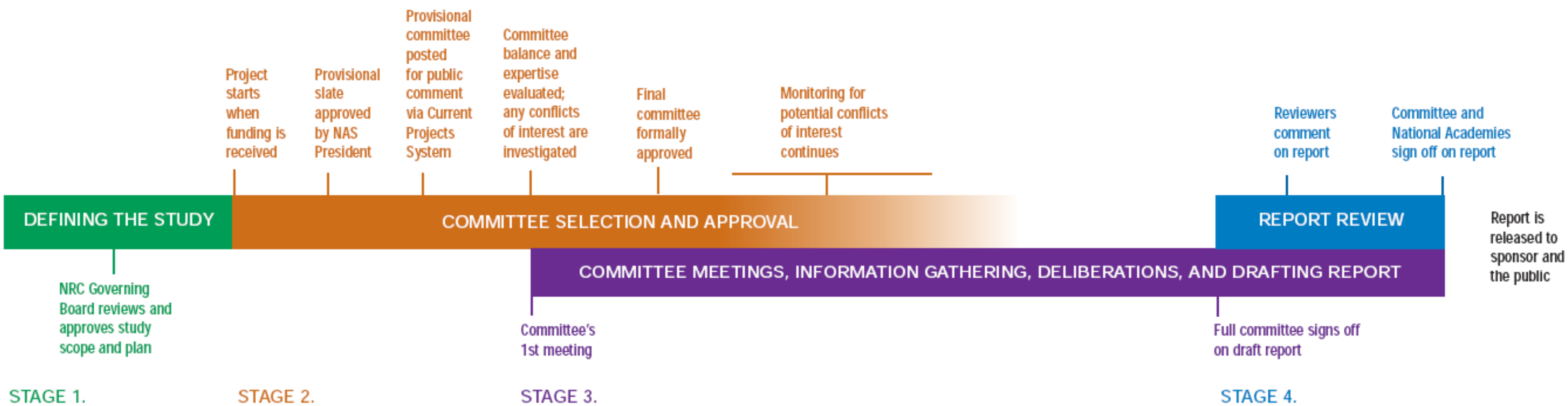

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Review of the Testing of Body Armor Materials for Use by the U.S. Army

United States Government Accountability Office

GAO Report to Congressional Requesters

October 2009

WARFIGHTER SUPPORT

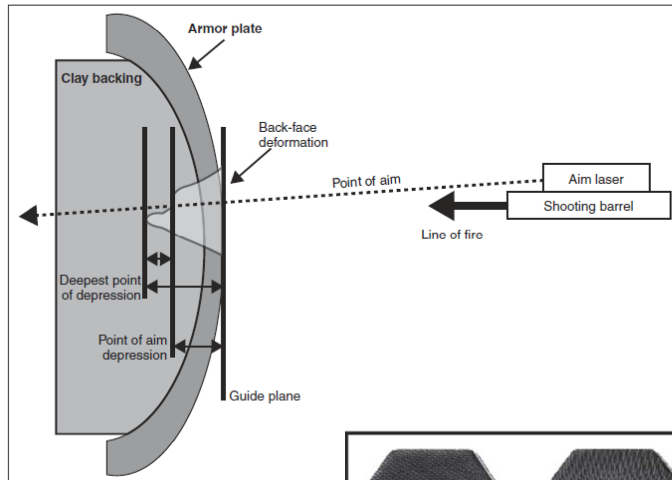
Independent Expert Assessment of Army Body Armor Test Results and Procedures Needed Before Fielding

GAO
Accountability * Integrity * Reliability

GAO-10-119

What GAO Found

During Preliminary Design Model testing the Army took significant steps to run a controlled test and maintain consistency throughout the process, but the Army did not always follow established testing protocols and, as a result, did not achieve its intended test objective of determining as a basis for awarding contracts which designs met performance requirements. In the most consequential of the Army's deviations from testing protocols, the Army testers incorrectly measured the amount of force absorbed by the plate designs by measuring back-face deformation in the clay backing at the point of aim rather than at the deepest point of depression. The graphic below depicts the difference between the point of aim and the deepest point.



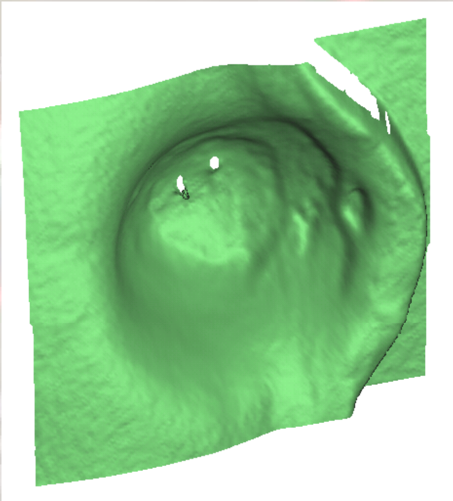
Source: GAO analysis.

Finding 1. The procedure adequately describes the appropriate use of the laser scanning system.

Finding 2. Surface profilometry by a laser scanning system is a valid approach for determining the contours of an indent in a nontransparent clay material at a level of precision adequate for the Army's current ballistic testing of body armor.

Finding 3. The digital caliper is adequate for measurements of displacements in the clay column-drop performance test where there is a well defined reference plane and one can visually see the surface of the clay, given that the depression is relatively shallow (approximately 22-28 mm) and the depression is fairly smooth.

Finding 4. The column-drop performance test is a valid method for assessing part-to-part consistency of clay boxes used in body armor testing.



Final Words:

The work is made possible by 6,000 of the world's top scientists, engineers, and other professionals who volunteer their time to serve on committees and participate in activities.

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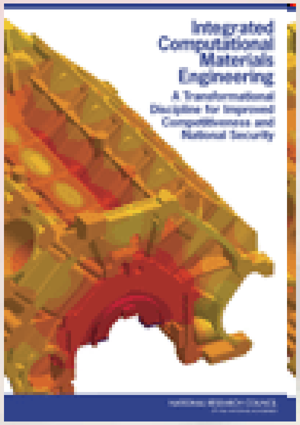
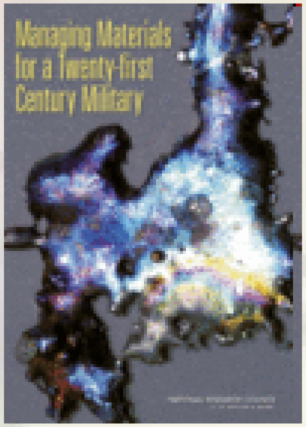
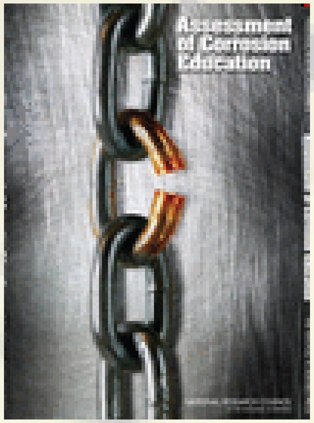


Integrated Computational Materials Engineering



Managing Materials for a Twenty-First Century Military



Assessment of Corrosion Education

Review of the Bureau of Reclamation's Corrosion Prevention Standards for Ductile Iron Pipe

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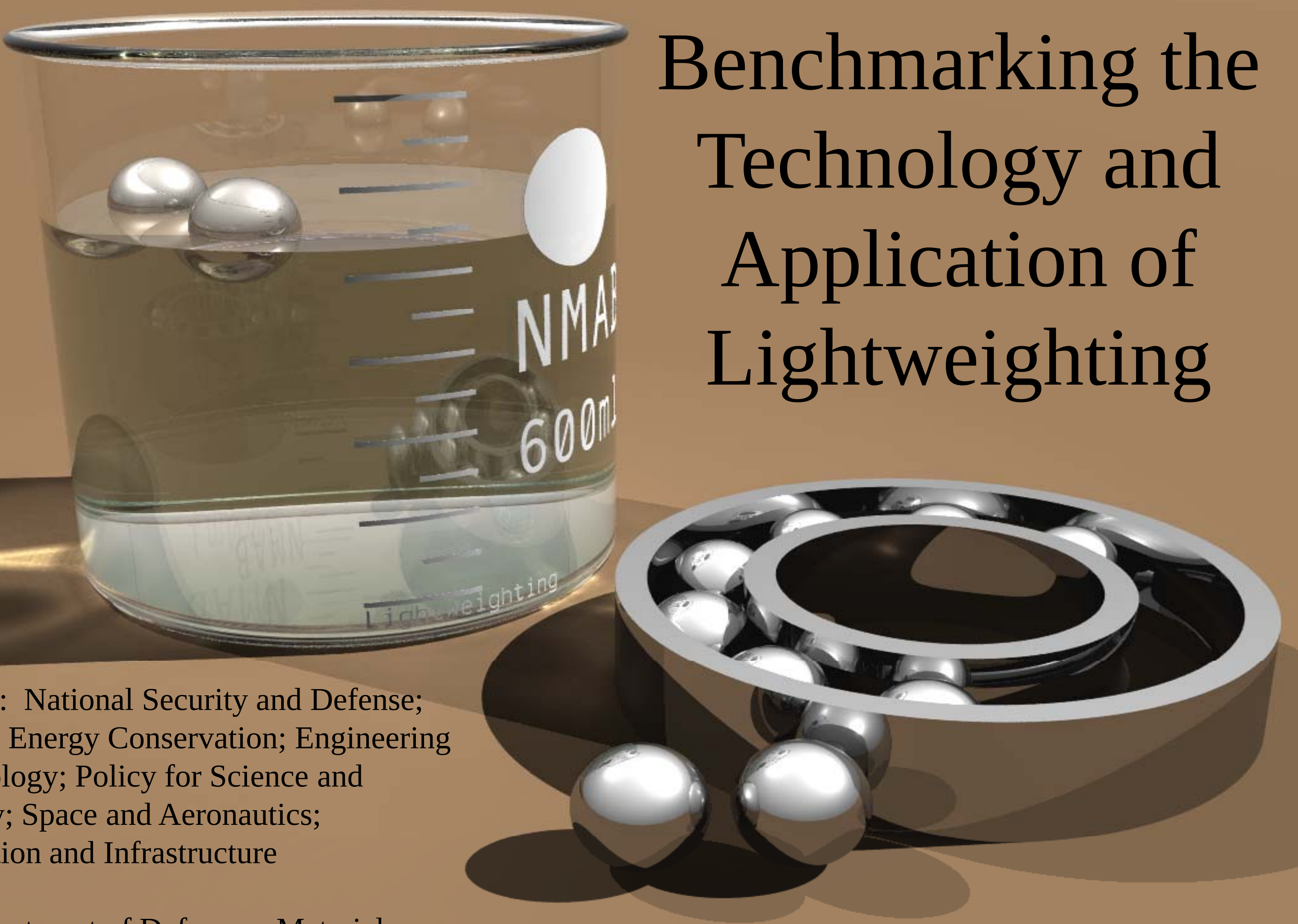
Benchmarking the Technology and Application of Lightweighting



Focus Area: National Security and Defense; Energy and Energy Conservation; Engineering and Technology; Policy for Science and Technology; Space and Aeronautics; Transportation and Infrastructure

Origin:Department of Defense – Materials Reliance 21 Panel - ad hoc study

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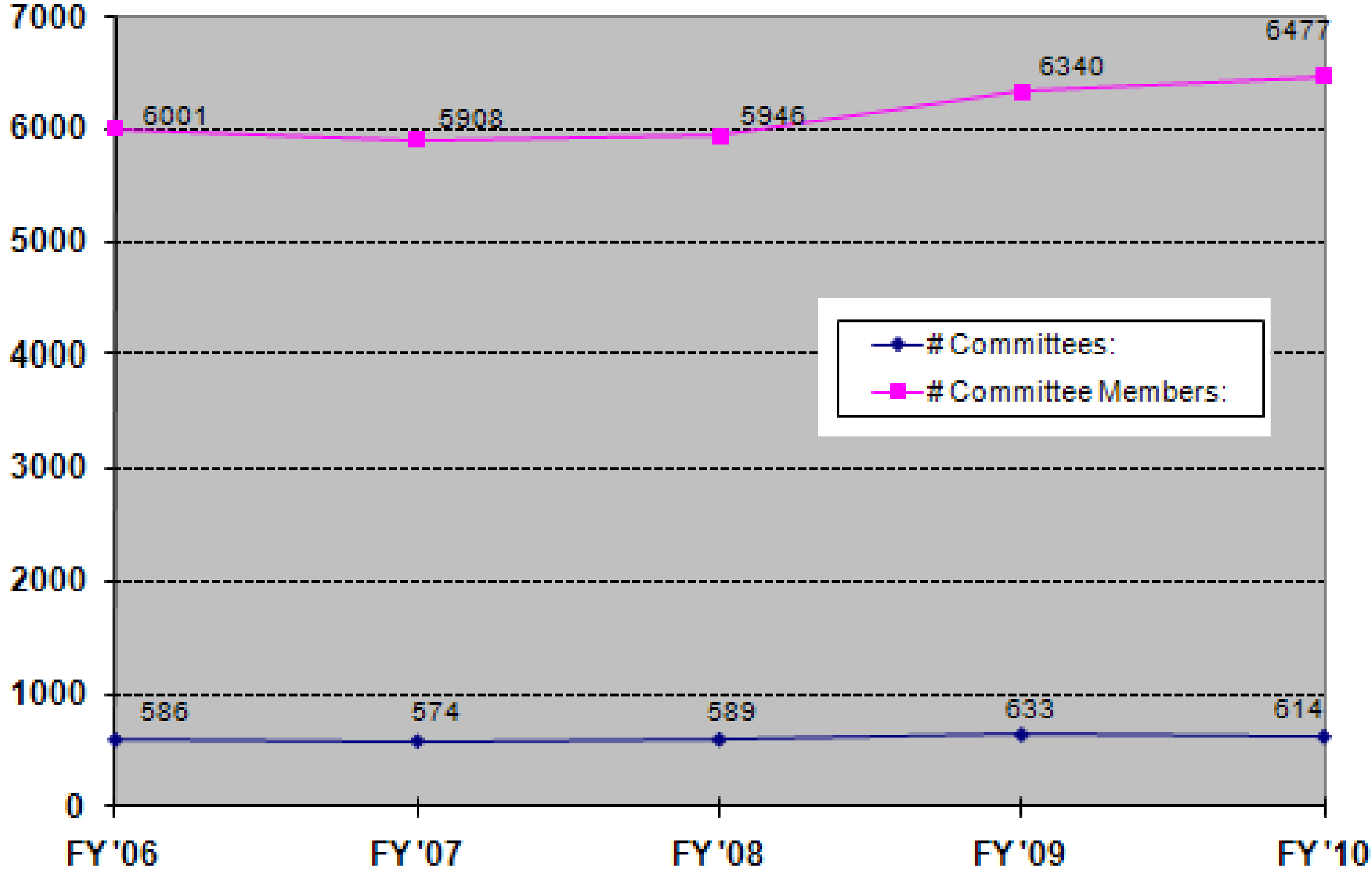
NUMBER OF NRC/IOM COMMITTEES AND COMMITTEE MEMBERS *

FOR THE PERIOD JANUARY 1, 2006 THROUGH DECEMBER 31, 2010



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GEOGRAPHICAL DISTRIBUTION OF NRC/IOM COMMITTEE MEMBERS

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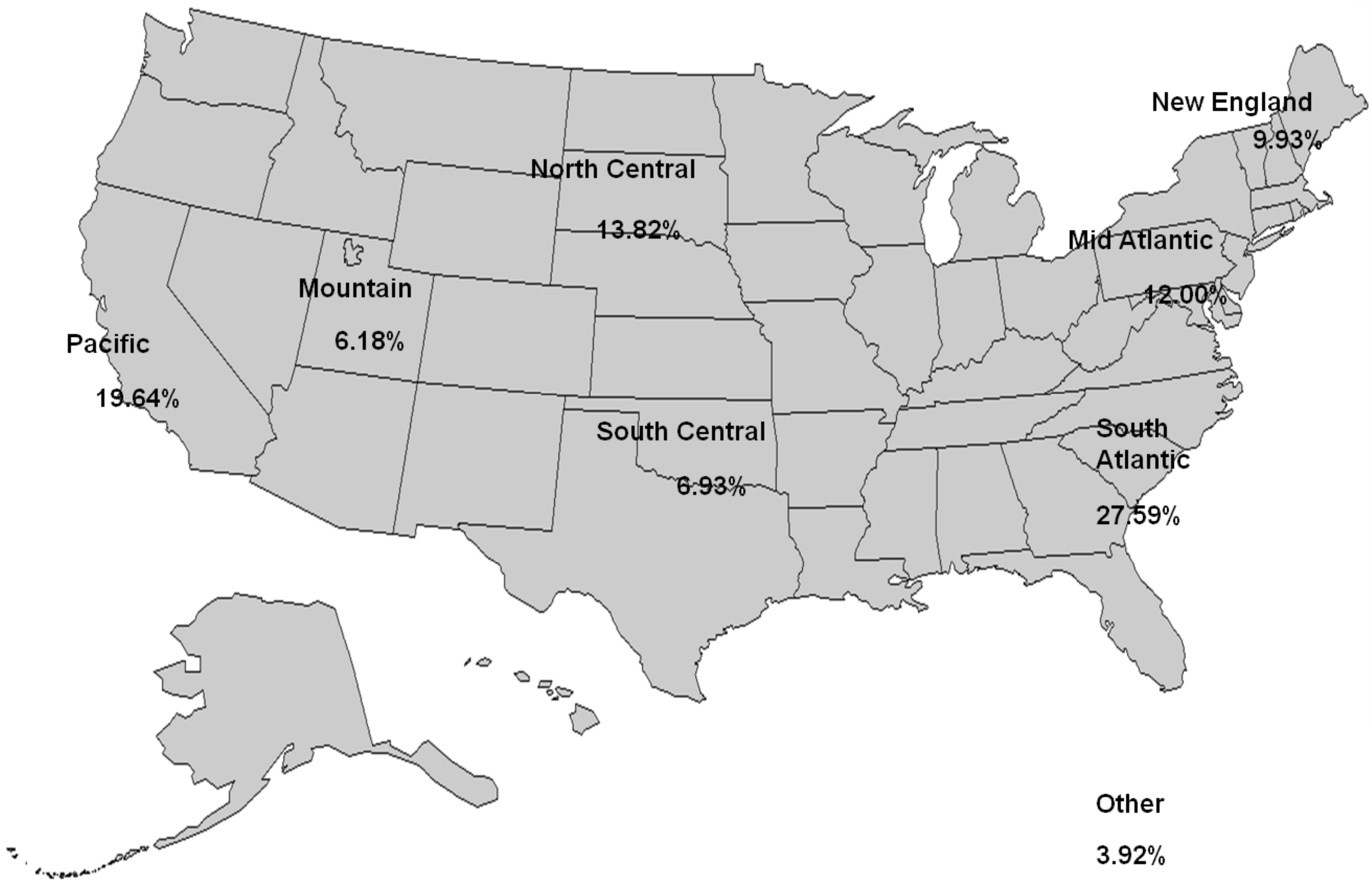

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NRC/IOM COMMITTEE MEMBERSHIP SECTOR AFFILIATION *

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