NSF Funding for Early Career Scientists: Opportunities and Tips for Success

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Overview

- Agency Mission, Organization & Function
- Support for New Investigators
- CAREER Program Goals, Eligibility Criteria and Proposal Requirements
- Proposal Review & Award Recommendation Process
- Tips for Success

- Objective: Is the CAREER program right for you?

Agency Mission

- To promote the progress of science;

- To advance the national health, prosperity, and welfare;

- To secure the national defense. (NSF Act of 1950)

- NSF Funds *Basic Science Research*:

  - Research questions grounded in a broad theoretical framework

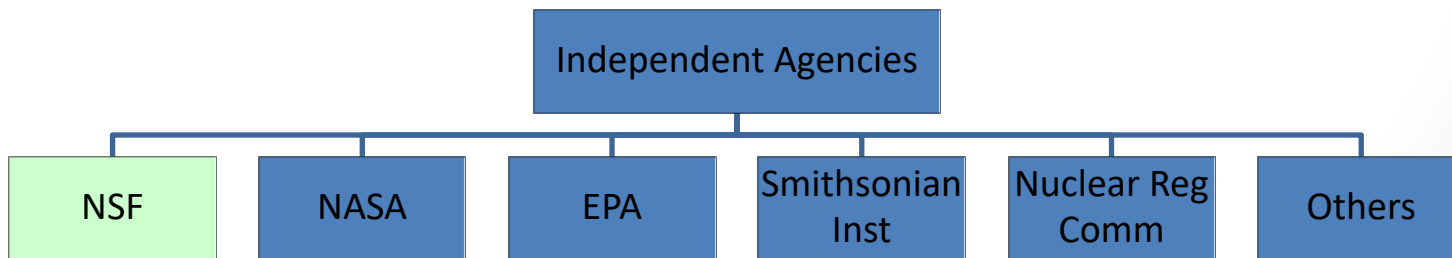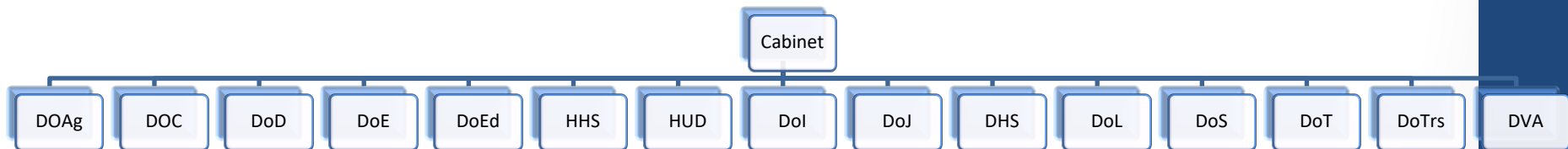 - Results contribute to broad theoretical understanding and knowledge.
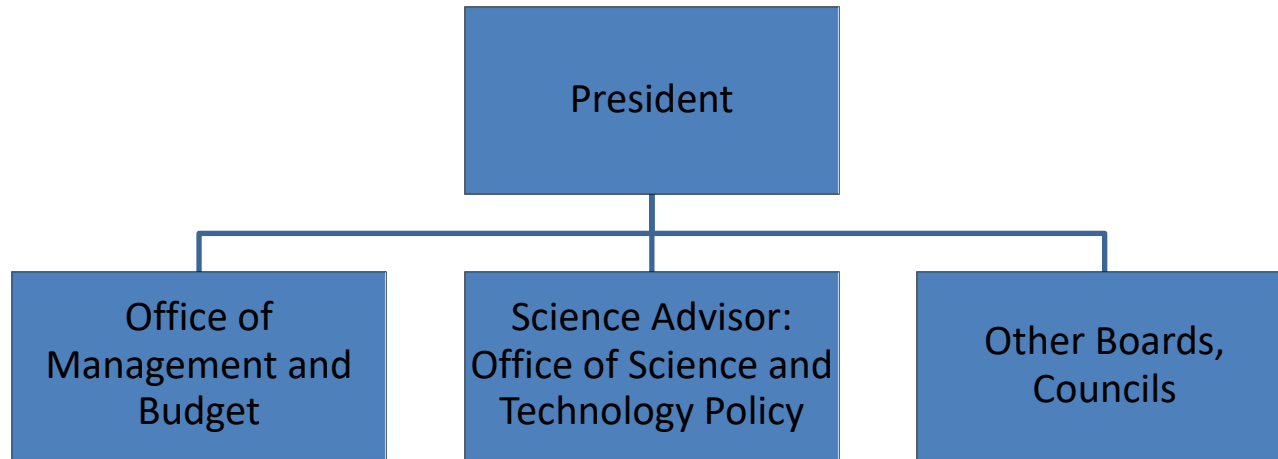
NSF does NOT fund clinical research nor overly applied research.

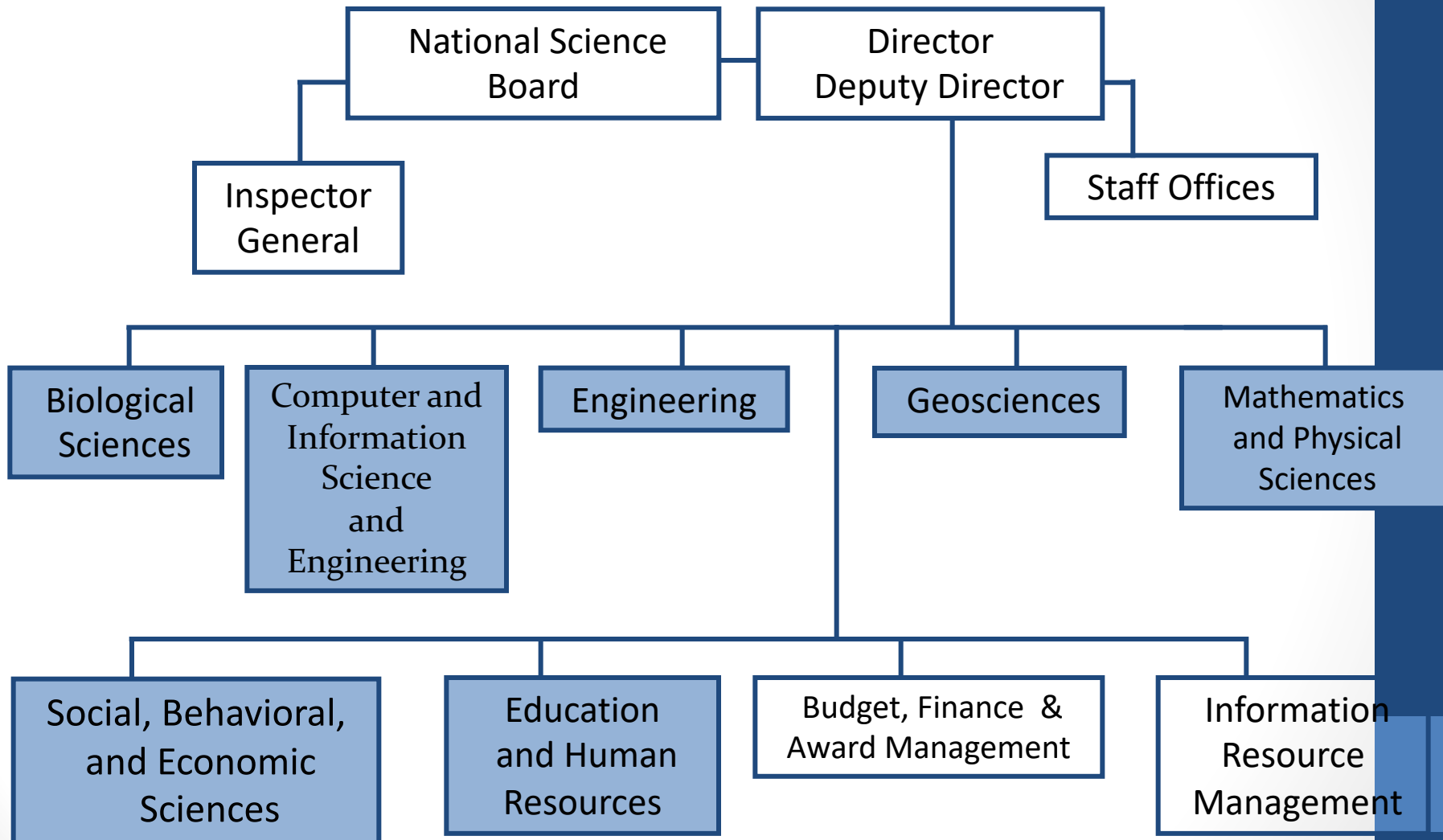# An institution with real people who welcome inquiries and communication

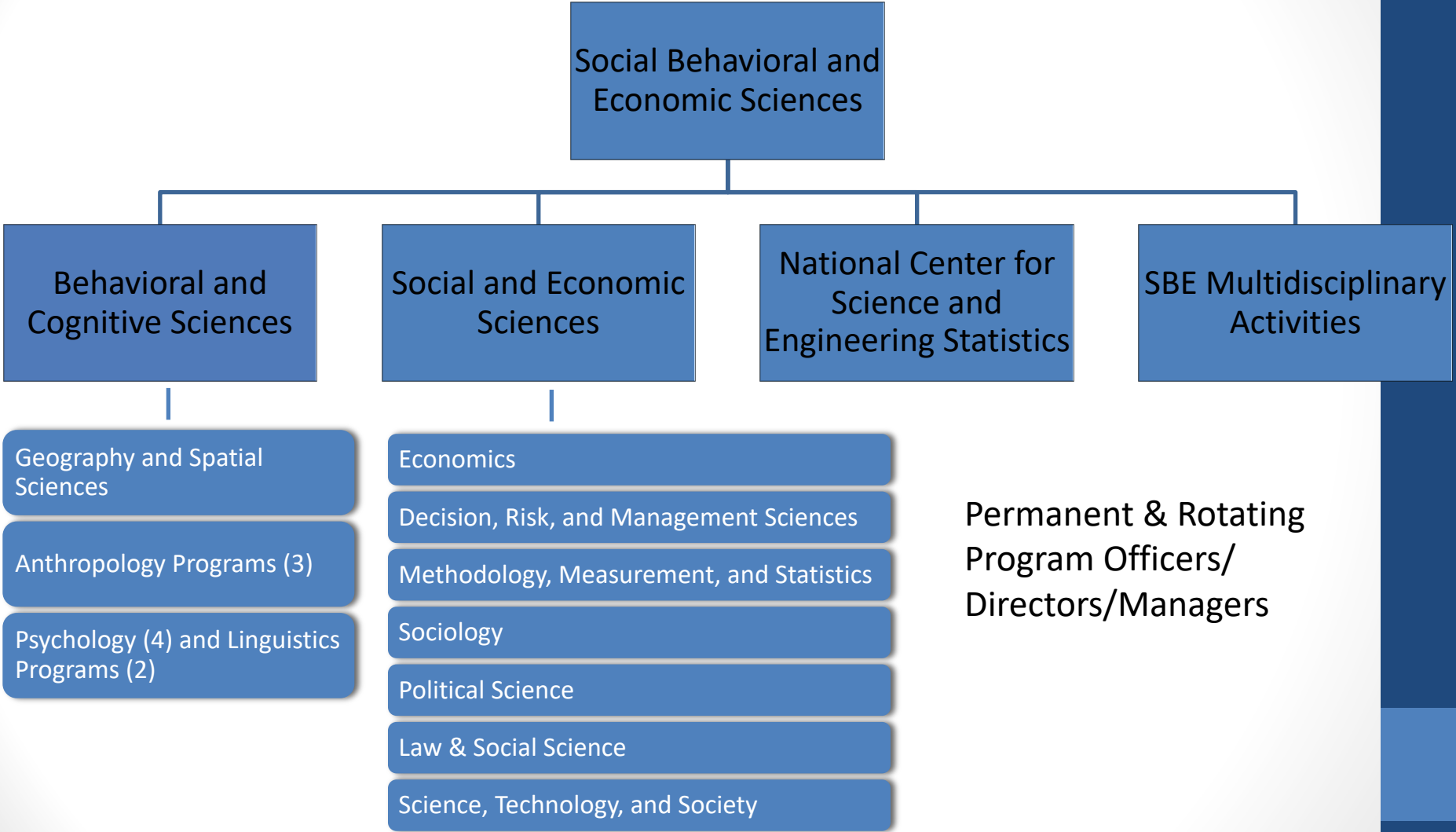

2415Eisenhower Ave., Alexandria, VA

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  Office of          Science Advisor:        Other Boards,
  Management and     Office of Science and    Councils
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Cabinet

| DOAg | DOC | DoD | DoE | DoEd | HHS | HUD | DoI | DoJ | DHS | DoL | DoS | DoT | DoTrs | DVA |

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                  Independent Agencies

  NSF    NASA    EPA    Smithsonian    Nuclear Reg    Others
                        Inst           Comm
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Agency Organization & Function

Directorates are divided into Divisions; Divisions are divided into Programs or Sections

Social Behavioral and Economic Sciences

- **Behavioral and Cognitive Sciences**
  - Geography and Spatial Sciences
  - Anthropology Programs (3)
  - Psychology (4) and Linguistics Programs (2)

- **Social and Economic Sciences**
  - Economics
  - Decision, Risk, and Management Sciences
  - Methodology, Measurement, and Statistics
  - Sociology
  - Political Science
  - Law & Social Science
  - Science, Technology, and Society

- **National Center for Science and Engineering Statistics**

- **SBE Multidisciplinary Activities**

Permanent & Rotating Program Officers/ Directors/Managers

=> **Consult cognizant Program Officers for program specific information and READ Program Solicitations carefully!**

Funding Types & Mechanisms

- Core Program Funding

- Cross-Directorate Initiatives
  - Dynamics of Integrated Socio-Environmental Systems (CNH2)
  - Innovations at the Nexus of Food-Energy-Water (INFEWS)
  - Smart & Connected Communities (SCC)

- Targeted Solicitations/Special Initiatives
  - Dear Colleague Letters (DCLs) through Core Programs or for Cross-Directorate or Special Initiatives – e.g., SBE Science of Broadening Participation

- Other Funding Mechanisms, such as EAGER, RAPID, RAISE

Types of Proposals/Awards

- "Regular" (Standard) Research
- Doctoral Dissertation Research
- New Investigators (CAREER)
- High Risk Awards (RAPID, EAGER)

- Research Community Building: Workshop, Conference, & Research Coordination Networks (RCNs)
- Training: Graduate Research Fellowships, Post-doctoral Fellowships, Research Experiences for Undergraduates (REUs)
- Equipment/Travel
- Facility/Center

Support for New Investigators

- All NSF programs support new investigators through all research competitions.

- About 2/3^{rds} of new investigators are supported by the "core" research programs.

- Faculty Early-Career Development (CAREER) Program
  - **Most prestigious awards to provide early career faculty with stable support to develop careers as outstanding researchers and educators who effectively integrate teaching, learning, and discovery**

The NSF CAREER Program

Faculty Early Career Development Program (CAREER)

Includes the description of NSF Presidential Early Career Awards for Scientists and Engineers (PECASE)

PROGRAM SOLICITATION
NSF 20-525

REPLACES DOCUMENT(S):
NSF 17-537

National Science Foundation

Directorate for Biological Sciences

Directorate for Computer and Information Science and Engineering

Directorate for Education and Human Resources

Directorate for Engineering

Directorate for Geosciences

Directorate for Mathematical and Physical Sciences

Directorate for Social, Behavioral and Economic Sciences

Office of Integrative Activities

Office of International Science and Engineering

Full Proposal Deadline(s) (due by 5 p.m. submitter's local time):

July 27, 2020

Fourth Monday in July, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

- The PI needs to meet all eligibility criteria as of the annual deadline
- Clarification regarding the minimum percentage appointment (tenure-track and tenure-track equivalent) for eligibility to the program
- Only one annual deadline applies to all CAREER submissions, regardless of Directorate
- Added guidance on the CAREER proposal submission timeline

Any proposal submitted in response to this solicitation should be submitted in accordance with the revised *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) (NSF 19-1), which is effective for proposals submitted, or due, on or after February 25, 2019.

Goals of the CAREER Program

- Five years of support to foster career development of outstanding new teacher-scholars.

- Minimum budget of $400K or $500K

- Build a foundation for a lifetime of integrated contributions to research and education.

- Provide incentives to universities to value the integration of research and education.

- Increase participation of those traditionally underrepresented in science and engineering.

CAREER is NSF wide

- All Directorates/Offices participate in the program

- New in 2020 – single deadline for all Directorates
  July 27, 2020

  4th Monday in July thereafter

- Proposals are submitted to and reviewed by a specific **Program** (e.g, Anthropology, Economics, Law & Social Sciences)

Investigator Eligibility Criteria

- Hold a doctoral degree in a field supported by NSF by proposal deadline

- Be untenured up until Oct 1st following proposal deadline (e.g., July 27, 2020 => October 1, 2020)

- Be employed in a tenure-track (or equivalent) position at an eligible institution as an Assistant Professor (until Oct 1st following deadline)

- Have not previously received a CAREER award

- Have not had more than two CAREER proposals reviewed

- Untenured Associate Professors are NOT eligible

CAREER varies across NSF

- Number of submitted and awarded CAREER proposals varies widely across NSF

- Review and funding methods vary according to Directorate and Division practices

- Many CAREER proposals compete with other research proposals submitted to the selected program – i.e., no separate pot of funds for CAREER awards

CAREER Proposals Submitted

CAREER awards

http://www.nsf.gov/career

CSE · GEO · ENG · BIO · EHR · MPS · SBE
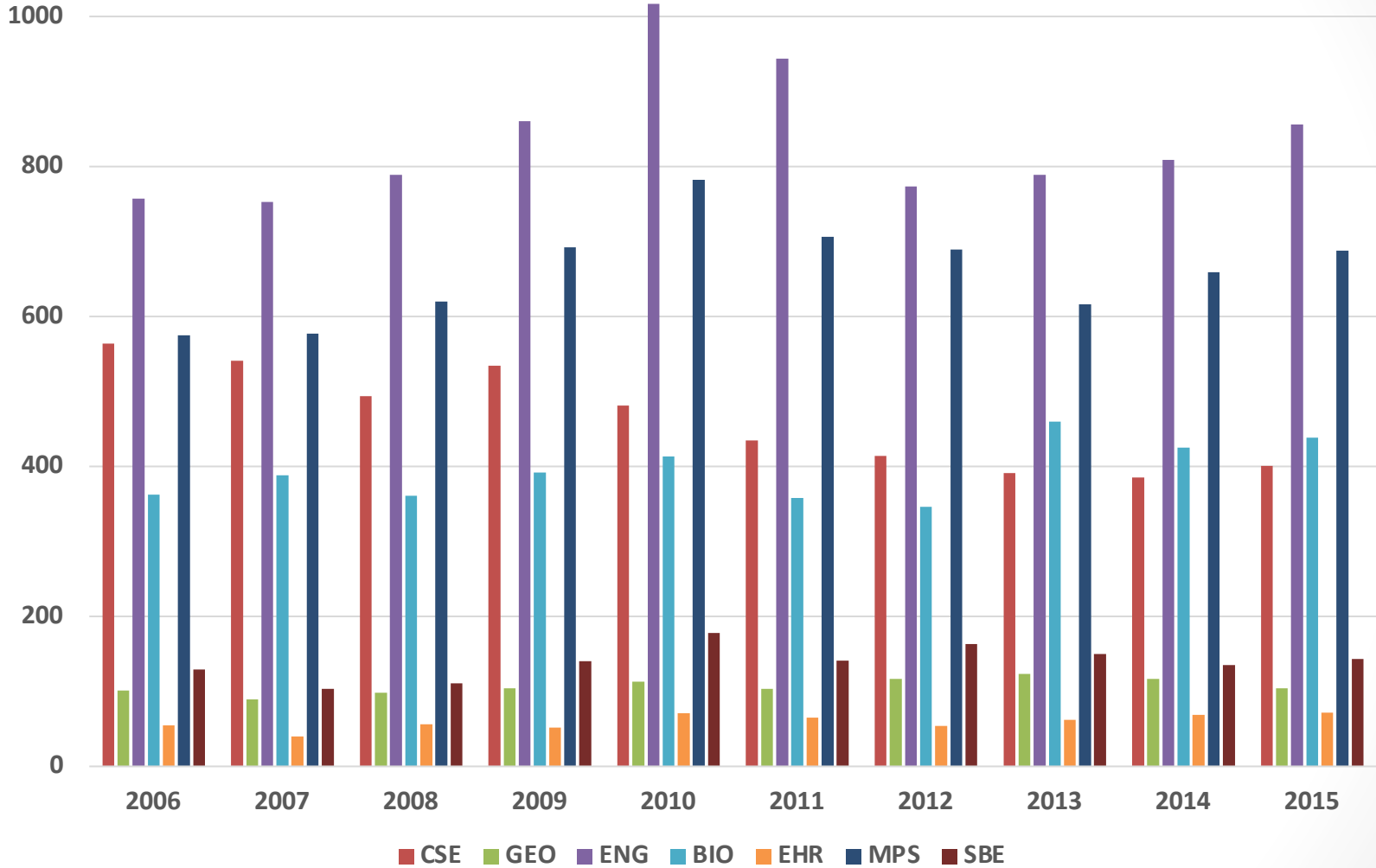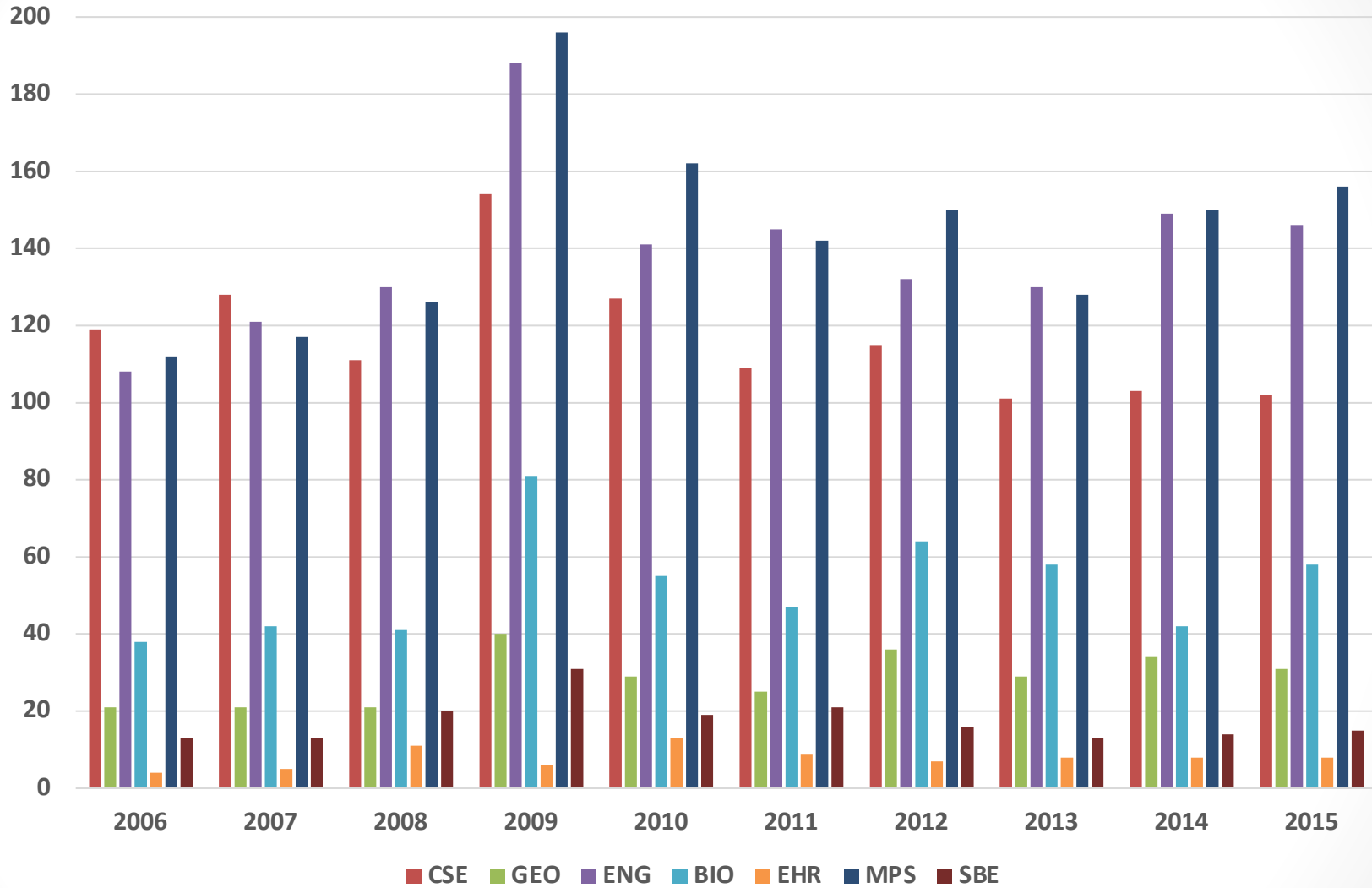
CAREER Funding Rate
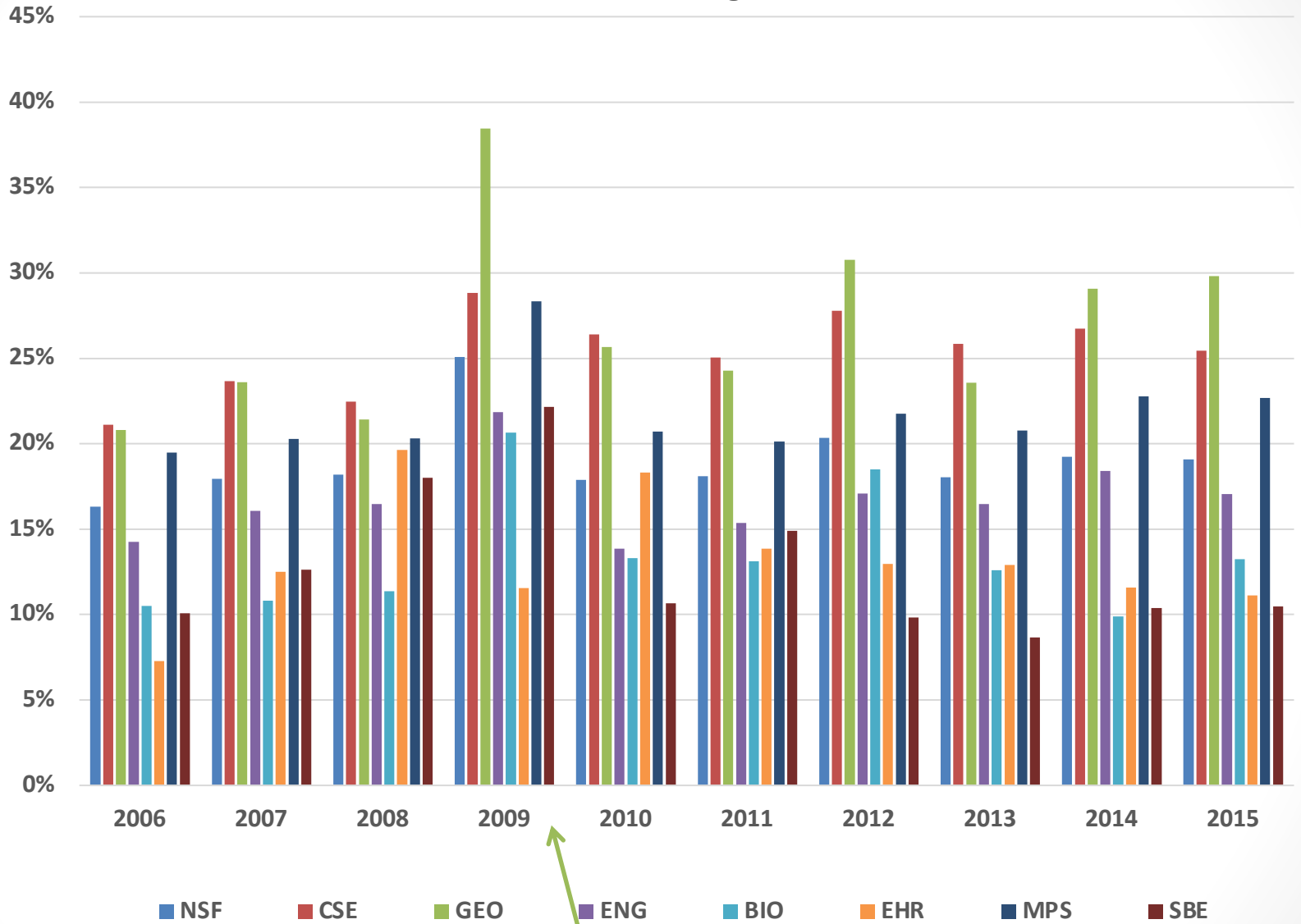
ARRA
(2009)

CAREER vs STANDARD:
What's Good About a CAREER Award?

- Lots of support for a long time

- Prestige

- CAREER awardees may be nominated to be Presidential Early Career Awards for Scientists and Engineers (PECASE)

What Are the Drawbacks to Seeking a CAREER Award?

- Very high expectations
  - To be competitive, you will need to do much more than normal for five years or longer

- Significant competition

- Lost opportunity costs
  - Focus on developing CAREER proposals may keep you from devoting attention to other tasks, including preparation of smaller proposals that may be more likely to be funded

Characteristics of a CAREER Proposal

- Strong theoretical foundation

- Core questions and/or hypotheses to focus the research

- Scientifically sound research plan for a research program that will include a number of related projects

- An education plan that goes beyond normal activities for an assistant prof (and a plan to evaluate the educational activities)

- Description of how research and educational activities are *integrated* with each other

Special Challenges for Preparing CAREER Proposals

- Development and effective articulation of a *multi-project research program*

- Development and articulation of plans and for *an innovative education program* and a process to evaluate it

- Effective *integration* of the research and education plans

- All described in sufficient detail in a 15-page project description

Success Rates and Expectations

- CAREER proposals are submitted to a disciplinary unit or Program

- They are reviewed according to the relevant Program guidelines - Talk to Program Officer or Division Contact for more information; check on typical award sizes in your program

  (*Read both CAREER solicitation and Program solicitation.*)

- Ask about expectations for scope of research and education plans – they vary across discipline/program

CAREER Education Plan

- Activities should go beyond what is expected from any Assistant Professor in your field

- Education activities may include – curriculum, pedagogy, outreach, mentoring at any level, majors and non-majors, teacher preparation or enhancement, K-12 students, and/or the general public.

- Innovative but doable – avoid unreasonable workload

- Should have a plan for assessing the success of the education program

- Check with your Program Officer or search the abstracts on the web

Integration of Research and Education

How will your research impact your education goals; how will your education activities feed back into your research?

- Involving others (graduate, undergraduates, K-12, high school teachers, public) in your research using new tools, laboratory methods, field components, web outreach, cyber networks, etc.

- Partnering with those in other communities, especially those traditionally underrepresented in Sciences and Engineering

- Searching for new methods to deliver your research results to a broad public audience

- Using the broader community to gather data for your scientific pursuits ("citizen science")

CAREER Personnel and Budgets

- No other co-investigators or senior personnel are allowed

- Consultants and sub-awards are allowed (but no senior personnel costs in sub-awards – other personnel may play only a *limited role)*

- Some programs will support buy out of academic year time for teaching intensive institutions (check with your Program Officer)

- International activities are encouraged and may be supported by the Office of International Science and Engineering (OISE)

- Some Directorates prefer making more awards but closer to the $400K minimum (or $500K in BIO and OPP)

- Sometimes funded through co-review by 2 or more programs

Departmental Letter (up to 2 pages)

- Support for the PIs proposed CAREER research and education activities

- Description of how the PIs career goals and responsibilities mesh with that of the institution and department

- Commitment to the professional development of the PI with mentoring and whatever is needed to forward the PIs efforts to integrate research and education

- Statement that indicates the PI is eligible for the CAREER program

- Should <u>not</u> serve as a letter of recommendation or endorsement of the PI or the research project

Is CAREER the right program for you?

- Can you think of a project that is appropriate for NSF with research and education activities that are innovative and ambitious?

- Is your Department/University supportive?

- Are you seriously committed to the goals of CAREER?

- Are you at the right stage in your career?

- Would you like to be considered for the Presidential Early Career Awards for Scientists and Engineers (PECASE), if eligible?

- Have you discussed your ideas with mentors, fellows, program officers?

CAREER Urban Myths

- "You cannot apply because you have another award from NSF"

- "It is an entry program, so apply to CAREER first"

- "I need to see a successful proposal to write a successful proposal"

- "I read on the web that to succeed, I have to…."

- "CAREER proposals are more portable"

- "The education component does not matter"

- "You have no chance, if you are not from a research-intensive institution"

NSF's Merit Review Process

Merit Review Criteria

- Intellectual Merit: Potential to advance knowledge

  - To what extent do the proposed activities suggest and explore creative, original, or ***potentially transformative*** concepts?

  - Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a ***sound rationale or methodology***?

  - Qualifications of team; adequacy of resources

- Broader Impacts: Potential to benefit society and contribute to the achievement of specific desired societal outcomes.

- Program-specific Special Review Criteria

Potentially Transformative Science

The Isserman Curve
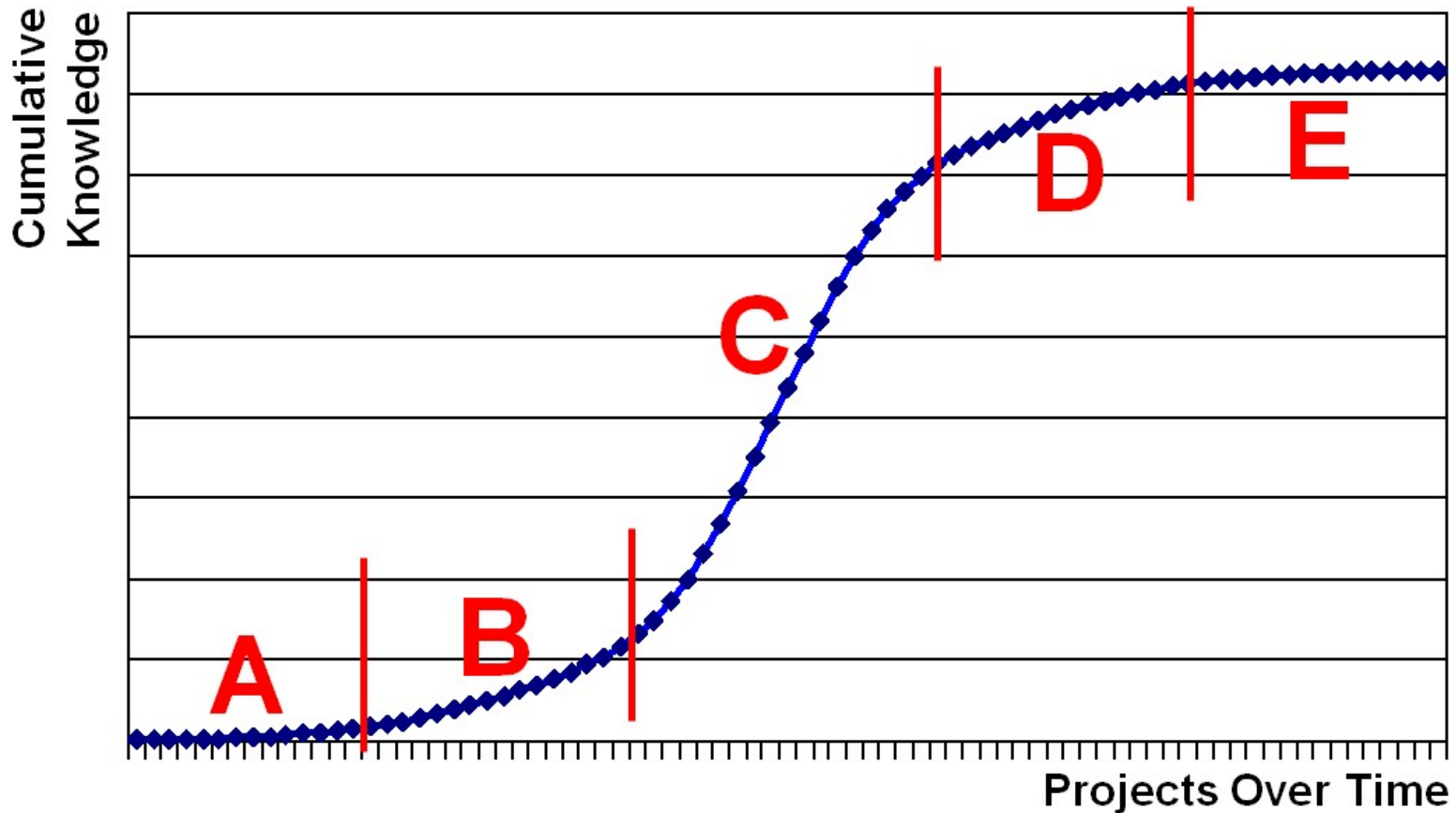
Examples of Broader Impacts

- Improved STEM education and/or educator development
- Development of a diverse scientific workforce
- Enhanced infrastructure for research & education
- Increased public scientific literacy and/or public engagement with science and technology
- Knowledge, products, and other contributions of direct value to society
- Enhanced international scientific collaborations
- Contributions to public policy; national security; improved U.S. economic competiveness

Multi-faceted Review Process

- ## External (Ad Hoc) Reviewers
  - Specialists; so relevant theory and technical details matter.

- ## Advisory Panel Members
  - Generalists; so broader significance matters.

- ## Program Officers
  - Investors seeking "big bangs for their bucks."

What's the "Bang" Associated with CAREER Awards?

- Generalizable knowledge that will enhance fundamental theory.

- Innovative educational activities that are integrated with the research plan.

- Many anticipated significant publications and better-educated students.

- Acceleration of an already-strong career.

Recommendation Process

- Written reviews by ad hoc reviewers and panelists – Overall rating: Excellent, Very Good, Good, Fair, Poor

- Advisory Panel – Recommendation on Competitiveness for Funding

- "Bin" Approach to Recommendations (3-5 bins)

Highly Competitive	Competitive	Not Competitive

- Program Officers Make Final Decisions - Portfolio Balance Approach

- Award process time: ~6 months

Why Proposals Are Declined
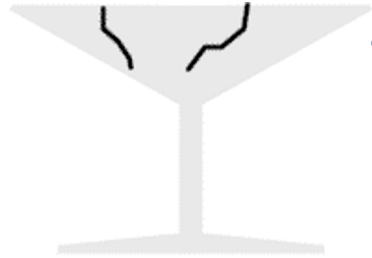
- Failure to establish a sound theoretical framework and/or poorly related to relevant literature.
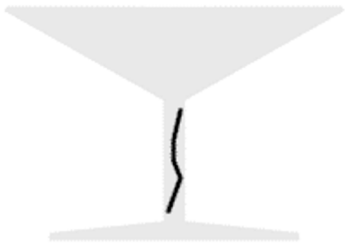
- Flawed research design OR failure to specify research methods in sufficient detail. Often, plans for data analysis are insufficient.

- Sound theoretical framework, solid methodology, but they don't align with each other.

Other Reasons

- Failure to respond to solicitation(s).

- Failure to follow directions.

- The project is too focused on a specific case.

- Project is "too applied".

- Anticipated contribution is *incremental*.

- Bad Luck.

Tips on Writing a Successful Proposal

Important NSF Resources

- *Proposal & Award Policies & Procedures Guide (PAPPG) -* NSF 20-01 (June 1, 2020)

https://nsf.gov/pubs/policydocs/pappg20_1/index.jsp

- CAREER Solicitation - NSF 20-525

- Specific Program Descriptions and Solicitations

Parts of an NSF proposal

- Title (be succinct; avoid cute titles)
- Cover sheet (form generated in Fastlane)
- Project Summary (Overview, IM, BI)
- Table of Contents(automatically generated in Fastlane)
- Project Description (15 pages)
- References cited
- Biographical Sketches (PI/co-PIs; 2pp; see prescribed template) *
- Budget
- Budget Justification
- Current and Pending Support (for PI/co-PIs)
- Facilities, Equipment, and Other Resources
- Data Management Plan (Max. 2 pages – see templates)
- Post Doctoral Mentoring Plan – if relevant
- Special Information and Supplementary Documentation *
- Collaborators and Other Affiliations *

* Most likely to lead to compliance problems

Project Description

- Flexible format – but some required sections (usually IM, BI, Prior Support)

- Proposers should address what they want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful (**Intellectual Merit**).

- Research Component and Education Component

- A separate section within the narrative must include a discussion of the **Broader Impacts** of the proposed activities.

- **Results from Prior NSF Support -** If any PI or co-PI has received NSF funding with a start date in the past five years (including any current funding and no- cost extensions), information on the award is required for each PI and co- PI.

Budgetary Guidelines

- **Minimum budget - $400K/$500K for CAREER**

- **Amounts should be:**
  - Realistic and reasonable
  - Well-justified and should establish need
  - Consistent with program guidelines

- **Eligible costs:**
  - Personnel
  - Equipment
  - Travel
  - Participant support
  - Other direct costs (e.g., subawards, consultant services/other personnel with *limited* role, computer services, equipment, and publications costs)

Data-Management Plan

- The **types of data**, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project;

- The **standards** to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies);

- **Policies for access and sharing**, including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;

- Policies and provisions for **re-use**, **re-distribution**, and the production of derivatives; and

- Plans for **archiving data**, samples, and other research products, and for preservation of access to them.

PIs should make all other data, software, and other products of the research readily available to potential users **through institutionally based** archives, repositories, and/or distribution networks so that the **products may be easily accessed by others over long time periods**.

General Tips

- Familiarize yourself with NSF's merit review criteria, align project with agency mission and program objectives.

- Read your drafts from a reviewer's perspective.
  Try to answer questions that reviewers might ask about your plans.

- Make sure your proposal is technically correct.
  Careless writing and math imply careless scholarship.

- Convey enthusiasm in your writing.

- Comply completely with the guidelines.

- It's not about You. It's about the Science.

- Talk to a Program Officer:
  - Get in touch early in the process (and well before the deadline).
  - Send an email rather than cold-calling.
  - Include a 1-2 page summary of the project.
  - Ask for feedback on how the project fits with program priorities.
  - Inquire whether there are other programs or initiatives (such as DCLs) that may be relevant.
  - **If a proposal is declined, schedule a follow-up chat to get feedback on whether and how to rework and submit again.**

Other Resources

- NSF CAREER Webinar (May 13, 2020) – recording/slides at:

https://nsf.gov/events/event_summ.jsp?cntn_id=300458&org=NSF.

- NSF CAREER FAQs:

https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf20025.

- Guides to Proposal Writing/Advice:

https://www.researchdevelopment.socsci.uci.edu/writing_proposal_writing_resources.php

QUESTIONS/COMMENTS?