Impact of Proposal and Award Management Mechanisms

UCAR Members Meeting
October 9, 2007

Slides provided by Joanne Tornow
National Science Foundation
Research Proposal Funding Rate Drops as NSF Budget Increases

![Graph showing the relationship between funding rate and NSF budget over the years.](image)

- **NSF Budget**:
  - 1997: $3,298
  - 1998: $3,425
  - 1999: $3,690
  - 2000: $3,923
  - 2001: $4,459
  - 2002: $4,774
  - 2003: $5,369
  - 2004: $5,652
  - 2005: $5,480
  - 2006: $5,645

- **R&RA Budget**:
  - 1997: $2,433
  - 1998: $2,572
  - 1999: $2,821
  - 2000: $2,979
  - 2001: $3,372
  - 2002: $3,616
  - 2003: $4,054
  - 2004: $4,293
  - 2005: $4,234
  - 2006: $4,351

- **Funding Rate**:
  - 1997: 30%
  - 1998: 30%
  - 1999: 30%
  - 2000: 30%
  - 2001: 27%
  - 2002: 27%
  - 2003: 24%
  - 2004: 21%
  - 2005: 20%
  - 2006: 21%
What is the Context?

- **Between FY 2000-2005:**
  - The NSF budget increased by 44%.
  - The average size of research awards increased by 41%.
  - Research proposal submissions increased by nearly 50%.
- NSF budget increases were absorbed by the growth in the average award size, leaving little flexibility to respond to growing proposal submissions. As a result, the research proposal funding rate decreased by 29%, from 30% to 21%.
- Directorate level trends show significant variability in rate of change, degree of change, and starting and end points of change.
Directorate Funding Rate Trends

Fiscal Year

Funding Rate

SBE  CISE  GEO  ENG  BIO  NSF  MPS
Directorate Proposal Submission Trends

![Graph showing the number of competitive proposals submitted from 1997 to 2006 by different departments: MPS, SBE, CISE, GEO, BIO, ENG. The graph illustrates trends and changes over the fiscal years.]
## ATM Research Proposal Statistics

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Submitted Proposals</td>
<td>671</td>
<td>898</td>
</tr>
<tr>
<td>Competitive awards:</td>
<td>356</td>
<td>341</td>
</tr>
<tr>
<td>Percent awarded</td>
<td>53%</td>
<td>38%</td>
</tr>
<tr>
<td>Average annual award:</td>
<td>$111K</td>
<td>$128K</td>
</tr>
</tbody>
</table>
Causal Factors

- The increase in proposal submissions was due to an increased applicant pool and to an increased number of proposals per applicant.
  - Increased size and capacity of the research community
  - Loss of funding from other sources
  - Increased use by NSF of targeted solicitations in new areas
  - External institutional pressures
Solicited vs. Unsolicited Proposal Trends

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Solicited Proposals</th>
<th>Unsolicited Proposals</th>
<th>Solicited Funding Rate</th>
<th>Unsolicited Funding Rate</th>
<th>NSF Funding Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>20%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
</tr>
<tr>
<td>2001</td>
<td>15%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
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<tr>
<td>2002</td>
<td>10%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
<td>20%</td>
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<tr>
<td>2003</td>
<td>5%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
<td>15%</td>
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<tr>
<td>2004</td>
<td>0%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>2005</td>
<td>0%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
</tbody>
</table>


Number of Proposals: 0, 5,000, 10,000, 15,000, 20,000, 25,000, 30,000

Funding Rate: 0%, 5%, 10%, 15%, 20%, 25%, 30%, 35%
External Institutional Pressures

Beyond the goal of making contributions to your area of science, to what extent do the following factors motivate you to submit research proposals to any funding source?

**Question 23:** Building/maintaining a grant record for academic tenure/promotion

**Question 24:** Contributing to the institution’s research status/reputation

**Question 25:** Supplementing or paying my own salary

**Question 26:** Building/maintaining a research infrastructure
Impacts: Quality and Nature of Proposed Research

- Proportion of highly-rated proposals has not declined, however, the funding rate of highly-rated proposals has decreased.
- Analyzed attitudinal data to assess community perceptions about transformative research:
  - 56% believe to a great or moderate extent that NSF welcomes transformative research.
  - 42% believe to a great or moderate extent that NSF funds transformative research.
  - NSF is the predominant choice for submitting proposals with transformative research ideas.
  - Significant disconnect between proposer and reviewer perceptions.
Impacts: Effects on Underrepresented Groups

- The decrease in funding rate has not had a disproportionate effect on women, minorities, beginning PIs, or PIs at particular types of institutions.
  - Funding rates
  - Share of proposal and award portfolios
  - Maintaining funding beyond first award
  - Years between degree and first award
Funding Rate Trends for New and Prior PIs in Underrepresented Groups

New PIs vs. Prior PIs

Fiscal Year: 1997 to 2006

- New Male
- Prior Male
- New Female
- Prior Female
- New Non-Minority
- Prior Non-Minority
- New Minority
- Prior Minority

Graph shows the funding rate trends over fiscal years 1997 to 2006 for different categories of PIs.
Impacts: Merit Review

- NSF’s peer review system is overstressed
  - Reviewer workloads have increased
    - Reviewer pool increased 15%, proposal load increased 50%
  - Increased use of panel-only review
  - Time spent on each review, as well as the thoroughness and quality of reviews, may be diminishing (based on survey data)
- Timeliness of proposal decisions did not decline, however PIs are increasingly dissatisfied with turnaround time
Community Perceptions About Funding Rates

- More than 60% of survey respondents perceive that the level of competition at NSF is more intense than at other agencies.

- Most survey respondents underestimated actual funding rates.
  - Nearly 49% of respondents estimate funding rates at 10% or lower.
Perceived vs. Actual Funding Rate

- BIO
- CSE
- EHR
- ENG
- GEO
- MPS
- OID
- OPP
- SBE
How to Improve Funding Rates?

- Limit Proposal Submissions
- Increase Number of Awards
Limit Proposal Submissions

□ Most funding opportunities do not limit submissions

□ Of those that do, three primary mechanisms are used:
  □ Preliminary proposals
  □ Limiting proposals submitted by an institution
  □ Limiting proposals by individual

□ Institution limits primarily used for solicitations focused on infrastructure, centers/facilities, and education/training.

□ If submission limits are used by research programs, primarily limit submissions by PI
Increase Number of Awards

- Primarily accomplished by increasing availability of funds:
  - Two fiscal years of funds used for a single competition
  - Adjustments made to the balance of standard and continuing grants
    - Provides some flexibility in responding to increased proposal submissions, but can only be employed for a limited time, and with discretion
Recommendations

- Focus on developing strategies that are appropriate within the context of each unit, that balance long-term planning with the ability to respond to changing needs, and that help break the decline-revise-resubmit cycle for highly fundable proposals.

- Improve communications with internal and external communities
  - When implementing new management practices
  - About sources of accurate NSF data

- Update the IPAMM trends analyses annually, and periodically reassess the practices and policies of the directorates/research offices.
Acknowledgements

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- Jeanne Hudson, OISE
- Neil Swanberg, OPP
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- Louie Rivers, SBE
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- Beth Ann Velo, BFA

**Booz Allen Hamilton Survey Team:**
- George Angerbauer, Michael Carrieri, Pat Corrigan, Mary Kay Gibbons, Chris Johnson, Keisha Kelly, and Luke Monck
Back-Up Slides
Data Sources

- **Statistical data**
  - NSF data on proposal funding rates, PI success rates, budget data, demographic data
  - Science and Engineering Indicators

- **Attitudinal data**
  - 2007 NSF Proposer Survey developed with Booz Allen Hamilton

- **Other input**
  - Focus groups of new rotators, COV reports, discussions with Advisory Committees and the National Science Board
A. Trends in the Use of Submission Limitations by Institution

<table>
<thead>
<tr>
<th>Year</th>
<th>Active**</th>
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<tbody>
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<td>2007*</td>
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B. Trends in the Use of Submission Limitations by PI

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<td>2007*</td>
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