Summary Report of Comments

Received on NIH System to Support Biomedical and Behavioral Research and Peer Review

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Submitted to:
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Executive Summary

This report provides a summary of the comments received in response to National Institutes of Health's (NIH) request for ideas and recommendations to improve the NIH System to Support Biomedical and Behavioral Research and Peer Review. Methods of analysis include quantitative analysis on responses to questions in the Web based response forms. This includes an analysis on frequency of comments:

- Distributed by day;
- Received by role (e.g. grantee, trainee, meeting participants, liaisons);
- Distributed by method received (e.g. Web mail, e-mail); and
- Received by role attributes (e.g. number of years as grantee).

The 2,803 comments received have been parsed into sixty three thousand independent quotes representing unique ideas within the comments. Those quotes then have been key-worded for sorting purposes. All calculations can be found in the appendices.

Results indicate that the comments received during the commenting process stem froms a broad cross section of NIH stakeholders. A majority of the quotes analyzed fit systematically within the 59 defined categories and represents incremental improvements to the NIH biomedical and behavioral research and peer review system. A small percentage of the comments received propose innovative or radical approaches to improving the peer review system.

The comments received are summarized within this report in a variety of ways to provide multiple ways for the NIH senior leadership and members of the Advisory Council to the Director Working Group to review and utilize the information to recommend next steps.

The report also investigates the fact that the analysis conducted has limitations. Some of the limitations include: 1) Comments received on behalf of an organization (thereby representing multiple individuals) were not weighted greater than those received on behalf of a single individual. 2) Frequency distributions per keyword were used to evaluate the magnitude of scale of the comments received and were not tallied to represent a "vote" or "majority opinion" by the submitters.

From a review of the comments received, it is the perception of respondents that NIH, and the Nation by extension, may be slipping past the tipping point of being able to maintain a strong, world-class research capacity. The various suggestions received for addressing this major problem fall primarily into two camps: 1) consolidate limited resources around the top producers, or 2) spread limited resources over the whole research work force. The proposed radical solutions to the perceived crisis amount to bypassing the traditional peer review system (perhaps temporarily) in favor of simple and inexpensive methods of funding research coupled with cost reduction initiatives.

It is recommended that the individual quotes pulled from the comments be considered in conjunction with the quote viewed within the context of the entire response. Reviewing the quotes from these two perspectives will facilitate the decision-making process.

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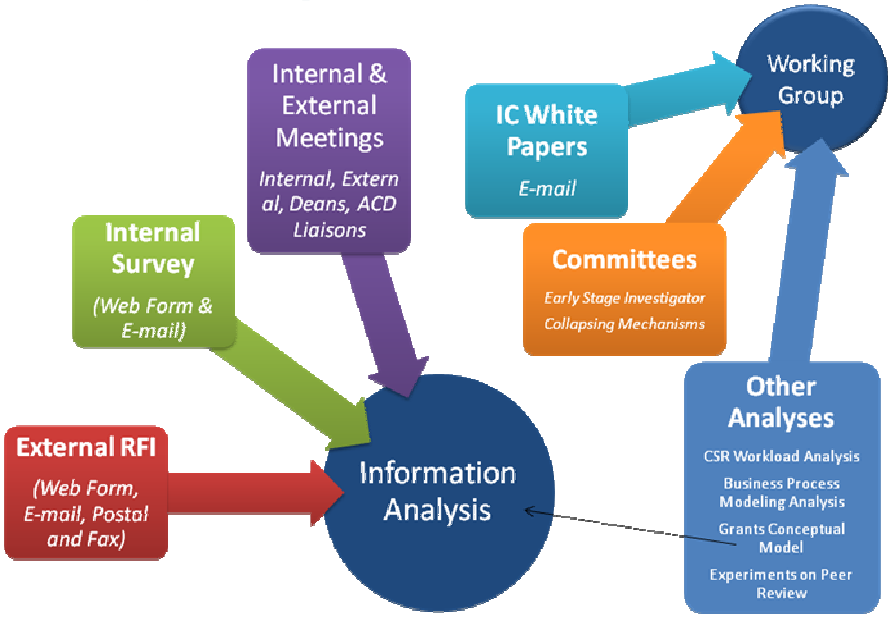
Introduction

BACKGROUND

SCOPE OF INPUT

The NIH is seeking comments regarding NIH's support of biomedical and behavioral research, including peer review, with the goal of optimizing its efficiency and effectiveness. The NIH is especially interested in creative suggestions, even if they involve radical changes to the current approach. NIH is seeking input through a variety of mechanisms as outlined in the diagram below.

Diagram 1: Summary of Information Inputs



For the purposes of this report, the following information was analyzed for inclusion in this report:

- Feedback from Internal & External Meetings including internal NIH meetings, meetings with Deans and ACD Liaisons
- Internal Survey of NIH Staff via SharePoint and e-mail
- July 6, 2007, Notice: Request for Information (RFI): NIH System to Support Biomedical and Behavioral Research and Peer Review (NOT-OD-07-074) http://grants.nih.gov/grants/guide/notice-files/NOT-OD-07-074.html

Responses to the RFI were received via a web form provided during the comment period, fax, postal mail, and e-mail. The documents received through postal mail and fax were e-mailed to the Peer Review

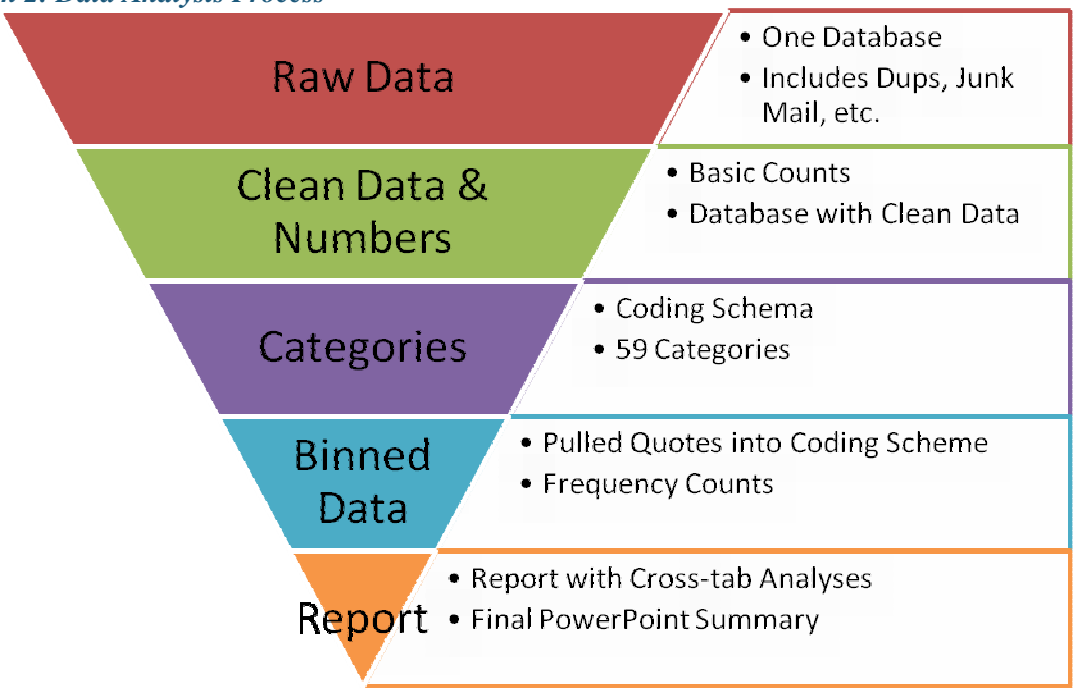
RFI e-mail box for central collection and analysis and are therefore represented as "emails" in the comment database.

SCOPE OF PROJECT REQUIREMENTS

The NIH received 2,803 narrative comments, including duplicates, in response to its request for information on how to improve the current NIH's system to support biomedical and behavioral research and peer review process. Ripple Effect Communications, Inc. was tasked with extracting meaning from the responses received. Ripple Effect's approach to accomplishing this goal was to organize the content of these comments into an easily the accessible and analyzable database, and to summarize the major trends suggested by this data. The specific requirements of Ripple Effect's contract to achieve this goal were:

- Capture all **comments** received by the three identified sources of input in a centralized database,
- Develop a **coding scheme** based on a sample content analysis of RFI responses,
- Assign each comment to the **appropriate category**(ies) of the coding scheme,
- Conduct **statistical analysis** of the content by coded category and display the results in summary charts and graphs in PowerPoint format, and
- Prepare a final report **summarizing** feedback, through **quotes**, from the comments categorized with the coding scheme.

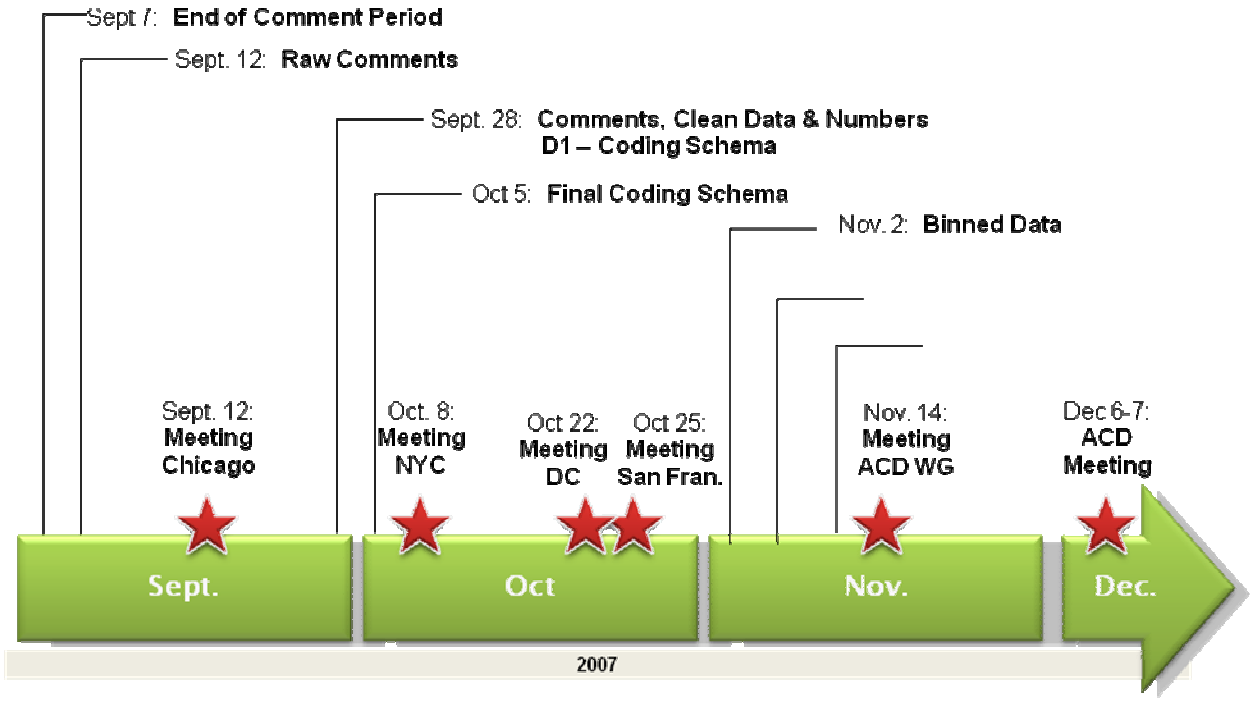
Diagram 2: Data Analysis Process



TIMELINE

The timeline for the activities is outlined below.

Diagram 3: Timeline of Key Input Activities September – December 2007



METHODOLOGY

CONSOLIDATING THE COMMENTS

All 2,803 comments from the sources identified in the background were consolidated into a central database. The database structure of the comments is outlined in Appendix A. E-mails received to the PeerReviewRFI@mail.nih.gov mailbox were also entered into this database, including the entire content of the e-mails and attachments received. Any PDF attachments that were images were scanned using optical character recognition and imported into the database.

Duplicates were identified by finding multiple comments from the same individual with the same exact content. Comments that were entirely off-topic (e.g. SPAM, selling products) were also identified as "duplicates." If an individual submitted multiple responses, each submission containing new content, they were not marked as duplicates. In addition, if two different individuals submitted the same information (e.g. pain research form letter) those two comments were not marked as duplicates. A total of 2,724 records were received after duplicates were identified and marked as such in the database. Duplicates were not deleted from the dataset to maintain the integrity of the information submitted.

CREATING A CODING SCHEME

The coding scheme evolved from the bottom up, by analyzing a sample of the responses to generate the scheme in an iterative fashion. This bottom up approach was consistent with the key aspect of the RFI design which stressed that all ideas and suggestions were welcome. No idea or comment was off the table, and "out-of-the-box" outlier ideas were encouraged. This guideline ensured that narrative responses would be very candid and open-ended. The final coding scheme is in Appendix A.

In order to provide an open organizing structure for comments, the final RFI was designed so that respondents were asked to address the **seven broad topics**: 1) challenges to research support and 2) review process, 3) solutions, 4) core values, 5) criteria, 6) scoring, and 7) career pathways. These basic topics provided several major pathways of inquiry into the community of people interested in NIH research programs. In addition, space for responding to the RFI was limited (3,000 characters maximum for each topic), in order to put an upper bound on the amount of narrative material that would have to be coded and analyzed. Finally, information on the background of respondent was collected on a self-reported voluntary basis in pre-selected categories of interest.

The seven topics provided an initial coding scheme of seven loosely connected categories. An initial review of the early responses revealed that respondents generally used the allotted space and the open format to speak their minds, regardless of which of the seven categories they used to insert their comments. "Challenges" were discussed in "solutions" and vice versa, and some respondents used the allotted space blocks on the web to write a continuous essay.

Nevertheless, these categories were used as a starting point and expanded through successive analysis/coding iterations by a coding team of three Ph.D. level scientists. The following process was followed:

1) First, a random selection of comments was assigned to each team member to scan for meaningful quotes that addressed peer review;

2) They then analyzed the quotes to define the code categories (starting with the seven of the RFI) into which the quote might belong (first cut);

3) Then they assigned the quote into one of the existing code categories that best matched the quote (second cut);

4) Finally, they revised the code structure by creating new code categories to house the quotes that did not fit existing categories.

Through 7 iterations of this process, the number of coded categories increased from the initial 7 categories to 59 categories. The first 4 iterations were done completely by hand and the last 3 iterations were done with computer-assisted search algorithms based on key words or phrases developed by the Ripple Effect staff as part of the scanning process. A summary of this 7 phase iterative process is summarized below:

- Scheme Iteration #1: 7 Code Categories Coded by hand N = 100
- Scheme Iteration #2: 12 Code Categories Coded by hand N = 200
- Scheme Iteration #3: 22 Code Categories Coded by hand N = 300
- Scheme Iteration #4: 27 Code Categories Coded by hand N = 400
- Scheme Iteration #5: 54 Code Categories Computer Assisted N = 20,000
- Scheme Iteration #6: 59 Code Categories Computer Assisted N = 41,000
- Scheme Iteration #7: 59 Code Categories Computer Assisted N = 63,000

To verify the consistency in coding the first 20,000 records were analyzed and then compared to the analysis of the larger set of 40,000 records. The results of this comparison shown in Chart 4 indicate that the top ten peer review issues are the same for both analyses with minimal changes in the rank order. There was one exception—"Funding."

Chart 4: Comparison of Rank Order for Comments Analyzed at 20k Quotes and 40k Quotes

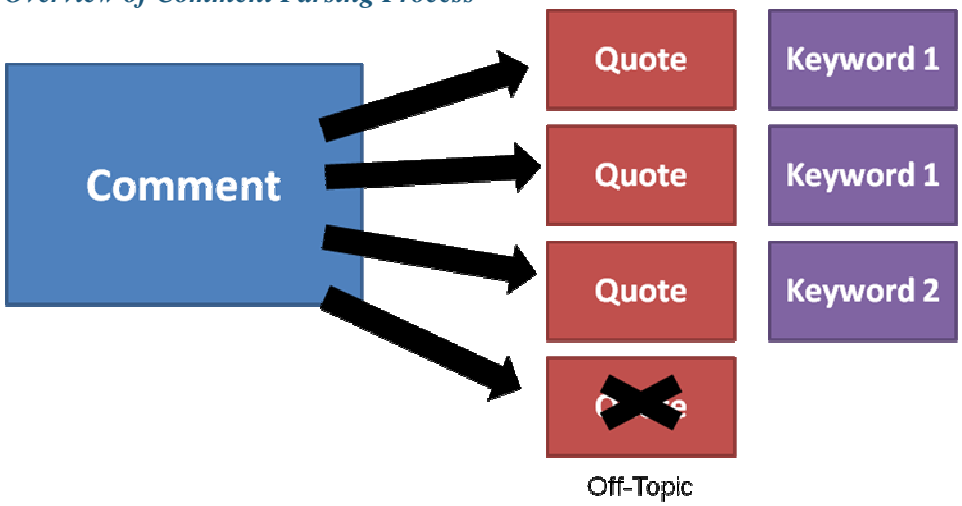
Peer Review Code Category	1st Run – 20,000 quotes			2nd Run – 40,000 quotes		
	Rank	Count	%	Rank	Count	%
Reviewers (1.9.4)	1	3118	19 %	2	5097	19 %
Application Process + Format (2.4 &1.4.1)	2	2798	17%	1	5908	22 %
Score (1.2)	3	2419	15 %	4	2876	11 %
Selection (1.3)	4	1623	10 %	6	1623	6 %
People in Review Process-Investigators (1.9.5)	5	1272	8 %	5	2439	9 %
Careers-New Investigators (3.3)	6	1193	7 %	7	1597	6 %
Funding-Number of Grants (4.5.1) + NIH Too Little Funds (4.5.2)	7	1172	7 %	3	3823	14 %
Review Staff (1.9.2)	8	820	5 %	10	820	3 %
Award Mechanisms (2.3)	9	812	5 %	8	1490	6 %
Criteria (1.1)	10	811	5 %	9	941	4 %
		16,038	100 %		26,614	100 %

The chart above illustrates that the top five in each run (using Run #1 as a base) dominate the total top-ten count at 70% for the 20k run and 67% for the 40k run. These top five issues, plus "Funding," will be used later in this report as a framework to describe the themes and trends that emerged from a top-level look at the total responses received in terms of problems, solutions and outliers.

POPULATING THE SCHEME AND BUILDING A SEARCHABLE DATABASE

The total coding scheme of 59 code categories is shown in Appendix A. Our initial hand-coding iterations to create code categories using hundreds of responses indicated that an average of about 20 quotes would be generated by each narrative response. This was a "one-to-many" challenge—each response could generate multiple meaning fragments (quotes) that could fit into one of the scheme categories. As the total response from the web response to the RFI grew to over 1,800 the decision was made to semi-automate both the scheme development process and the process for populating the scheme. The combined hand/computer-assisted process utilized to generate code categories and populate them with the 40,000 quotes is illustrated in the diagram below.

Diagram 5: Overview of Comment Parsing Process



The hand scanning process of iteration numbers 1 – 3 not only produced new code categories but also produced useful phrases that captured relevant meaning for peer review. When we transitioned to a computer search/matching process in iterations 5 – 7, these phrases drove the automated process. The process utilized the following steps:

1. Start with an initial set of phrases and construct Boolean search algorithms to search the raw database in the database to pull out quotes that were relevant to peer review.

2. Develop a computer query in the database to match this list of quotes to a list of key word phrases we had defined to represent each coding category. Initially, some quotes would be left over unmatched to a code category. Either more categories were needed, or more keyword phrases were needed to represent the existing code categories, or the remaining quotes were weakly related to the existing code categories.

3. A visual inspection of the unmatched quotes would usually suggest how each of the three possibilities had to be addressed. By going through this iterative process with the database in iteration numbers 5, 6 and 7 we increased the number of code categories from 27 to 54 to 59, respectively, and generated the final list of key word search phrases for the final coded schema listed in Appendix A.

The number of quotes processed in these three iterations was 20k, 40k and 63k respectively. The database of 63,000 quotes, with cross-tab analysis capabilities, and a PDF file of the 2,803 raw comments were uploaded into SharePoint sites to allow for analysis by NIH working groups and decision makers.

http://sps.od.nih.gov/peerreview/Lists/Peer%20Review/AllItems.aspx

OVERVIEW OF TOP THEMES

The top ten themes from the 59 categories are listed below based on the percentage of total quote counts:

	Category	Percentage of Top Ten
1.	Application-Process and Format (codes 2.4+1.4.1)	22%
2.	Reviewers (code 1.9.4)	19%
3.	Funding-Number and Amount (codes 4.5.1+4.5.2)	14%
4.	Score (code 1.2)	11%
5.	Investigators-People in the Review Process (code 1.9.5)	9%
6.	Selection (code 1.3)	6%
7.	Careers-New Investigator Issues (3.3)	6%
8.	Award Mechanisms (code 2.3)	4%
9.	Criteria (code 1.1)	4%
10.	Review Staff (code (1.9.2)	3%

The top six issues accounted for 82% of the total quote count and were selected for detailed analysis. The code numbers in parentheses identify the location of the particular issue in the 59 code scheme used to organize the quotes.

MAJOR THEMES FOR THE TOP SIX ISSUES

The chart below summarizes the key problems, key solutions and key outliers (or radical) suggestions for addressing each issue. The phrases listed in the chart are representative of the dominant themes discovered by reviewing the quotes for each issue. A sample of 400 quotes was reviewed for each of the six issues. An outlier, as a form of "extreme" solution, was considered "radical" if it tended to represent a systemic change on how the peer review system currently works, versus "incremental" changes that were suggested by most of the quotes. In fact, a key word search of the entire narrative database of comments indicated that radical suggestions represent 0.3% to 0.5% of all suggestions--only 30 to 50 quotes per ten thousand.

Chart 6: Key Themes for the Top 6 Ranked Issues on Peer Review

RANK (Scheme Codes)	ISSUE (Meta Category)	KEY PROBLEMS	KEY SOLUTIONS	KEY OUTLIERS
1 **(2.4+1.4.1)**	**Applications** (Peer Review Process and Grant Structure)	Proposals and application for funding too long; Low pay line causes more proposal submissions; Traveling is becoming a burden.	10 pages maximum for proposals; Improve use of electronic means of review and discussion; Improve electronic submission.	Include video/CD on what to expect and how to prepare for peer review; Pilot study with applicants identities removed.
2	**Reviewers** (Peer Review	Too many proposals; Not enough relevant	Mix new & experienced reviewers	Have submitters evaluate reviewers;

(1.9.4)	Process)	expertise; Too much personal and professional bias. Limit grants to 1 – 3 per P.I.	to balance perspectives and systematically train more reviewers; Use precise "peer knowledge;" Increase telecommunications use.	Mix in reviewers outside of NIH community. Have a panel of professional reviewers review all grant proposals.
3 **(4.5.1+4.5.2)**	**Funding** (Number of Grants and NIH Funding Levels)	Peer review will erode at current low levels of funding; Funding instability leads to loss of talent; Too much spent on bioterrorism; The rich get richer; Too much funding for big centers & initiatives.	Fund people not protocols; Spread control of funds to more people; Concentrate limited funds to major labs; Spread funding across the community for the survival of biomedical research.	Throw top 20% in a lottery and randomly select and fund until money is allocated; Set aside portion of funding for non-peer reviewed proposals; Tie funding to productivity rating.
4 **(1.2)**	**Score** (Peer Review Process)	Inconsistent and non-transparent scoring processes; 50% of all proposals not reviewed; Limited feedback to investigators; NIH does not fund innovative research; Cutting edge science has no peers.	Change scoring to separate score components; Provide reviewers/investigators with sample proposals and scores/sub-scores; Have a separate scoring system for young promising investigators.	Use a transparent funding algorithm that acknowledges reality: A% by score order, B% by lottery for next score tire, C% for select pay; Use a remote e-scoring system.
5 **(1.9.5)**	**Investigators** (Review Process)	Baby boomer research gap; New not getting funded, old near retirement; Too many grants per P.I. for funds available; time on proposals vs. Time on research.	More pilot grants to test feasibility for long-term research; Create incentives for young investigators to stay in research via special awards.	Put a temporary freeze on grants per P.I. to preserve research workforce until a plan to stabilize NIH is created.
6 **(1.3)**	**Selection**	Age discrimination; the young and innovative lose at NIH; Low pay lines = low stability=loss of talent; 50% are not funded; Lack of feedback to investigators.	Cap awards/investigator; Have two award types—mentored young) and un-mentored (proven); Use MERIT awards to fund the young, novel, innovative, etc.	Form "investigator study sections" to advise NIH; Fill pipeline by matching awards of $100k for 3 years to qualified assistant professors.

CONCLUSIONS

The perception of those who commented is that NIH, and the Nation by extension, may be slipping past the tipping point of being able to maintain a strong, world-class research capacity. The most immediate consequence of "having too little funding for so many good ideas" is the loss of talent to other non-biomedical fields—especially young and promising talent to fill the pipeline and to replace the soon-to-retire senior biomedical researchers. Loss of talent has negative consequences for biomedical research from which it will take generations to recover. In addition to loss of pipeline talent, the peer review system itself is under attack because of the difficulty of discriminating between the many worthy competing grant proposals when the pay line is low. A vicious cycle is being setsetting in motion in which low pay lines lead to more proposals being written and submitted, which in turn results in even lower pay lines. Meanwhile, researchers are spending more and more time writing proposals and less and less time doing research. As a result of this cycle, some believe that "50% of all proposals are not reviewed," and that NIH has shifted away from an attitude of finding ways to fund research to finding ways not to fund research. "Peer review will erode at current levels of funding."

The various suggestions for addressing this major problem fall primarily into two categories: (camps: 1) consolidate limited resources around the top producers, or 2) spread limited resources over the whole research work force. The main argument for consolidating limited resources is to get the "biggest bang for limited bucks" at the cost of reducing the size of overall research capacity. Respondents with this view also argued that perhaps a "thinning of the ranks" would be in order. The main argument for the second category is that it is better to keep the largest number of researchers working, even with limited funds for each, in order to maintain capacity until funding increases. In addition, respondents holding this view also would argue that "since innovation is probabilistic" and NIH is criticized for not being innovative, spreading the wealth would increase the chance of NIH producing innovative research outcomes. A compelling argument for the later suggestion is an overwhelming recommendation from the respondents is to limit the number grants per investigator to between 1 and 3.

The proposed radical solutions to the perceived crisis amount to bypassing the traditional peer review system (perhaps temporarily) in favor of simple and inexpensive methods of funding research coupled with cost reduction initiatives. Most suggestions for alternative funding methods address the perceived randomness of selection when there appears to be no basis for choosing one over another except personal bias. Therefore, the use of various "lottery selection" methods is part of many radical funding approaches. Comments suggest that the top 20% of proposals by score be randomly selected and funded until the money runs out. Another more conservative approach suggests a three-tiered model in which a fixed percentage of proposals in each tier is funded: by score order for the first tier, by lottery for the second tier, and by select pay for the third tier.

Other radical suggestions address modifications to the traditional peer review process (such as having investigator study sections, evaluating reviewers, etc.) but they do not address the underlying strategic issue of too little money for too many researchers. In addition, while "applications" represented the loudest voice by number of counts, these suggestions address peer review procedural operations, not strategic issues of survival. As Dr. Tabak has said on many occasions during this project, "a high frequency count does not necessarily mean that what is being said is fundamentally important."

Summary of Data on Comments

NUMBER OF COMMENTS RECEIVED

All numbers in the table below exclude duplicates.[1]

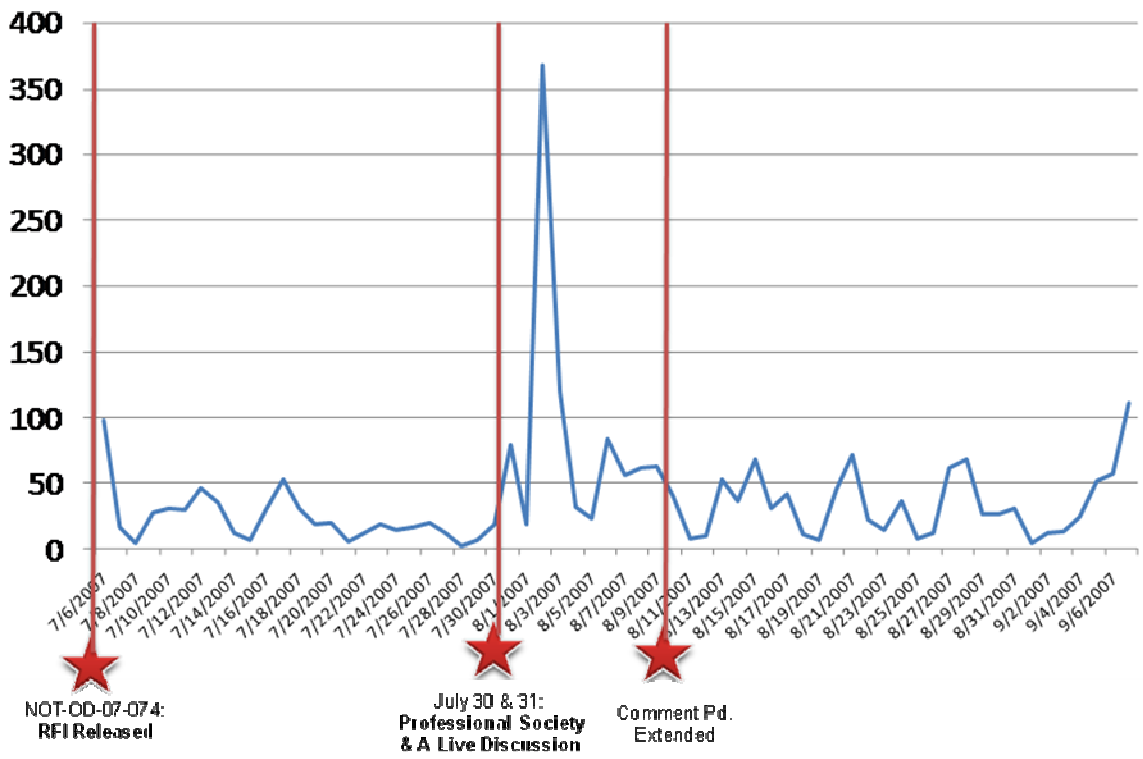
Chart 7: Summary of Comments Received

Total Number of Comments	2,724	Comments received via all methods between 7/6/2007 – 11/23/2007
Number of Duplicates	79	See definition of duplicate in footnote below.[1]
External Comments	2,522 (93%)	Comments received from members of the extramural community
Internal Comments	202 (7%)	Comments received in response to the internal survey of the NIH Staff
Received after Comment Period	249 (9%)	Comments received after the close of the comment period on 9/7/2007
Received via E-mail	694 (25%)	Submitted via e-mail
Received via Web Form	2,030 (75%)	External RFI & Internal NIH SharePoint Survey
Received on Behalf of Organizations	40	Responses in which the submitter indicated the responses were on behalf of their organization
Received in Response to Meeting Participation	16 13 from San Francisco	Responses in which the submitter specifically mentioned one of the NIH meetings in the narrative response.
Received by Scientific Liaisons	39	Scientific Liaison interacted with teams of scientists at their various designated institutions

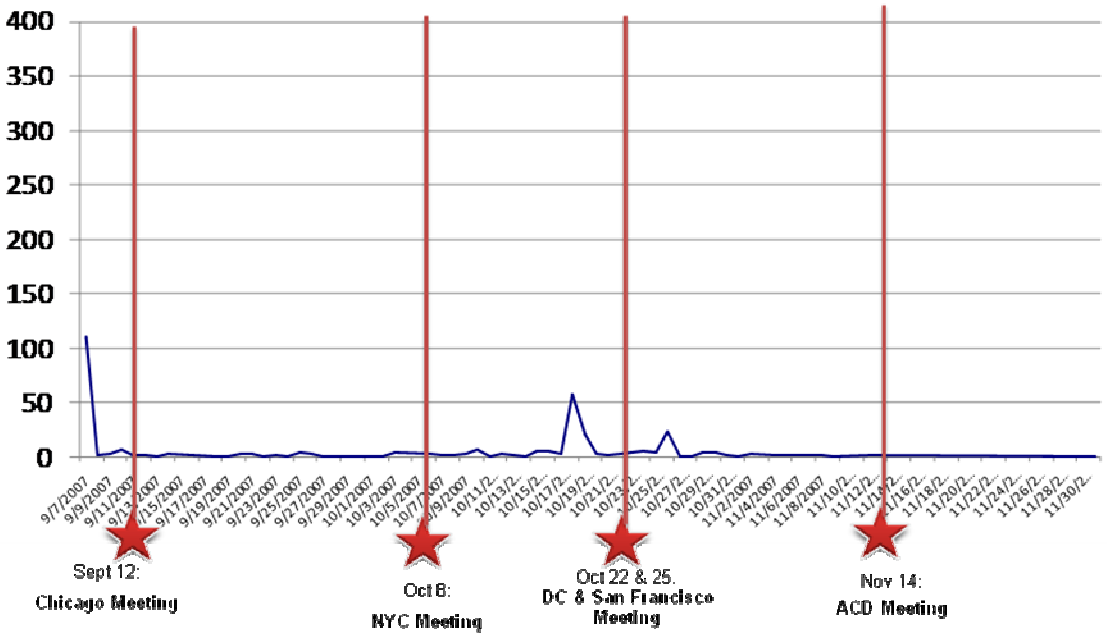
[1] Duplicates are defined as exact duplicates of records. Two submissions by the same individual or organization that were different were not marked as duplicates. In addition, any comments received that were off-topic were also marked as duplicates (e.g. marketing or SPAM)

COMMENTS DISTRIBUTED BY DATE

Graph 8: July 6 – September 7, 2007 – RFI Comment Period



Graph 9: September 7 – November 30, 2007 – Post-Comment Period



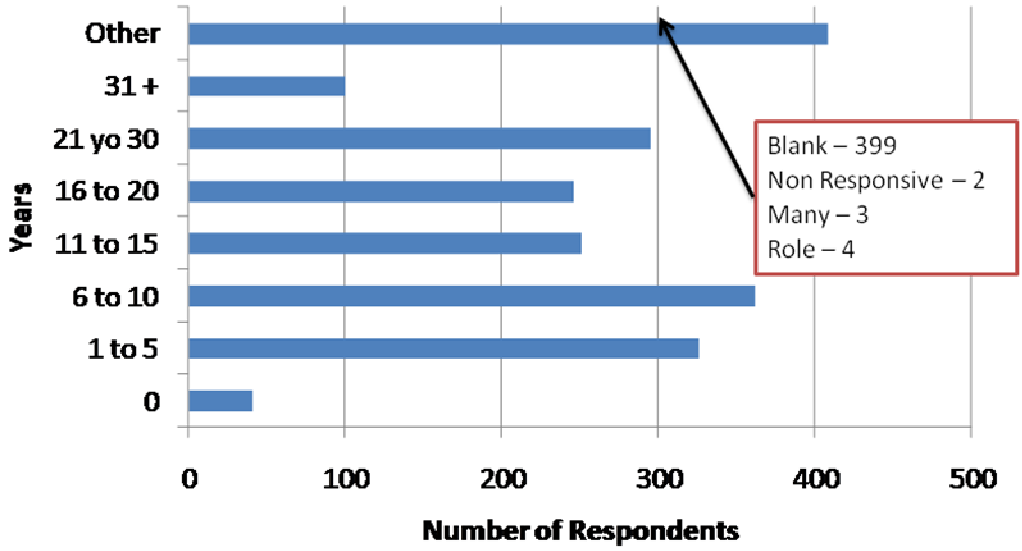
ORGANIZATIONAL RESPONSES

Organizational responses were received from:

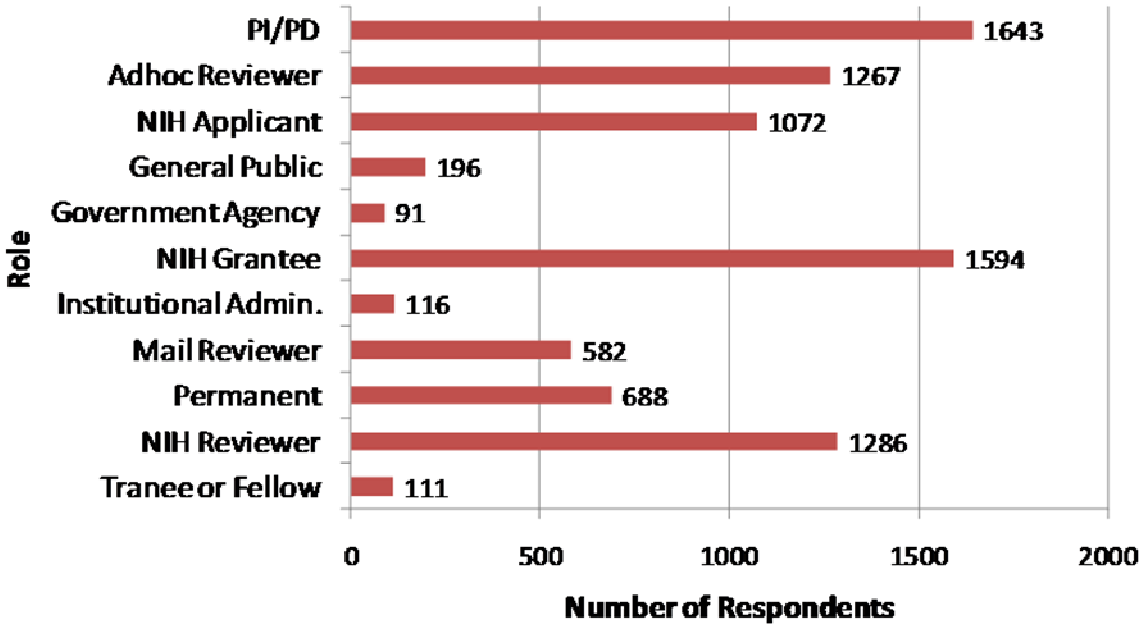
- 20/20 GeneSystems, Inc.
- American Association for Dental Research (AADR)
- American Association of Colleges of Osteopathic Medicine
- American Association of Neurological Surgeons (AANS) and the Congress of Neurological Surgeons (CNS)
- American Gastroenterological Association
- American Heart Associates
- American Heart Association
- American Heart/ American Stroke Association
- American Medical Women's Association
- American Osteopathic Association (AOA)
- American Psychosomatic Society
- American Society of Clinical Oncology
- American Society of Transplantation (AST)
- Association for Research in Otolaryngology
- Association of American Medical Colleges
- Association of Professors of Medicine (APM)
- Biophysical Society
- Center for Asia Pacific Women in Politics (CAPWIP) Institute for Gender, Governance & Leadership
- Community Partner Summit Policy Work Group
- Community-Campus Partnerships for Health
- Department of Oral Biology, University at Buffalo
- Division of Psychotherapy
- FasterCures / The Center for Accelerating Medical Solutions
- Genetics Society of America
- Gill Center for Biomolecular Science
- Huntsman Cancer Institute
- Institute for Aging Research
- International Bone & Mineral Society
- Massachusetts Institute of Technology
- MEDICAL PHYSICS Scientific Journal
- Molecules for Health, Inc.
- Parkinson's Action Network (PAN)
- Pediatric Dengue Vaccine Institute, International
- Population Association of America/Association of Population Centers
- Scientists at University at Buffalo School of Dental Medicine
- Society for Behavioral Neuroendocrinology
- Society of Nuclear Medicine (SNM)
- Society of Toxicology
- University of Pennsylvania School of Medicine

RESPONDENT PROFILE (SELF IDENTIFIED)

Graph 10: Number of Years as an NIH Grantee



Graph 11: Number of Comments by Role



Summary of Data on Quotes

DISTRIBUTION BY KEYWORD

Chart 12: Total Number of Quotes Attributed to Each Keyword

Keyword	Number of Quotes
1.1 - Peer Review Process: Criteria:	8,714
1.1.2 - Peer Review Process: Criteria: Innovation	1,071
1.10 - Peer Review Process: Core Values:	600
1.11 - Peer Review Process: Politics:	76
1.12 - Peer Review Process: Conflicts:	495
1.13 - Peer Review Process: Evaluating Process:	1,747
1.2 - Peer Review Process: Score:	3,237
1.2.2 - Peer Review Process: Score: Triage	744
1.3 - Peer Review Process: Selection:	1,246
1.4.1 - Peer Review Process: Format: General	3,311
1.4.2 - Peer Review Process: Format: Online	314
1.4.3 - Peer Review Process: Format: Summary Statement	414
1.4.4 - Peer Review Process: Format: Telephone	244
1.5 - Peer Review Process: Timing:	774
1.6 - Peer Review Process: Consistency:	363
1.7 - Peer Review Process: Budget:	594
1.8 - Peer Review Process: Incentives:	203
1.9.1 - Peer Review Process: People: Advisory Council Members	131
1.9.2 - Peer Review Process: People: Review Staff	885
1.9.3 - Peer Review Process: People: Program Officers	717
1.9.4 - Peer Review Process: People: Reviewers	6,059
1.9.5 - Peer Review Process: People: Investigators	863
1.9.6 - Peer Review Process: People: Leadership	1,140
2.1 - Grant Structure: Guiding Policies:	951
2.2 - Grant Structure: External Pressures:	46
2.3 - Grant Structure: Award Mechanisms:	1,779
2.4 - Grant Structure: Application Process:	3,730
2.5.1 - Grant Structure: Type of Research: Clinical vs Basic	859
2.5.2 - Grant Structure: Type of Research: Content Focus	112
2.5.3 - Grant Structure: Type of Research: Big Science	31
2.6 - Grant Structure: Grants Administration:	40

3.1 - Career Pathways: Pathway Structure:	20
3.2 - Career Pathways: Career Stage Focus:	921
3.3 - Career Pathways: New Investigator Issues:	353
3.4 - Career Pathways: External Competition:	47
4.1.1 - Funding: Who: Individuals	1
4.1.3 - Funding: Who: Private Sector	6
4.1.4 - Funding: Who: Large	42
4.1.5 - Funding: Who: Small	2
4.1.6 - Funding: Who: Foreign	104
4.2.1 - Funding: For What: Highest Score	18
4.2.3 - Funding: For What: Best Science	519
4.2.4 - Funding: For What: PI Reputation	12
4.3.1 - Funding: When: Award Cycle Timing	149
4.3.2 - Funding: When: Number of Years	209
4.4.2 - Funding: Where: Laboratories	32
4.4.3 - Funding: Where: Universities	79
4.4.4 - Funding: Where: U.S. Region	785
4.5.1 - Funding: For How Much: Competitiveness	143
4.5.1 - Funding: For How Much: Number of Grants	770
4.5.2 - Funding: For How Much: NIH Too Little	2,975
4.5.4 - Funding: For How Much: Salaries and Pay	693
4.6.1 - Funding: On What Terms: New Funding	26
4.6.2 - Funding: On What Terms: Continuing Funding	438
4.6.3 - Funding: On What Terms: Overhead	155
4.7 - Funding: For What Outcomes:	479
5.0 - Other:	12534
Total	**63,002**

Graph 13: Total Number of Quotes Attributed to Each Keyword

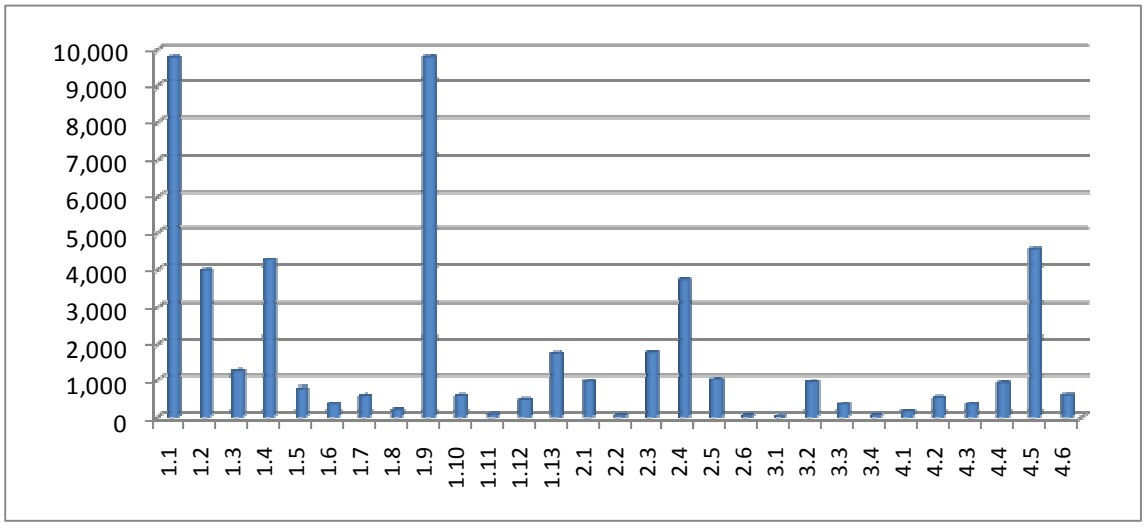


Chart 14: Total Number of Quotes Attributed to Each Keyword by Role

Keyword	PI/PD	NIH Grantee	ADHOC Reviewer	NIH Applicant	NIH Reviewer	General Public	Mail Reviewer	Permanent	Government Agency	Institutional Admin	Trainee or Fellow
1.1 - Criteria	5547	5402	4399	3669	4370	625	2093	2551	237	326	354
1.1.2 - Innovation	677	658	549	460	552	83	249	291	33	42	52
1.10 - Core Values	409	389	334	286	328	51	160	170	20	37	22
1.11 - Politics	61	59	51	39	54	3	27	31	1		6
1.12 – Conflicts of Interest	254	255	215	159	217	47	104	112	25	25	12
1.13 - Evaluating Process	335	332	284	226	278	50	139	135	11	19	28
1.2 - Score	2151	2108	1797	1435	1810	200	840	987	98	127	134
1.2.2 - Triage	316	307	277	223	268	43	132	139	14	29	26
1.3 - Selection	923	932	722	633	745	127	331	372	52	74	83
1.4.1 - Format	2466	2369	2000	1662	2008	341	925	1058	123	195	152
1.4.2 - Online	217	203	181	153	182	32	86	96	18	29	21
1.4.3 - Summary Statement	248	225	185	166	180	41	73	74	11	12	12
1.4.4 - Telephone	45	44	44	29	43	6	30	31	2	5	4
1.5 - Timing	434	423	341	282	342	55	170	163	19	31	32
1.6 - Consistency	290	278	224	194	227	34	114	136	12	14	22
1.7 - Budget	348	345	291	207	284	45	132	186	15	22	19
1.8 - Incentives	102	103	86	74	83	18	39	55	4	5	4

Keyword	PI/PD	NIH Grantee	ADHOC Reviewer	NIH Applicant	NIH Reviewer	General Public	Mail Reviewer	Permanent	Government Agency	Institutional Admin	Trainee or Fellow
1.9.1 - Advisory Council Members	82	82	65	43	76	8	28	37	11	1	
1.9.2 - Review Staff	585	568	503	419	519	87	242	294	37	45	25
1.9.3 - Program Officers	513	519	398	336	414	76	192	223	46	57	44
1.9.4 - Reviewers	4099	3978	3371	2820	3388	514	1580	1855	204	284	228
1.9.5 - Investigators	729	700	574	480	575	81	266	279	39	48	59
1.9.6 - Leadership	168	168	134	116	138	17	53	76	11	14	17
2.1 - Guiding Policies	703	690	564	480	562	89	275	314	20	44	60
2.2 - External Pressures	38	36	30	21	32	5	18	14	3	1	1
2.3 - Award Mechanisms	1125	1100	853	721	867	165	401	451	52	100	82
2.4 - Application Process	2008	1916	1634	1371	1633	208	770	843	98	114	101
2.5.1 - Clinical vs. Basic	415	408	321	252	327	49	169	161	20	23	31
2.5.2 - Content Focus	10	11	12	6	12	5	4	5		1	1
2.5.3 - Big Science	24	24	23	11	24	1	15	17		5	
2.6 - Grants Administration	24	25	21	15	21	2	7	10	2	1	3
3.1 - Pathway Structure	6	6	5	5	6	1	3	3		2	
3.2 - Career Stage Focus	595	576	449	402	472	84	200	249	48	45	64
3.3 - New Investigator Issues	296	288	230	217	231	46	113	113	15	20	17
3.4 - External Competition	9	9	8	6	8	4	5	4		1	2
4.1.1 - Who Individuals	1	1	1	1	1						
4.1.3 - Who Private Sector	5	5	5	3	5	2	3	4		1	
4.1.4 - Who Large	36	37	30	26	29	6	20	12			3
4.1.5 - Who Small	1	1	1	1	1	1					
4.1.6 - Who Foreign	79	74	68	57	63	21	35	33	3	5	7

Keyword	PI/PD	NIH Grantee	ADHOC Reviewer	NIH Applicant	NIH Reviewer	General Public	Mail Reviewer	Permanent	Government Agency	Institutional Admin	Trainee or Fellow
4.2.1 - For What: Highest Score	15	14	11	9	12	2	1	8			2
4.2.3 - For What: Best Science	395	385	321	273	312	54	165	180	16	31	39
4.2.4 - For What PI Reputation	8	7	6	6	7	3	1	2		1	
4.3.1 - When Award Cycle Timing	11	11	8	11	8	2	6	2			2
4.3.2 - When Number of Years	175	174	143	108	152	25	75	85	6	9	8
4.4.2 - Where Laboratories	8	8	7	8	7	5	4	2	1		1
4.4.3 - Where Universities	24	20	18	19	13	1	9	6		3	2
4.4.4 - Where U.S. Region	401	394	334	259	341	56	162	164	20	34	20
4.5.1 - For How Much Competitiveness	121	119	102	78	102	12	45	48	4	7	8
4.5.1 - For How Much Number of Grants	622	603	493	383	494	62	224	275	29	58	32
4.5.2 - For How Much NIH Too Little	2296	2235	1845	1491	1833	276	848	949	97	157	179
4.5.4 - For How Much Salaries and Pay	183	179	134	125	139	20	74	90	7	13	12
4.6.1 - On What Terms New Funding	12	12	10	8	9	1	3	8	14		
4.6.2 - On What Terms Continuing Funding	236	235	204	151	200	29	81	116	14	18	20
4.6.3 - On What Terms Overhead	97	100	80	63	79	12	37	36	13	3	17
4.7 - For What Outcomes	254	243	181	168	180	37	82	103	8	22	29

Chart 15: Total Percent of Quotes Attributed to Each Keyword by Role

Keyword	PI/PD	NIH Grantee	ADHOC Reviewer	NIH Applicant	NIH Reviewer	General Public	Mail Reviewer	Permanent	Government Agency	Institutional Admin	Trainee or Fellow
1.1 - Criteria	18%	18%	17%	18%	17%	16%	18%	19%	15%	15%	17%
1.1.2 - Innovation	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
1.10 - Core Values	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	1%
1.11 - Politics	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1.12 – Conflicts of Interest	1%	1%	1%	1%	1%	1%	1%	1%	2%	1%	1%
1.13 - Evaluating Process	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
1.2 - Score	7%	7%	7%	7%	7%	5%	7%	7%	6%	6%	6%
1.2.2 - Triage	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
1.3 - Selection	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	4%
1.4.1 - Format	8%	8%	8%	8%	8%	9%	8%	8%	8%	9%	7%
1.4.2 - Online	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
1.4.3 - Summary Statement	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
1.4.4 - Telephone	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1.5 - Timing	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%
1.6 - Consistency	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
1.7 - Budget	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
1.8 - Incentives	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
1.9.1 - Advisory Council Members	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
1.9.2 - Review Staff	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%
1.9.3 - Program Officers	2%	2%	2%	2%	2%	2%	2%	2%	3%	3%	2%
1.9.4 - Reviewers	13%	13%	13%	14%	13%	13%	13%	14%	13%	13%	11%

Keyword	PI/PD	NIH Grantee	ADHOC Reviewer	NIH Applicant	NIH Reviewer	General Public	Mail Reviewer	Permanent	Government Agency	Institutional Admin	Trainee or Fellow
1.9.5 - Investigators	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	3%
1.9.6 - Leadership	1%	1%	1%	1%	1%	0%	0%	1%	1%	1%	1%
2.1 - Guiding Policies	2%	2%	2%	2%	2%	2%	2%	2%	1%	2%	3%
2.2 - External Pressures	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2.3 - Award Mechanisms	4%	4%	3%	3%	3%	4%	3%	3%	3%	5%	4%
2.4 - Application Process	6%	6%	6%	7%	6%	5%	6%	6%	6%	5%	5%
2.5.1 - Clinical vs. Basic	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
2.5.2 - Content Focus	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2.5.3 - Big Science	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
2.6 - Grants Administration	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3.1 - Pathway Structure	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
3.2 - Career Stage Focus	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%	3%
3.3 - New Investigator Issues	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
3.4 - External Competition	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.1.1 - Who Individuals	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.1.3 - Who Private Sector	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.1.4 - Who Large	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.1.5 - Who Small	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.1.6 - Who Foreign	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%
4.2.1 - For What: Highest Score	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.2.3 - For What: Best Science	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%
4.2.4 - For What PI Reputation	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.3.1 - When Award Cycle Timing	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.3.2 - When Number of Years	1%	1%	1%	1%	1%	1%	1%	1%	0%	0%	0%

Keyword	PI/PD	NIH Grantee	ADHOC Reviewer	NIH Applicant	NIH Reviewer	General Public	Mail Reviewer	Permanent	Government Agency	Institutional Admin	Trainee or Fellow
4.4.2 - Where Laboratories	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.4.3 - Where Universities	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.4.4 - Where U.S. Region	1%	1%	1%	1%	1%	1%	1%	1%	1%	2%	1%
4.5.1 - For How Much Competitiveness	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
4.5.1 - For How Much Number of Grants	2%	2%	2%	2%	2%	2%	2%	2%	2%	3%	2%
4.5.2 - For How Much NIH Too Little	7%	7%	7%	7%	7%	7%	7%	7%	6%	7%	9%
4.5.4 - For How Much Salaries and Pay	1%	1%	1%	1%	1%	1%	1%	1%	0%	1%	1%
4.6.1 - On What Terms New Funding	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	0%
4.6.2 - On What Terms Continuing Funding	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
4.6.3 - On What Terms Overhead	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%
4.7 - For What Outcomes	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%

SUMMARY OF THEMES

1.0 PEER REVIEW PROCESS

1.1 Evaluation Criteria

Category	Problem	Solution
General Comments	• Reviewers are not weighing criteria equally or objective Funding is not based on "official" review criteria • Numerical ratings are not appropriate • Shortening the length of the application will not allow PI/PDs to demonstrate ability to meet criteria • Quantity rewarded instead of quality	• SRAs or Study Sections need to enforce consistency of criteria • Stop changing the criteria • Identify applications that will be not funded earlier on in the process • Weight certain criteria higher than other criteria

Significance	• This criteria is interpreted differently by each reviewer (e.g. medical application significance, significance of research) • Researchers have been guided to consider significance over innovation	• Should be "potential" significance
Investigators	• Members of study sections are judged more critically as PI/PDs in the application process • PI/PDs inflate productivity (e.g. publications, list of grants)	• Criteria should reflect the applicant (e.g. junior investigator vs. senior investigator) • Review criteria should be different for each mechanism
Innovation (1.1.2)	• Current System discourages creativity and innovation through selection • Innovation seems to "trump" other criteria • Experimental design is incremental not innovative • Criteria other than innovation should be emphasized • Reviewers do not appreciate or understand new and innovative approaches • Study section members may "sabotage" innovative research	• Need to encourage "open mindedness" when evaluating innovation • Innovation should focus on the approach
Additional Criteria		• Productivity • Immediacy of Potential Clinical Applications • Past Performance or Track Record (e.g. Publications, Performance on Past Grants) • Potential Significances or Impact • Excellence of Science • Responsiveness to RFA/RFP

1.2 Score

Category	Problem	Solution
General Comments	• Scores are becoming meaningless since they do not lead to funding • Previously un-scored applications are automatically removed from consideration • Scoring is arbitrary and subjective • There is a bias to pad scores within the reviewers field of interest • Feasibility section is misunderstood by most reviewers • A strong primary reviewer can greatly influence the score	• If initial score is high enough, then invite the PI to proceed with the full application • Training on how to managing the scoring aspect of the study sections • Change the scoring system to resemble gymnastics, not golf • Scoring should separate science and applicant considerations • Written critiques should be more consistent with the score • Required that a PI's second or third R01

	• A single negative comment (factually based or not) will impact the entire score • Upward score drift in study sections • Study sections are attempting to make programmatic decisions during scoring by scoring "the same old proposal" lower • Reviewers score "new applicants" lower to compensate for the fact they are given more funding • Applications with highly divergent scores among reviewers rarely leads to convergence or consensus through discussion	receive a higher score • Reviewers should be able to ask for preliminary data • If one reviewer scores a proposal in the "excellent" range it should be included for discussion
Streamline Process/Triaging (1.2.2)	• Virtually no difference in score or success rate of funded vs. un-funded applications • Triaging is used to censor ideas from competing laboratories • First time applicants are often triaged due to insufficient resources • Pressure for study sections to "triage" as many applications as possible to reduce cost and effort of review • Triaging system is confusing because the same application can receive a nearly fundable score in one study section and be triaged when resubmitted for consideration	• Score all applications • Streamline process should be abolished • Limit detailed discussion or feedback on those applications that score 100-250 • Provide applicants and reviewers additional guidance on the streamlining process

1.3 Selection

Category	Problem	Solution
General Comments	• The concept of "Centers" has outlived its usefulness • The "good-ole-boy" network bias in the review and selection system • Applicants frustrated in recent years by the mixed messages and inconsistency in the process • The peer review process is overloaded to the breaking point	• Always fund excellent science • Fund scientists with a proven track record • Remove biased reviewers • Program officers request additional reviews from experts with the review submitted is insufficient before funding • There needs to be a mechanisms where highly innovative and speculative ideas can be funded and bypass reviewers conservative biases • Develop a mechanism to appeal unfair/non accurate and bias reviews • Run a lottery to award grants • Simplify the selection process and use funds to award more grants

		• Increase number of past-merit-based awards with greater freedom for future research

1.4 Format

Category	Problem	Solution
General Comments	• Review process is negative, critical, not positive and not constructive • Peer review process is flawed but the best mechanism we have	• Reviewer's should not be allowed to identify new problem issues on a revised submission • Ensuring that proposals are reviewed by experts with domain knowledge should be a highest priority going forwards • A deliberative peer review process that is conducted through in-person meetings of the review panel is the main strength of the review system and should be maintained
Online	• Web reviews are inadequate and do not help program at all • Individuals are against Asynchronous web-based reviews and will not participate in them in the future • As part of the pilot for web-based reviews and while I applaud the effort to limit travel, I don't think applications get the same quality of review using the web-based format as they do during the face-to-face meetings	• Videoconferences could be used instead of traditional meetings to increase participation and reduce travel costs • De-emphasize live discussions and substitute asynchronous, written discussions • Face to face discussion often brings out issues regarding relevance and factual errors that have been made in reviews in a manner that would not occur if the process became more electronic • Electronic review process shows promise for removing personality of reviewer influencing group vote • Central WEB hub that would explain the different granting agencies, their funding priorities, and different type of grants available • In order to be successful, electronic review platforms must be state-of-the-art
E-Submission	• The electronic grant submissions process is a cumbersome mess • New electronic submissions make it more difficult to "fix" errors	• Electronic submissions has certainly simplified the review process • DOD has/had a much more streamlined online application system which could been selected for all federal grant applications.
Summary Statement	• Statements such as "it is conceivable that the preliminary data are wrong" or “it is conceivable that the transgenic system alters the process in unknown ways” without complete discussion/explanation	• Create an internal review process that provides a reasonable filter for appropriateness of the written critiques and summary statements • Put a "lay person" summary in with no

	are not acceptable • Re-submission cycles often involve "missing" a cycle because of the time involved to prepare and disseminate the summary statements • One reviewer in particular made many negative comments which were scientifically untrue, and in several cases s/he had obviously not read sections of the proposal which had specifically anticipated and answered some of the concerns raised • Too many incredibly off-base comments from people who comment in a helpful way on the stats but then proceed to go on to content issues they know little/nothing about • Applicants are told in the first or second review that something was a strength and then having it called a weakness in a subsequent review • Summary statements often do not reflect the actual discussion during the review	scientific terms so that the public can better grasp what we do • Opportunity for rebuttal to the pink sheet comments other than in the resubmission • Review should focus on the big picture and not the nit picking details
Telephone	• Phoned-in reviews are often difficult to hear • Telephone conferences are not as effective as doing reviews in person	• Conducting more phone-based reviews could reduce cost and burden of the process • Need to make phone review the norm

1.5 Timing

Category	Problem	Solution
General Comments	• The time spent on resubmission is not worth the return on investment • Reducing the application length will exacerbate the problem • Increasing disparities between the resources of the haves and have-nots, who must spend their time re-writing proposals rather than focusing on papers and research, thus falling further behind and becoming less competitive with every cycle • It takes nine months from submission to start date for any one proposal, which is a lifetime for those on the tenure clock	• Turnaround time of summary statements needs to be reduced to allow for re-submission • Technology should be leveraged to reduce turnaround time for feedback • Grants should be awarded for a longer period of time • Reduce the length of the grant applications and in turn reduce the time spent on applications • Focus on long term goals as opposed to the NIH model which results in behavior akin to a publically held corporation more worried about the stock price than actual accomplishment

1.6 Consistency

Category	Problem	Solution
General Comments	• Reviews will always be inconsistent due to human effort • The inconsistency of peer review is noticed during resubmission • It is difficult to develop a fair and consistent review process with funding rates less than 10%	• Continuity in review staff will help to ensure consistency • Create a tool that can help monitor and manage deviant score outside the norm • Consistency will be improved with higher paid reviewers of higher quality • Increase diversity in study section participation will improve consistency

1.7 Budget

Category	Problem	Solution
General Comments	• In the current climate investigators must request budgets for new grants which allow for greater funding amounts • Modular and non-modular budgets do not make sense	•

1.8 Incentives

Category	Problem	Solution
General Comments	• Incentives are insufficient for excellent individuals to participate in peer review	•

1.9 People

Category	Problem	Solution
Advisory Council Members (1.9.1)	• Misconceptions exist on the role of reviewers, council and NIH in the peer review process • Advisory council and IC Directors over-rid the recommendations of the scientific review committees • Council meeting schedule has the greatest impact on the timing of funding decisions and length of application cycle • Applicants have no way to provide input to council meetings • Reviewers often ignore the priorities determined by council • The council is merely a “rubber stamp” of the study sections • Inconsistency in scoring makes it difficult for Council to review applications	• The second level of review by Advisory Councils should be more transparent • Councils should meet right after study sections so that time could be saved

Review Staff (1.9.2)	• Poor morale exists among the SRAs • Bias exists both in a positive and negative way. • SRAs do not keep one reviewer from dominating the conversation	• SRAs who have served for 10 years on a specific panel ought to be reassigned • Convene study sections in topical areas (e.g. physics, engineering) • SRAs should be careful to seek the right reviewers • SRAs and Program officials need to take an active role to ensure no bias
Program Officers (1.9.3)	• Programmatic knowledge is largely discounted, if not ignored • External review should not be to the exclusion of internal expertise with awareness of programmatic history • There are too many programs and too much variance from institute to institute	• Have program staff critique the reviews of reviewers • Program official input should be heard during reviews
Reviewers (1.9.4)	• Not enough reviewers available or included to represent the breadth of areas of expertise • The very best reviewers are extremely busy • Difficult to recruit and retain the best reviewers • Ad hoc reviewers create inconsistency	• Include members of the general public in the review teams • Study sections should become smaller and more focused • Reduce reviewer workload (shorter grants; fewer grants; focused areas of expertise) • Some panels need to rely on less experienced reviewers
Investigators (1.9.5)	• Investigators feel "nit-picked" and not like they are receiving constructive feedback • PIs must prove what they know by publishing, but they can only get funded if they have already published • Emphasis on "independence" is outdated • Excellence or leadership in one's field is too subjective	• Should emphasize PI track record to promote research • PI should be made aware of the grant would never be funded based on NIH policies • Investigators should limit the number of grant applications • Cap the grant dollars to individual PIs.
Leadership (1.9.6)	• This lack of stability appears to have resulted from mismanagement, and probably could have been avoided • Top-down management of today's NIH does not work • Innovative ideas cannot come from the top • CSR leadership does not really listen to the scientific community • Risk is not supported by NIH leadership	• Strong leadership is important in IRGs

1.10 Core Values

- Innovation
- Fairness, Unbiased, Objectivity, Impartiality
- Honesty, Integrity (Scientific)

- Timely Review
- Impact
- Confidentiality
- Equity
- Scientific Excellence, Funding Best Science, Scientific Rigor
- Open-mindedness
- Transparency
- Consistency
- Independence
- Competition

1.11 Politics

Category	Problem	Solution
General Comments	• Decisions are based on a political agenda and not good science • The political agenda of advocacy groups can skew the scientific portfolio	• Distributed power is better than concentrated power to keep politics out of the process • Maintain an independent review process that is not influenced by politics

1.12 Conflicts

Category	Problem	Solution
General Comments	• Conflicts of interest in the peer review process have not sufficiently been addressed • Conflicts can occur in the "ole-boy" network when individuals support their friends in the peer review process • The confidentiality of the peer review process must be maintained to avoid conflict	• Potential competition with applicant should be considered a conflict • Stronger conflict of interest guidelines should be implemented • Oversee peer review process by a board of impartial or retired scientists

1.13 Evaluating Process

Category	Problem	Solution
General Comments	• Stop "tinkering" with the peer review process	•

2.0 GRANT STRUCTURE

2.1 Guiding Policies – See Core Values

2.2 External Pressures

Category	Problem	Solution
General Comments	• Pressure can lead to fraudulent findings or reports • Low success rates creates pressure to be overly critical	• Maintain freedom of excessive external pressure

	• The external pressure for funding is leading some scientists to other career paths • There is an increased pressure on scientists to submit and obtain grants to maintain positions in institutions	

2.3 Award Mechanisms

Category	Problem	Solution
General Comments	• Too many grant mechanisms • Grant mechanisms are implemented inconsistently •	• Reduce the number of grant mechanisms • Only support R01s

2.4 Application Process

Category	Problem	Solution
General Comments	• Significant time is required to submit grant applications • The electronic grant application process is confusing and problematic	• Standardize grant applications • Provide an alternative to resubmission

2.5 Type of Research

Category	Problem	Solution
Clinical vs. Basic (2.5.1)	• Clinical research is an "endangered" species • Basic researchers are being set up for failure when they may not have tangible outcomes • Basic research has taken a reduction in funding in recent years • Study sections are often biased for or against clinical or basic research	• Spend more funds on research that has a clinical applicability • Spend more funds on basic research which is the foundation for clinical research • Include the community in the review process • Have separate study sections for basic and clinical research
Content Focus (2.5.2)	• Input for the consumer advocate should be considered • Concern that NIH should not be spending so much money on Cancer Centers	• Proposals should be divided by broad disease specific areas or research areas • Evaluate effectiveness of cancer centers, do not necessarily eliminate them
Big Science (2.5.3)	• Too much emphasis on "big science" • Big science may be necessary but is not innovative • Big science is not necessarily good science • Study sections seem to favor big science	• Emphasize translational research • Support more individual research grants

2.6 Grant Administration

Category	Problem	Solution
General Comments	• Grants systems are not compatible for Mac users • Pure Edge software is needlessly time consuming • Too many registrations and log-ins required • Having too many mechanisms is confusing for grants administration staff	• Use eRA commons instead of biosketches, etc. to get the most current information on applicants • Include grants management staff in funding decisions

3.0 CAREER PATHWAYS

3.1 Pathway Structure

Category	Problem	Solution
General Comments	• The best and brightest will choose more stable and lucrative careers in business, law, clinical medicine and finance	• Best science may come from non-traditional pathways • NIH should evaluate attrition rates at each stage of the career path

3.2 Career Stage Focus

Category	Problem	Solution
General Comments	• Focusing on new investigators is admirable, but it ignores all the stages leading to this point • We are losing a generation of scientists after training • There is a lack of mentorship in the review process • The timing of the review process holds up individual careers • Not enough women PIs have scientific career and family	• Mid-career and Senior investigators need funding to continue research • Review should focus on the last 5 years of the career instead of the entire career • Review process should reflect the stage in the persons career • Increase support for undergraduates considering a career in research • Limit career development support to only the most pressing issues

3.3 New Investigator Issues

Category	Problem	Solution
General Comments	• The highly competitive environment affects the ability of new investigators to compete • Since tenure has been extended to 10 years, it has become even more difficult for young investigators • Support of new investigators discriminates against those more proven and	• A better mix of senior and junior peer reviewers would improve the process • It is important to determine the appropriate ratio of young investigators to sustain the research enterprise

	experienced investigators • Younger scientists are leaving academia • Senior investigators try to eliminate junior PIs with now power • Having young scientists being evaluated by people who's frame of reference is out of date introduces more problems	

3.4 External Competition

Category	Problem	Solution
General Comments	• There is external competition for minorities and other under-served populations • There is increased competition with foreign scientists • Geographical, gender and minority quotas come at a price to science	• Interact more with minority professional associations • Include more minorities in study sections.

4.0 FUNDING

4.2 For What

Category	Problem	Solution
Highest Score (4.2.1)	• See 1.2 Score	•
Hottest Science (4.2.2)	• None	•
Best Science (4.2.3)	• Current scoring does not promote the "best" science • Best science is usually attributed with good track record, well designed experimental methods and preliminary data	• Let the best science be selected in the first level of review
PI Reputation (4.2.4)	• It is difficult for assistant professors to get funded • PIs do not want study sections with a poor reputation to review their proposal	• Provide anonymized applications for review

4.3 When

Category	Problem	Solution
Award Cycle Timing (4.3.1)	• See 1.5 Timing	•
Number of Years	• See 1.5 Timing	•

(4.3.2)

4.4 Where

Category	Problem	Solution
Institutions (4.4.1)	• None	•
Laboratories (4.4.2)	• None	•
Universities (4.4.3)	• None	•
U.S. Region (4.4.4)	• The current training, and peer review meetings favors those on the east coast • A majority of reviewers are from the Northeast • New biotechnology industries are largely absent in rural/non-metropolitan areas	• Move NIH campuses across the Nation (instead of just the east coast) • Move study sections to a central location or the west coast, in addition

4.5 For How Much

Category	Problem	Solution
Competitiveness (4.5.1)	• The current system is so competitive that it is difficult to assume any success • It is difficult for reviewers to find any issues in this highly competitive environment • Very tight funding makes it likely that all of us will not be funded on our first submission - if that submission is a competitive renewal • Problem is that most of PIs write terrible proposals, and so they suffer disportionately from an intensely competitive funding climate, with a large emphasis on grantsmanship • With funding rates of 15% or 10% or even 6% found in the US, if you calculate the time it takes 20 PIs to write 20 grants and with 1 or 2 grants being funded, the long detailed proposal submission process is not an efficient use of the PIs time and is not economically competitive for our Nation	• Redesign the intramural review process to make it as competitive as extramural • Increase the amount of funding to NIH • Focus on funding areas of priority
Number of Grants (4.5.2)	• There is no limit to the number of grants per institution or individual PI • There should be a limit on the number of big program project grants	• Limit every PI to no more than two R01 grants • Increase the number of grants and reduce the level of support to increase the success rate • Limit the number of grants and/or maximum funding each PI can get from NIH
NIH Too Little	• Without more funds the current system	• The government must raise the priority of

(4.5.3)	cannot improve • Too little money goes into too few hands to make a difference • Too little money to go around • When success rates are relatively low and very good grants go unfunded, the reviewer is left with the feeling that they have wasted their time and effort • Problems are magnified when money gets tight	biomedical research • Provide more funding for research
Salaries and Pay (4.5.4)	• With current paylines many researchers will leave the research • Restricting PIs to a few grants may affect salaries which require multiple grants to cover • Faculty members are in danger of losing jobs during an NIH funding lull • Salaries and paylines increase but the number of grants do not • Faculty should not be dependent on grants to pay their salary • Paylines moving is a budget issue, not a scientific one • Lower paylines has created the increase in number of grant applications in order for institutions to cover the risk of their current investments	• Stop supporting salaries of PIs and Co-PIs • Universities should be responsible for supporting faculty position salaries • NIH should only support up to a certain percentage of salaries (i.e. 30 – 70%) • Make universities pay 50% of salaries

4.6 On What Terms

Category	Problem	Solution
Continuing Funding (4.6.2)	• Submissions of grant applications begin in year two of the grant to ensure that there is no break in funding • Discontinuity in funding is a huge problem • Difficult to maintain continuity in research when there is a lapse in funding • Multiple grants are a mechanism to maintaining the continuity of grant facilities	• Fund proven scientists for a longer period of time (e.g. 10 years) • Increase NIH overall level of support • Reduce the funding level, but increase the number of years of support
Overhead (4.6.3)	• There is no reason NIH should pay Indirect rates of 60, 70 and 80% • The number of meetings for some grants is impacting administrative overhead (e.g. CTSA) • Universities should not expect NIH to pay	• NIH should require a uniform overhead percentage • Increase indirect rates on K awards • Be more clear on expectations for use of indirect funds to ensure they will serve to support the PI

	for overhead costs • Very high "overhead" of the current systems is the equivalent of a costly non-productive frictional drag on the research enterprise • Indirect rates should not vary based on the institution	• Cut down on administrative costs • Reducing indirect rates to universities may free up funds for research

4.7 For What Outcomes

Category	Problem	Solution
General Comments	• SRAs make grant assignments in a way that affect their outcome • Difference in outcome between study sections and SEPs • Benefit of the doubt to well know researchers at big institutions • Outcomes may not come until the end, instead of through periodic publications • Move away from the concept of "safe" science, in which the outcome of each proposed experiment is obvious, to a system that values proposals that take more risks • Publications, citations and presentation are not the only indicators of a positive outcome • Proposal outcomes are often determined by one or few individuals	• Tax payers pay for it, it must be clear that they potentially could benefit from the science • Emphasize promise and early accomplishment • Number of publications should not be cross counted between grants • Outcome based on preliminary data • Outcome based on creative thinking • Outcome based on impact on healthcare • Relationship to the NIH Mission • NIH should evaluate the outcome of the grants to see if its money has been spent wisely • Research with some risk that has potentially negative outcome should still be encouraged • The quality and impact of the publications should be considered instead of the number of publications • Review should be controlled by the program staff (like in DOD, NSF, DOE and NASA)

Appendix A: Data Dictionary & Entity Relationship Diagram

ENTITY RELATIONSHIP DIAGRAM

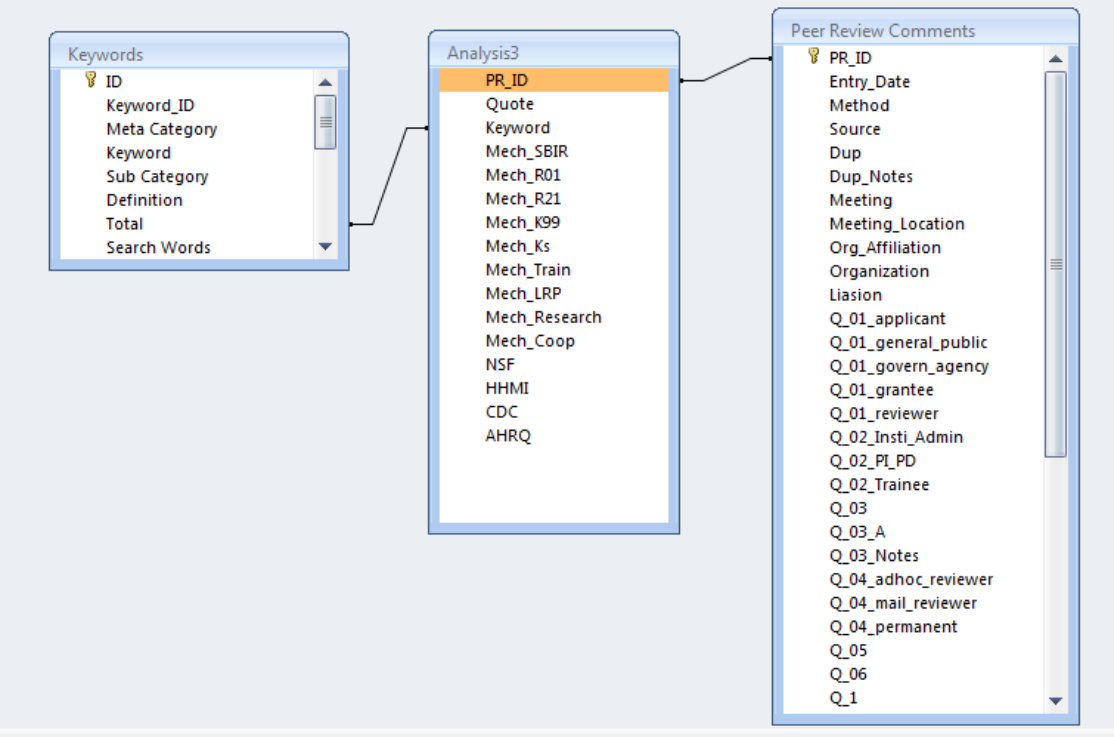


TABLE: PEER REVIEW COMMENTS

Field Name	Data Type	Description
PR_ID	Auto Number	ID for Peer Review Comment
Entry_Date	Date/Time	Date and Time of Comment
Method	Choice	ANALYSIS: Mail vs. Fax vs. Web Form
Source	Choice	ANALYSIS: Internal vs. External
Dup	Yes/No	ANALYSIS: Yes-duplicate or empty
Dup_Notes	Text	ANALYSIS: Note on location of original input or reason for duplicate
Meeting	Yes/No	ANALYSIS: Attended a Meeting?
Meeting_Location	Choice	ANALYSIS: Washington, D.C, San Fransisco, New York, Chicago, NIH, Professional Society, Deans
Org_Affiliation	Yes/No	ANALYSIS: On Behalf of an Organization
Organization	Text	ANALYSIS: on behalf of...

Liaison	Yes/No	ANALYSIS: From a Scientific Liaison
Q_01_applicant	Text	Profile Q1. NIH applicant
Q_01_general_public	Text	Profile Q1. member of the general public
Q_01_govern_agency	Text	Profile Q1. member of a government agency
Q_01_grantee	Text	Profile Q1. Which of the following roles describes you? current or former NIH grantee
Q_01_reviewer	Text	Profile Q1. current or former NIH reviewer
Q_02_Insti_Admin	Text	Profile Q2. Institutional Administrator
Q_02_PI_PD	Text	Profile Q2. PI/PD or Researcher
Q_02_Trainee	Text	Profile Q2. Trainee or Fellow
Q_03	Text	Profile Q3. How many total years have you been an NIH grantee?
Q_03_A	Number	ANALYSIS: Number of Years
Q_03_Notes	Text	ANALYSIS: For Blanks to Years
Q_04_adhoc_reviewer	Text	Profile Q4. as an Ad-Hoc reviewer
Q_04_mail_reviewer	Text	Profile Q4.as a mail reviewer
Q_04_permanent	Text	Profile Q4.as a permanent study section member
Q_05	Text	Profile Q5. How many total years have you served as a reviewer in any capacity?
Q_06	Text	Profile Q6. How recently did you serve as a reviewer?
Q_1	Memo	Comment 1. Challenges of NIH System of Research Support
Q_2	Memo	Comment 2. Challenges of NIH Review Process
Q_3	Memo	Comment 3. Solutions to Challenges
Q_4	Memo	Comment 4. Core Values of NIH Peer Review Process
Q_5	Memo	Comment 5. Peer Review Criteria and Scoring
Q_6	Memo	Comment 6. Career Pathways
Q_7	Memo	Comment 7. Are there any other comments or suggestions you would like to make on any of the topics mentioned above?
Q_7_I	Memo	INTERNAL Comment 7. Can you suggest any improvements or experiments in scoring and ranking applications that will help you make more informed funding decisions?
Q_8_I	Memo	INTERNAL Comment 8. Can you suggest any improvements or experiments that might help study sections focus more on making budgetary adjustment recommendations?
Q_9_I	Memo	INTERNAL Comment 9. What role(s) do you represent?
Q_10_I	Memo	INTERNAL Comment 10. What role(s) do you serve as a grantee?
Q_12_I	Memo	INTERNAL Comment 12. If you have served or are currently serving as a reviewer for NIH, please check all that apply.:
Subject_Line	Text	CUT & PASTE: E-mail Subject Line
Full_Name	Text	CUT & PASTE: Sender
E-mail_Address	Text	CUT & PASTE: E-mail Address
Attachments	Yes/No	Yes/No: Has an attachment?
Email_Attachment_01	Memo	CUT & PASTE: E-mail Content of Attachment
Email_Content	Memo	CUT & PASTE: Content

TABLE: PEER REVIEW COMMENTS

Field Name	Data Type	Description
PR_ID	Auto Number	ID for Peer Review Comment
Quote	Memo	Comment quote
Keyword	Choice	Descriptive Keyword Category
Mech_SBIR	Yes/No	SBIR; STTR; R43; R44
Mech_R01	Yes/No	R01
Mech_R21	Yes/No	R21; Exploratory Grant; Developmental Grant
Mech_K99	Yes/No	K99; Career Transition Award
Mech_Ks	Yes/No	Career Development; K01; K02; K05; K06; K07; K08; K12; K14; K18; K22; K23; K24; K25; K26; K30; KL1; KD1; KL2
Mech_Train	Yes/No	Research Training; T32; F32; F05; F30; F31; F32; F33; F34; F37; F38; R25; T01; T02; T09; T14; T15; T32; T34; T35; T36; T37; T42; T90
Mech_LRP	Yes/No	Loan Repayment; LRP; OLRS; L30; L32; L40; L50; L60
Mech_Research	Yes/No	R03; R13; R15; R17; R18; R21; R24; R30; R33; R36; R37; R41; R42
Mech_Coop	Yes/No	U01; U09; U10; U11; U13; U17; U19; U30; U41; U42
NSF	Yes/No	National Science Foundation; NSF
HHMI	Yes/No	Howard Hughes Medical Institute; HHMI
CDC	Yes/No	Centers for Disease Control; CDC
AHRQ	Yes/No	Agency for Healthcare Quality and Research; AHRQ

TABLE: KEYWORDS

Field Name	Data Type	Description
Keyword_ID	Text	Keyword Numbering Scheme 1.0 – 5.0
Meta Category	Choice	Five Meta Categories: Peer Review Process; Grant Structure; Career Pathways; Funding; Other
Keyword	Text	Specific Keyword
Sub category	Text	Sub-category of Keyword
Definition	Memo	Definition of Keyword
Total	Calculated	Keyword_ID + Meta Category + Keyword + Sub-Category + Total
Search Words	Memo	Terms or phrases associated with keyword associations

Appendix B: Keywording Structure

59 Total Keywords

Keyword	Definition	Search Terms & Phrases
1.1 - Peer Review Process: Criteria:	Standards for proposal evaluation.	Evaluation Criteria; Criteria; Significance; Investigator; Environment; Past Productivity; Productivity;
1.1.2 - Peer Review Process: Criteria: Innovation	Ideas that can potentially lead to major leaps of progress.	Innovation; Innovative;
1.10 - Peer Review Process: Core Values:	Foundational beliefs that underlie the NIH research enterprise	Core Value; e.g. Fairness; Integrity; Honesty
1.11 - Peer Review Process: Politics:	Non-merit factors that influence decisions for award.	Politics; Political
1.12 - Peer Review Process: Conflicts:	Conflicts and Confidentiality	Conflicts of Interest; COI; Confidentiality; Confidential; Conflicts
1.13 - Peer Review Process: Evaluating Process:	Comments on Change and Process of Evaluation	Evaluation Process; Change Process; RFI;
1.2 - Peer Review Process: Score:	Numerical assignment of merit	Score;
1.2.2 - Peer Review Process: Score: Triage	Discussion of different views of reviewers on final selection.	Triage;
1.3 - Peer Review Process: Selection:	Funding decisions for award.	Selection; NOA; Notice of Award;
1.4.1 - Peer Review Process: Format: General	Packaging required for proposals	Appendix; Format; Packaging
1.4.2 - Peer Review Process: Format: Online	Requirement for electronic delivery of proposals	Online; Asynchronous;
1.4.3 - Peer Review Process: Format: Summary Statement	Packaging required for proposals	Summary Statement
1.4.4 - Peer Review Process: Format: Telephone	Packaging required for proposals	Telephone; Phone;
1.5 - Peer Review Process: Timing:	Time table for proposal process.	Timing;
1.6 - Peer Review Process: Consistency:	Reliable patterns of review.	Consistency;
1.7 - Peer Review Process: Budget:	Cost/Return of Peer Review Process itself	Cost; Return on Investment; ROI
1.8 - Peer Review Process: Incentives:	Motivation to attract quality people in the review process.	Incentive; Honorarium; Compensation for Reviewer;
1.9.1 - Peer Review Process: People: Advisory Council Members	Primary actors of the process.	Advisory Council;
1.9.2 - Peer Review Process: People: Review Staff	Primary actors in the process.	SRA; SRO; CSR; Scientific Review Administrator; Scientific Review

		Officer
1.9.3 - Peer Review Process: People: Program Officers	Primary actors in the process.	Program Officer; PO
1.9.4 - Peer Review Process: People: Reviewers	Primary actors of the process.	Peer Reviewer; Reviewer
1.9.5 - Peer Review Process: People: Investigators	Primary actors in the process.	PD/PI; PD; PI; Primary Investigator; Project Director; Investigator
1.9.6 - Peer Review Process: People: Leadership	Primary actors in the process.	Zerhouni; Scarpa; Leadership
2.1 - Grant Structure: Guiding Policies:	Principles, laws, and regulations that shape the process.	Policies; Policy
2.2 - Grant Structure: External Pressures:	Forces outside NIH acting on the process.	External Pressure
2.3 - Grant Structure: Award Mechanisms:	Specific focus on separate research objectives	Mechanism;
2.4 - Grant Structure: Application Process:	Actions that proposing investigators must take.	Application; Esubmission; E-Submission
2.5.1 - Grant Structure: Type of Research: Clinical vs Basic	Research orientation.	Clinical; Basic; Translational
2.5.2 - Grant Structure: Type of Research: Content Focus	Research orientation.	Cancer; Diabetes;
2.5.3 - Grant Structure: Type of Research: Big Science	Research orientation.	Big Science
2.6 - Grant Structure: Grants Administration:	The monitoring and management of fund distribution.	Grants Administration; Grant Administration; Grants Management; GMO
3.1 - Career Pathways: Pathway Structure:	Different avenues for career researchers.	Pathway
3.2 - Career Pathways: Career Stage Focus:	Addressing changing skills/needs during a career.	Career Stage; Senior Investigator; Junior Investigator; Mid Career; Career
3.3 - Career Pathways: New Investigator Issues:	Those transitioning to independent research status.	New Investigator; Young Investigator
3.4 - Career Pathways: External Competition:	Losing talent to other fields.	External Competition; Foreign Competition;
4.1.1 - Funding: Who: Individuals	Experienced to entry level investigators.	
4.1.2 - Funding: Who: Institutions	Universities, Non-Profits,, etc.	Non-Profit;
4.1.3 - Funding: Who: Private Sector	Big Pharma, Independent laboratories, small companies, etc.	Private Sector; Small Business; Pharmaceutical;
4.1.4 - Funding: Who: Large	Top 20% of organizations by grant funding awards.	Large Institutions
4.1.5 - Funding: Who: Small	Bottom 80% of organizations by grant funding awards.	Small Institutions
4.1.6 - Funding: Who: Foreign		Foreign
4.2.1 - Funding: For What: Highest Score	Best science by merit score?	
4.2.2 - Funding: For What: Hottest Science	Making sure a hot new area is supported.	Hot Science

4.2.3 - Funding: For What: Best Science	Best science by proposal research plan?	Best Science
4.2.4 - Funding: For What: PI Reputation	Best science by most quality publications?	PI Reputation; PD Reputation; Investigator Repulation
4.3.1 - Funding: When: Award Cycle Timing	Submission, review, award decision, & feedback schedule.	Feedback;
4.3.2 - Funding: When: Number of Years	Expected length of funding support.	Duration of Grant; Grant Duration; Length of Funding; Years of Funding; Length of Award
4.4.1 - Funding: Where: Instituions	Geographical dispersion of research funds.	
4.4.2 - Funding: Where: Laboratories	Geographical dispersion of research funds.	
4.4.3 - Funding: Where: Universities	Geographical dispersion of research funds.	
4.4.4 - Funding: Where: U.S. Region	Geographical dispersion of research funds.	North; South; East; West
4.5.1 - Funding: For How Much: Competitiveness	initial funding, add-on funding, overhead funding.	New Funding; Add-on; Add on; initial funding
4.5.1 - Funding: For How Much: Number of Grants	Grants/P.I. /Institution.	Number of Grants
4.5.2 - Funding: For How Much: NIH Too Little	Loss of good research and talent due to low pay lines.	Funding Levels; NIH Funding; Pay Lines; Direct Costs
4.5.4 - Funding: For How Much: Salaries and Pay	Distribution of salaries by responsibility.	Salaries; Pay Lines; Pay; Fringe
4.6.1 - Funding: On What Terms: New Funding	Shared funding, joint ownership of results, etc.	Intellectual Property; Shared Funding; Multiple PI;
4.6.2 - Funding: On What Terms: Continuing Funding	Length of funding years needed to produce quality research.	Continuity; Continue;
4.6.3 - Funding: On What Terms: Overhead	Indirect cost of supporting direct research	Overhead; Indirect; Administrative costs; Cost Recovery;
4.7 - Funding: For What Outcomes:	New knowledge, personal medicine, close application gap.	Personalized Medicine; Application Gap; Outcome; Publications