Center for Scientific Review

NATIONAL INSTITUTES OF HEALTH

2022-2027 (Draft) STRATEGIC PLAN

Center for Scientific Review

MESSAGE FROM THE DIRECTOR

I am pleased to present the 2022-2027 Strategic Plan for the NIH Center for Scientific Review (CSR). CSR is responsible for conducting the initial scientific peer review of the majority of the nearly 90,000 grant applications submitted to the NIH each year. The NIH currently disburses over $40 billion per year, through grant applications, to support biomedical research at universities and small businesses. The proposed science covers an enormous range—from fundamental biology to clinical trials of potential treatments. CSR reviews over 75% of these applications, covering all science within NIH's scope, and does so with less than 0.5% of the NIH budget. Each year CSR recruits more than 20,000 expert scientists across the United States to participate in approximately 1,300 review meetings to evaluate applications in scientific areas spanning basic, translational, clinical, behavioral, population and social sciences. Our dedicated, engaged staff of 550+ scientific, administrative and technical support personnel work together to advance CSR's singular mission: to ensure that NIH grant applications receive fair, independent, expert, and timely scientific reviews—free from inappropriate influences—so NIH can fund the most promising research.

This strategic plan provides a framework for CSR's ongoing initiatives and future goals in pursuit of our critically important mission. Our work is guided by the broader vision of fostering and enhancing the quality and fairness of the peer review process. For each of the five major goals, the plan articulates implementation strategies and targeted outcomes. Our approach is shaped by the principles that guide all of CSR's actions: diversity and fairness; transparent, data-driven decision making; engagement with our stakeholders. The overarching themes include:

- **Continuous evaluation of the scientific scope and management of CSR's review committees.** Defining the appropriate scope of a review committee is critical to identifying high-impact science. A major initiative, ENQUIRE (Evaluating Panel Quality in Review), uses data as well as input from external and internal stakeholders, to align existing review groups with rapidly evolving scientific fields, create new review groups to include new/emerging areas, and discontinue those in declining areas.
- **Broadening, diversifying, and training the pool of CSR's qualified peer reviewers.** There is a critical need for the NIH to hear diverse perspectives to fulfill peer review's mission of identifying the best, most disruptive, novel science. As such, the most effective review committees are those that are frequently revitalized, with diversity in multiple dimensions,

including scientific background and perspective, demography, career stage, region of the country, and peer review experience.

- **Enhanced training and development of all CSR staff.** CSR's exemplary pandemic response provided a glimpse of all that can be achieved by an engaged, well-trained, collaborative staff from diverse backgrounds. Highlighting the critically important role of CSR's scientific review officers as empowered stewards of a fair and expert scientific peer review process, and fostering the creativity and expertise of our administrative, technical and support staff will be critical for CSR's future.
- **Changing the peer review process to improve the scientific quality and fairness of review outcomes.** This substantive theme includes CSR's many multipronged efforts and novel approaches to promote review integrity, reduce or prevent the biases that exist in the broader scientific community from infiltrating the peer review process, and re-examine the review criteria to ensure the highest quality of review.
- **Committing to achieve our mission through transparency, engagement with the scientific community, and a data-driven approach to decision-making.** Building a strong foundation of excellent data, communications and outreach operations now will ensure that CSR is poised for peer review involving the next generation of scientific advances and scientists.

I invite you to examine this roadmap of our path forward and remain engaged with us. With your input, we can continue to evolve, adapt and grow.

Noni H. Byrnes, Ph.D.
Director
Center for Scientific Review
National Institutes of Health
U.S. Department of Health and Human Services

Table of Contents

Message from the Director i

Overview 1

- About the Center for Scientific Review (CSR) 1
- Organizational Structure 2
- CSR by the Numbers 3
- NIH Peer Review and Funding Process 4
- Special NIH Research Initiatives Reviewed by CSR 5
- CSR and the 21st Century Cures Act 6
- Stewardship of Taxpayer Funds 6
- Underlying Principles 7

2022-2027 Strategic Plan 11

- Goal 1 11

  Maintain scientific review groups that provide appropriate scientific coverage and review settings for all of NIH science.

- Goal 2 14

  Further develop a large cadre of diverse, well-trained, and scientifically qualified experts to serve as reviewers.

- Goal 3 18

  Further develop an outstanding, engaged, and diverse staff.

- Goal 4 22

  Implement changes to the peer review process to make it more fair, effective, and efficient.

- Goal 5 27

  Achieve our mission through transparency, engagement with the scientific community, and a data-driven approach to decision-making.

Conclusion 30

Overview

About the Center for Scientific Review (CSR)

At CSR, our mission is to ensure that grant applications submitted to the National Institutes of Health (NIH) receive fair, independent, expert, and timely scientific reviews, free from inappropriate influences, so NIH can fund the most promising research. NIH is the largest funder of biomedical research in the world and invests approximately $40 billion annually in biomedical research for the American people. More than 80 percent of NIH's funding is awarded for extramural research, which occurs largely through nearly 50,000 grants to more than 300,000 researchers at more than 2,500 universities, medical schools, and other research institutions, as well as in small businesses, across the United States (NIH, 2020).

Applications first undergo a thorough merit-based, highly competitive review process, called "peer review," that is typically led by CSR. Scientists submit their best ideas to NIH through their applications, which are then reviewed by groups of outside experts who meet to evaluate the scientific and technical merit of the submissions. The NIH institutes and centers (ICs) to which grant applications are assigned for funding consideration then make the final funding decisions. CSR oversees the peer review of more than 75% of the more than 88,000 applications NIH receives each year. It is an enormous effort that calls on more than 20,000 individual scientists who lend their expertise, time, and talent to this process. CSR also has a dedicated staff of more than 500 highly trained professionals who work with the external experts, focusing their efforts on making peer review as fair, effective, and efficient as possible.

Through the process of peer review, any good idea can be recognized—whether from a large institution or a small one, or from a high-profile scientist or someone new to a field. Peer review helps us to identify the most meritorious studies aimed at increasing our scientific understanding and ultimately improving the health and quality of life of Americans. Scientific and health breakthroughs can often be traced back to one or more NIH peer review groups that found promise in the original research grant applications and were referred for funding consideration by other NIH ICs. For example, NIH's peer review is connected with advances such as the COVID-19 vaccines, as well as fewer cases of cardiovascular disease and breast cancer.

Since its establishment in 1946, CSR has remained committed to engagement with its stakeholders, especially those in the scientific community, and has continually evaluated and improved the NIH peer review process, striving to assess grant applications in a data-driven and transparent manner.

Overview

Organizational Structure

OFFICE OF THE DIRECTOR

Office of Communications and Outreach (OCO)
Dr. Kristin Kramer
Director

CSR Director
Dr. Noni Byrnes

Senior Advisor
Dr. Christine Melchior

Associate Director for Diversity and Workforce Development
Dr. Gabriel Fosu

Deputy Director
Dr. Bruce Reed

Chief of Staff
Dr. Amy Wernimont

Deputy Ethics Counselor
Ms. MonaLisa Lynch

Executive Officer
Ms. Bonnie Ellis

Office of Training and Development (OTD)
Dr. Miriam Mintzer
Director

OPERATIONAL DIVISIONS

Division of Management Services (DMS)
Ms. Bonnie Ellis
Director

Division of Planning, Analysis, and Information Management (DPAIM)
Dr. Dipak Bhattacharyya
Acting Director

Division of Receipt and Referral (DRR)
Dr. B. Duane Price
Acting Director

SCIENTIFIC DIVISIONS

Division of AIDS, Behavioral, and Population Sciences (DABP)
Dr. Valerie Durrant
Director

Division of Neuroscience, Development, and Aging (DNDA)
Dr. Delia Olufokunbi Sam
Director

Division of Translational and Clinical Sciences (DTCS)
Dr. John Bowers
Director

Division of Basic and Integrative Biological Sciences (DBIB)
Dr. Raymond Jacobson
Director

Division of Physiological and Pathological Sciences (DPPS)
Dr. Ross Shonat
Director

Each CSR scientific division includes approximately six scientific review branches. Review branches are management units within CSR and comprise a cluster of scientific review groups in a general scientific area and the staff who administer those groups. Applications are first broadly assigned to a review branch, and then to either a standing panel (scientific review group with members approved through a nomination process in compliance with the Federal Advisory Committee Act) or a special emphasis panel (a review group with only ad hoc reviewers) within that branch. The standing panels within the various branches mainly review research project grant applications. Most National Research Service Award individual fellowship applications and small business applications are also reviewed at CSR in recurring special emphasis panels designated for their review.

Overview

CSR by the Numbers

NIH

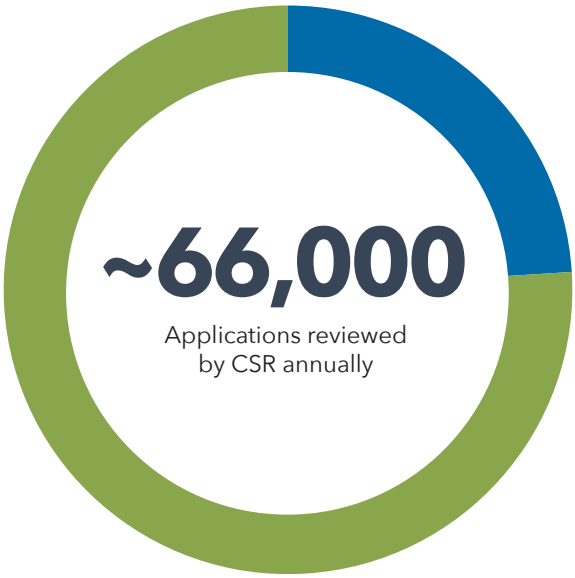
~88,000

NIH applications received annually

CSR

75%

of NIH applications are reviewed by CSR



92%

Research Project Grants (R01)

95%

Small Business (SBIR/STTR)

83%

Fellowship

~20,000

Reviewers participate

~1,300

Meetings

CSR

~250

Scientific Review Officers

Notes: *Research project grants (RPGs) include R01s and similar grant mechanisms. See https://grants.nih.gov/grants/peer/critiques/rpg.htm for more details.*

For details on Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs see https://seed.nih.gov.

Source: *Advisory Council Year 2021.*

Overview

NIH Peer Review and Funding Process

The decision of whether an NIH institute or center will fund a research grant application is made through a multi-step process. First, CSR's Division of Receipt and Referral (DRR) receives all applications submitted to NIH and checks them for compliance. DRR then assigns each application: 1) to one or more ICs for funding consideration and 2) to a scientific review group to evaluate the scientific and technical merit of the application. These review groups are composed primarily of non-federal, volunteer scientists who have expertise in relevant scientific disciplines and current research areas. CSR coordinates the reviews for most R01s, fellowships, and small business applications. Individual NIH ICs coordinate the review for the remaining NIH grant applications (approximately 25%).

After CSR's scientific review group assesses the scientific and technical merit of a grant application, it undergoes a second level of review by the advisory council of the IC assigned for funding consideration. Advisory councils are composed of scientific experts and public representatives chosen for their expertise, interest, or activity in matters related to health and disease. Advisory councils evaluate the scientific merit and program priority of all applications for research grants, training grants, and career development awards. Final funding decisions are made by the IC director based on the advice of advisory councils and IC staff.

Overview

Special NIH Research Initiatives Reviewed by CSR

Because CSR is recognized across the NIH as expert in peer review, CSR is often asked to review high-profile and high-priority special initiatives. In FY21, CSR reviewed 182 special initiatives. A sample of these are:

BRAIN: The Brain Research Through Advancing Innovative Neurotechnologies® (BRAIN) initiative is aimed at revolutionizing our understanding of the human brain. By accelerating the development and application of innovative technologies, researchers will be able to produce a revolutionary new dynamic picture of the brain that, for the first time, shows how individual cells and complex neural circuits interact in both time and space.

SenNet: The NIH Common Fund's Cellular Senescence Network (SenNet) program was established to comprehensively identify and characterize the differences in senescent cells across the body, across various states of human health, and across the lifespan. SenNet will provide publicly accessible atlases of senescent cells, the differences among them, and the molecules they secrete, using data collected from multiple human and model organism tissues.

RADx: The goal of the Rapid Acceleration of Diagnostics (RADx®) initiative is to speed innovation in the development, commercialization, and implementation of technologies for COVID-19 testing. Accurate, fast, easy-to-use, and widely accessible testing is required before the nation can safely return to normal life.

FIRST: The NIH Common Fund's Faculty Institutional Recruitment for Sustainable Transformation (FIRST) program aims to enhance and maintain cultures of inclusive excellence in the biomedical research community. "Inclusive excellence" refers to organizational cultures that establish and sustain scientific environments that cultivate and benefit from a full range of talent.

HEAL: The Helping to End Addiction Long-term® Initiative, or NIH HEAL Initiative®, is an aggressive, trans-agency effort to speed scientific solutions to stem the national opioid public health crisis. Almost every NIH institute and center is accelerating research to address this public health emergency from all angles.

Overview

CSR and the 21st Century Cures Act

CSR's actions and cross-cutting themes within this strategic plan are concordant with the 21st Century Cures Act 42 USC 289A-2(A)(3) with enhanced data sharing and involvement in key initiatives such as the BRAIN initiative. The 21st Century Cures Act expressly charges the NIH with ensuring that women and minorities are appropriately included as subjects in all clinical research supported by NIH. Peer reviewers are required to stringently evaluate inclusion plans in each application to ensure that plans for the inclusion of women and minorities are appropriate for the aims of the proposed research. Inadequacies or irregularities identified by reviewers are reported in the summary statement for the application and an "unacceptable" code is entered into a central NIH database. NIH IC program staff must ensure that these issues are resolved before an award is made. The peer review of inclusion plans is a critical step towards reducing health disparities.

Stewardship of Taxpayer Funds

In everything we do at CSR, we aim to ensure that we are good stewards of the funds that we receive from taxpayers. Our work in peer review is of particular importance, as it is the first step in assessing the scientific and technical merit of the submitted applications for research support. Through its work in peer review, CSR plays a substantial role in NIH's overall efforts to fund research with the potential of producing the best results for the American people's investment in biomedical research. As noted above, scientific and health breakthroughs can often be traced back to one or more NIH peer review groups, in which the review panel identified the potential of the proposed research and referred it for funding consideration.

Overview

Underlying Principles

At CSR, we are guided by principles that express our values and support our overall mission. We are committed to 1) diversity and fairness, 2) transparent, data-driven decision making, and 3) active communication to involve stakeholders.

Diversity and Fairness

Peer Review: We will ensure diversity and fairness are at the forefront in all decisions. Diversity in perspectives—through, for example, different scientific expertise, demographics, areas of residence, career stages, and peer review experience—will help us to fulfill peer review's mission of identifying the best, most "disruptive," novel science. Through fairness we seek to protect the integrity of the review process. Together, diversity and fairness help to identify science with the highest impact. CSR has taken multiple steps to move peer review to fully reflect these principles:

- The center has developed a bias mitigation training module focused on peer review. The training aims to help reviewers identify sources of potential bias in reviews and provide tools to intervene.
- To broaden the reviewer pool drawn from the research community, CSR has built a database that includes scientists with competitive research support from outside NIH (e.g., the National Science Foundation, U.S. Department of Defense, private foundations, etc.); those at different stages of their research career, and individuals suggested by scientific societies. This complements the databases and search tools derived from NIH business systems.
- The center posts data that measure the diversity of scientific review groups along multiple dimensions—race, gender, ethnicity, and career stage. CSR not only publicly posts data but provides these data to staff and management to encourage continuous attention to the importance of panel diversity. We expect that ongoing attention will promote continued progress.
- Several weeks before review meetings, scientific review officers (SROs) train their panel members on review policies and procedures. This ensures that all reviewers will have the same understanding of these policies and procedures, including the scoring scale.
- Our annual chairperson training sessions incorporate key actions. We emphasize the influence the chairperson has in setting and changing a review group's culture. We ask chairs to consciously foster a positive review group culture that places importance on confidentiality and integrity and that encourages broad participation and inclusion across the committee. We empower chairs to call out statements that bias the scientific assessment of an application and refocus the discussion on impact and consistency in applying the review criteria.
- CSR works to keep NIH peer review fair through a strong, proactive approach to integrity. We have implemented enhanced reporting procedures and follow up on every allegation. We involve the scientific community in peer review integrity training, provide regular training to SROs, and have improved our digital security and digital forensics capabilities.

Overview

CSR Workplace: During the past two years, CSR has increased transparency in hiring practices through the posting of search committee rosters. In addition, the center has made it standard practice to rotate search committee membership and broaden the mix of people on search committees. We now provide Q&A informational sessions for every promotional opportunity well in advance of the vacancy announcement. CSR has also worked to advance diversity, equity, inclusion, and accessibility in the workplace. At the request of staff, we created a means for staff to voice complaints and concerns related to respect, dignity, and any aspect of internal culture, in house, in addition to the multiple pathways that NIH provides. Concerned staff also have access to CSR's associate director for diversity and workforce development to discuss concerns.

Transparent, Data-Driven Decision Making

We are working to continually evaluate practices and make improvements. We strive to make changes in a transparent and data-driven manner in the peer review process and in the workplace.

Peer Review: CSR has adopted a cutting-edge, data-driven approach to improve processes, to inform decision-making, and to ensure peer review is functioning to identify the highest impact science in a manner that fosters public trust. CSR leads in implementing surveys to understand key aspects that affect the peer review process. We continue to survey reviewers and staff for data-driven decision making regarding future review meetings and to monitor trends in scoring, discussion, recruitment, and general attitudes. We have implemented enhanced workload tracking, diversity tracking for panels, and tools to identify unallowable dyads (two reviewers from the same institution at the same review meeting, at the same time), as well as a Policy Search Portal, which enables SROs to easily access policies relating to grant review. CSR is also leveraging technology to improve upon multiple business processes including increased efficiency and simplification of trans-NIH referral processes.

Our Evaluating Panel Quality in Review (ENQUIRE) process exemplifies our use of data for decision making. Evaluations through ENQUIRE ensure that our review groups are focusing on the appropriate science for the field, with a thorough assessment of each panel every 5 years. Other sources of data for our decision making include platforms for other NIH ICs and leadership of scientific societies to recommend potential reviewers; a Reviewer Finder database for SROs; the CSR Review Integrity Project to examine reviewer service history, patterns of collaborations and publications, and trends to flag potential problems; refinements to the Assisted Referral Tool to address changes to review group guidelines as a result of ENQUIRE; and collaboration across NIH to make the tool available to all ICs. In addition, CSR is working to improve business processes through Automated Receipt & Referral workload tracking, enhanced stakeholder communications and outreach via blogs and social media, increased video production for reviewer/chair training, new dashboards for executive decision-making, and machine-learning/artificial intelligence for flagging potential violations of review integrity.

CSR Workplace: CSR also uses transparent, data-driven decision making to improve the workplace. CSR regularly informs staff of matters affecting the center and seeks input from staff through formal and informal processes. CSR also provides staff with various training opportunities, to attain new skills or sharpen current ones, and provides leadership development opportunities. The goal is to continually develop an outstanding, engaged, and diverse workforce though transparency regarding center operations and through the capture of data that address not only concerns, but also opportunities the staff are seeking to increase and/or sharpen their skills in efforts to help CSR to achieve its mission.

Active Communications to Involve Stakeholders

We involve stakeholders, within NIH and the greater scientific community, as we strive to evaluate and improve the peer review process. To involve stakeholders, we seek open and active communication and employ multi-directional communication strategies. Specific actions include the following:

- During the past two years, CSR has expanded its Office of Communications and Outreach. The office plays an important role in all CSR initiatives, reaching stakeholders through a wide variety of media.
- The CSR Advisory Council (CSRAC) was established to gain insights from the scientific community. We have diversified the CSRAC through involvement of ad hoc participants and strive to ensure that the council is diverse in terms of demographics, career stage, and institution type.
- We have recently created CSRAC working groups to include representatives outside of the advisory council, both from the external scientific community and from other NIH ICs, to work on important topics vital to peer review. CSRAC working groups have engaged in various activities, such as:
  - Issuing a report with recommendations to simplify NIH peer review criteria to refocus reviewer attention on the important big-picture questions of scientific impact and merit and to reduce administrative burden;
  - Developing bias mitigation training for peer reviewers;
  - Creating reviewer integrity training; and
  - Revitalizing CSR's Early Career Reviewer program.

Early Career Reviewer (ECR) Program

The program aims to enrich and diversify CSR's pool of trained reviewers and to provide early career scientists first-hand experience with peer review. This review experience is expected to help them better navigate the NIH and write more competitive grants of their own. Learn more: https://public.csr.nih.gov/ForReviewers/BecomeAReviewer/ECR

Overview

- A critical challenge faced by CSR is keeping scientific review groups aligned with rapidly changing science. CSR's ENQUIRE is a systematic, data-informed process that relies on critical input from the external scientific community, and from senior program officials across NIH. These groups recommend changes in review group focus or scope needed to facilitate the identification of high-impact science.
- CSR regularly asks for reviewer input through surveys and blogs. In our blogs, we have asked for information from the community regarding some of our practices and future decisions. For many of our decisions, we incorporate stakeholder opinions through surveys of reviewers, program officers, and SROs. When the COVID-19 pandemic began, CSR quickly converted all face-to-face meetings to virtual meetings. In two separate surveys, reviewers informed CSR about their experience using the virtual platforms. CSR staff were also surveyed. This feedback is shaping the conduct of review meetings and our ideas about the future.
- CSR is expanding outreach efforts for maximum impact. We insist that minority-serving institutions and institutions without high levels of NIH funding be represented at every presentation CSR provides to groups of institutions. We also do targeted outreach for early career scientists.
- For example, in Spring 2021, CSR ran a panel discussion on the Early Career Reviewer (ECR) program with panelists who had recently served as ECRs, two of whom were from underrepresented minority groups (URMs) in the biomedical research workforce. Targeted publicity about the event resulted in excellent attendance and a substantial increase in applications to the ECR program from minority scientists.

GOAL 1

Maintain scientific review groups that provide appropriate scientific coverage and review settings for all of NIH science.

High-quality review requires continuous evaluation of the effectiveness of our individual review groups to ensure that they accurately identify high-impact science in each field. CSR will conduct major assessments of review groups at regular intervals and across multiple IRGs to evaluate peer review groups with a common scientific or methodological focus.

Goal 1: Objectives

Maintain scientific review groups that provide appropriate scientific coverage and review settings for all of NIH science.

Objective 1.1: Ensure that scientific review groups evolve to stay appropriately aligned with current and emerging areas of science.

In 2019, CSR embarked on a new framework/process for scientific review group evaluation: ENQUIRE (Evaluating Panel Quality in Review). ENQUIRE builds on CSR's existing successful model of review group evaluation, using an external panel of accomplished scientists with a broad perspective to assess scope by examining workload trends, review group guidelines, random sample abstracts/specific aims, and publication/bibliometric data. The process also engages an internal NIH panel with stakeholders from relevant funding NIH ICs to examine process issues (e.g., distributions across ICs, scoring patterns, reviewer and program officer surveys, strength of discussions at review meetings, rosters, Early Stage Investigator application/award rates, etc.). The outcome of an ENQUIRE review ranges from changing scientific guidelines that delineate topics that are reviewed in each review group to creating or eliminating individual review groups. This process ensures our review groups are continuously refreshed and able to assess innovations in biomedical science.

Implementation Strategy:

- Systematically and regularly update all 175+ CSR scientific review groups through a data-driven evaluative process (ENQUIRE).

Target Outcome:

- Approximately 20% of review groups are evaluated through the ENQUIRE process each year.

Objective 1.2: Maintain accurate scientific review group guidelines and ensure review group rosters contain expertise appropriate to the review group scope.

In addition to the ENQUIRE process, we routinely evaluate scientific review group guidelines to make sure they accurately reflect the scope of science reviewed in the review group as well as the appropriateness of the scientific expertise of the panel members.

Implementation Strategies:

- Seek input from internal and external stakeholders on nomination slates for membership on scientific review groups annually.
- Periodically evaluate rosters and guidelines of special emphasis panels (SEPs), special committees of ad hoc experts for the review of a specific set of applications (e.g., SBIR/STTR; fellowships) and special initiatives (e.g., program announcements with special receipt, referral and/or review considerations, called PARs).
- Regularly review and update scientific review group descriptions.

Target Outcomes:

- Each year, feedback is requested from internal and external stakeholders on nominees to scientific review groups.
- Scientific review group nomination slates annually undergo a systematic evaluation of reviewer expertise and qualifications on multiple levels (for example by Review Branch chiefs, division directors, CSR deputy director, CSR director, NIH Office of the Director).
- Scientific guidelines for recurring SEPs are reviewed annually and modified as necessary.

GOAL 2

Further develop a large cadre of diverse, well-trained, and scientifically qualified experts to serve as reviewers.

Quality peer review relies on a diverse, qualified, and well-trained pool of potential reviewers. Review panels that are appropriately trained and demographically diverse with robust representation from all career levels allow for new and broad scientific input and enhance the quality of the review process and outcomes.

Goal 2: Objectives

Further develop a large cadre of diverse, well-trained, and scientifically qualified experts to serve as reviewers.

Objective 2.1: Broaden the pool of reviewers and ensure that review panels are diverse on multiple dimensions.

CSR aims to broaden its pool of well-trained reviewers and increase diversity among reviewers in keeping with the Notice of NIH's Interest in Diversity (NOT-OD-20-031). CSR will employ a multipronged approach to achieve this aim focused on proactive outreach and engagement of underrepresented groups of investigators, preventing the overuse of established reviewers, and incentivizing review service.

Implementation Strategies:

- Identify and recruit the next generation of reviewers through the Early Career Reviewer (ECR) Program.
- Increase the number of women, minorities, and underrepresented minorities identified as potential reviewers through targeted outreach to the scientific community (including scientific societies, academic institutions, NIH, and other federal agencies).
- Increase the number of reviewers with disabilities through means such as continued use of virtual meetings, allowing those with physical disabilities to participate without travel, better communication around 508 compliance and resources to ensure accessibility, and exploration of technologies to enable broader participation in review.
- Monitor review service history and limit the overutilization of the same reviewers.
- Identify and evaluate innovative methods to incentivize review service.
- Improve search tools and technologies for identifying potential reviewers.

Target Outcomes:

- Each meeting of standing scientific review groups and each recurring SEP reviewing R01 grants includes 2 ECRs.
- Annual increases in diversity of reviewers available in Reviewer Finder (internal database of potential reviewers).
- Annual improvements in diversity of standing panels and SEPs.
- Reduced use of reviewers with very high service levels.

Objective 2.2: Ensure reviewers are well-trained.

Quality review depends on reviewers who are trained in the peer review process, NIH review policy, and the scientific review criteria designed to identify high-impact science. CSR will continue to develop innovative training tools designed to meet the learning needs of reviewers to ensure they are equipped to conduct rigorous and effective evaluations of NIH applications.

Implementation Strategies:

- Establish an Office of Training and Development charged with the development of reviewer training materials and evaluation of training efforts.
- Assess reviewer training needs and develop centralized reviewer training modules.
- Evaluate and improve annual training for new chartered scientific review group chairs on an annual basis.

Target Outcomes:

- Interactive reviewer training modules are consistent, adaptable, transparent, and effectively meet the learning needs of reviewers.
- Other training resources (slides) are updated annually and are easily accessible.
- Chairs are well prepared to lead/manage review discussions (as measured by chair/reviewer surveys).

Objective 2.3: Evaluate reviewer performance.

Reviewers and review quality benefit from continuous evaluative feedback. While SROs provide tailored individualized feedback to reviewers, a more formal process for reviewer performance assessment and feedback allows for a uniform, structured, and consistent framework for performance improvement.

Implementation Strategies:

- Develop methods of identifying problematic scoring patterns such as score inflation or score compression.
- Develop methods of screening all critiques for uncivil or unprofessional content.
- Develop screening methods to identify critiques that lack content or do not comply with review policies.

Target Outcomes:

- Development of standard metrics that would identify specific training needs for individual reviewers.
- Structured and data-driven process for assessing reviewer performance and providing feedback is developed, implemented, and periodically updated.

GOAL 3

Further develop an outstanding, engaged, and diverse staff.

One of CSR's greatest assets is the talented and dedicated staff who support the work of peer review in multiple ways. To be organizationally agile and adaptable, and to effectively respond to scientific innovation and administrative challenges, CSR must continue to build a diverse and exceptional workforce and provide staff with support on all fronts.

Goal 3: Objectives

Further develop an outstanding, engaged, and diverse staff.

Objective 3.1: Ensure CSR has a diverse and effective workforce through a targeted recruitment, hiring, and retention approach.

To ensure CSR has a diverse workforce that can effectively manage peer review at current and projected levels of NIH applications, we have continued to increase recruitment efforts to include broad dissemination of SRO job announcements through social media and through professional networks of current CSR staff. CSR aims to better utilize social media and professional networks to reach scientists from underrepresented groups and to understand and mitigate barriers to applying.

Implementation Strategies:

- Recruit and hire SROs and support staff to meet organizational workload targets (designed to ensure effective and efficient review standards).
- Increase the demographic diversity of staff through thoughtful, targeted recruitment efforts.

Target Outcomes:

- Meet targeted SRO/support staff recruitment goals/annually.
- Year-over-year increase in staff diversity.

Goal 3: Objectives

Objective 3.2: Ensure CSR staff members have access to role-relevant training and ongoing career development opportunities.

To ensure that peer review remains strong and effective and to allow us to recruit and retain the best staff, CSR must offer excellent training and career development opportunities. Building on a strong base, CSR will expand opportunities through new organizational structures and by engaging CSR staff, across roles and managerial units, in needs assessment and in creating the resources staff need.

Implementation Strategy:

- Establish an Office of Training and Development (OTD) charged with building organizational capacity for comprehensive staff training, development, and engagement.

Target Outcomes:

- Complete an assessment of needs and opportunities for career development for non-scientific staff, SROs, and supervisory staff.
- Develop and implement a comprehensive CSR staff training plan that takes into consideration all major roles within CSR.
- Fully staff the OTD to include three additional staff members, each focusing on one of the following needs – training activities for reviewers, training for newly hired SROs, continuing education for experienced SROs.
- By 2027, an extensive set of resources and programs, using a variety of media and approaches will be in place, substantially meeting the goals of the comprehensive training plan and addressing the training and development needs of staff across CSR.

Goal 3: Objectives

Objective 3.3: Create/maintain a safe and inclusive culture that values diversity, individual and team contributions, collective well-being.

CSR values the integration of organizational habits and leadership practices that promote effective communication and an inclusive culture of collaboration and teamwork. CSR has undertaken an assessment of workplace culture, conducted in addition to the annual Federal Employee Viewpoint Survey. CSR's broad goals in this space are to identify actions and communications that are effective in promoting collegiality and pride and ownership in accomplishing our mission and to amplify and extend those strategies. Furthermore, CSR seeks to understand challenges to productive and collegial workplace culture and to identify concrete actions to address them. Actions to foster collective well-being include flexible work environment and schedules, telework/remote work, and active management of workload.

Implementation Strategies:

- Align CSR workplace culture development activities with key recommendations from the NIH-wide diversity plan, NIH UNITE (an initiative to address structural racism and promote racial equity and inclusion at NIH and within the larger biomedical research enterprise), and internal workplace assessments.
- Articulate and implement specific actions and goals related to workplace culture based on recommendations.

Target Outcomes:

- The Federal Employment Viewpoint Survey (FEVS) will reflect overall yearly improvements in job satisfaction and overall work experience.
- Periodic workplace culture assessments, conducted by CSR's Inclusion, Diversity, Equity, and Accessibility Council will demonstrate increased perception of a work culture that is inclusive, supportive, and equitable.
- Outcomes are communicated to staff.

GOAL 4

Implement changes to the peer review process to make it more fair, effective, and efficient.

Strengthening the culture of peer review maintains its integrity and effectiveness. CSR is committed to examining and improving upon the peer review process in a data-driven and transparent manner.

Goal 4: Objectives

Implement changes to the peer review process to make it more fair, effective, and efficient.

CSR believes that maintaining integrity and quality in the peer review process is essential to advancing our mission of ensuring that ***NIH grant applications receive fair, independent, expert, and timely scientific reviews—free from inappropriate influences—so NIH can fund the most promising research.*** Over the past few years, CSR has conducted studies to examine potential bias in review such as a uniquely large-scale study to understand the effects of anonymization on review outcomes (Nakamura et al., 2021) and a study of whether reviewers weigh criteria differently depending on race/ethnicity of the applicant (Erosheva et al., 2020).

Objective 4.1: Provide SROs and reviewers with essential knowledge and tools to reduce potential bias in peer review.

Bias is a human characteristic and can arise in peer review, particularly with over 18,000 individuals serving as reviewers each year. To combat potential biases, CSR has developed and continues to maintain bias awareness training for reviewers that aims to increase awareness of potential biases and to provide mitigation strategies for bystanders that serve to refocus evaluation on established review criteria. CSR aims to reduce biases through broad dissemination of the training to both SROs and reviewers and to further refine the training based on stakeholder input.

Implementation Strategies:

- Increase focus on fairness to mitigate bias in review.
- Increase SRO and reviewer awareness of the types of potential bias in review through on-going training (e.g., Bias in Review module).
- Build SRO and reviewer capacity to intervene effectively on issues of bias.

Target Outcomes:

- Reviewer training modules include increased focus on fairness in mitigating potential bias.
- SRO training curriculum addresses the role of SRO in ensuring fairness in review.
- Bias in Review Awareness Training: 100% SRO completion rate.
- Bias in Review Awareness Training: 75% Reviewer completion rate.
- Annually assess and revise, as necessary, Bias in Review Awareness Training module.

Objective 4.2: Take additional steps to protect the integrity of peer review.

The integrity of the NIH peer review process is key to maintaining public trust in our biomedical research enterprise, and it is thus of critical importance to our scientific community of reviewers and investigators. While our SROs are responsible for managing conflicts of interest, we also depend on our reviewers to identify such conflicts, any potential breach of confidentiality, or any attempt to influence the outcome of the review.

Implementation Strategies:

- Engage CSR Review Integrity Officer in reports/inquiries related to breaches of confidentiality or review integrity.
- Augment methods of detecting bad actors and threats to the integrity of review.
- Provide reviewers and SROs regular, updated training on peer review integrity.
- Promote awareness and reporting of integrity lapses.

Target Outcome:

- Summary data related to violations of review integrity will be posted annually.

Objective 4.3: Evaluate review criteria and formats to improve the openness, fairness, and effectiveness of peer review.

Over the past several years, there have been consistent concerns about the complexity of review criteria and administrative load of peer review. CSR shares the concern that the current set of standards has the unintended consequence of dividing reviewer attention among too many questions, thus reducing focus on scientific merit and increasing reviewer burden. Each element was intended to make the review better, but there is a concern that the cumulative whole may in fact distract from the main goal of review—which is to get input from experts on the scientific and technical merit of the proposed work. CSR will work to streamline the review process to improve its efficiency and effectiveness.

Implementation Strategies:

- Revise NIH review criteria for Research Project Grants (e.g., R01) to focus reviewer efforts on judging scientific and technical merit.
- Identify changes to the fellowship review process that would make it more open and fair and improve the ability of reviewers to assess the training potential of training grants applications (F, K grant mechanisms).

Implementation Strategies *(continued)*:

- Identify changes to improve the review of small business applications (Small Business Innovation Research [SBIR] and Small Business Technology Transfer [STTR] grant mechanisms), taking into account the unique goals of the small business funding programs.
- Limit/reduce administrative elements reviewers evaluate.
- Explore review formats that may reduce bias (e.g., blinding reviewers to the identity elements for part of the review process).

Target Outcomes:

- Reviewers report (via reviewer survey) more efficient and focused review requirements that effectively target significance and potential impact of proposed science.
- Funding institutes report (via program officer survey) that summary statements clearly articulate significance and potential impact of proposed science.

Objective 4.4: Improve assignment and referral of applications.

CSR requires review processes that are transparent, consistent, reliable, and responsive to the state of the science. A key aspect of this process is ensuring applications are referred to the scientific review group of best fit to allow appropriate scientific assessment.

Implementation Strategies:

- Evaluate and update referral processes to ensure applications are directed to appropriate scientific review groups for review.
- Adjust assignment and referral guidelines based on the outcome of ENQUIRE reviews.
- Ensure scientific review group guidelines are clear and accurate.

Target Outcomes:

- Assisted Referral Tool, which identifies best-fitting scientific review groups, is updated within 1 week of posting any revisions to scientific review group guidelines.
- Machine learning and artificial intelligence tools are incorporated into the referral process to efficiently automate the referral process where appropriate, in conjunction with human judgment.

Objective 4.5: Leverage data and technology to better support the peer review process.

While CSR conducts peer review efficiently with streamlined processes in place, better integration of emerging technological solutions to administer review would further improve workflow and optimize organizational performance. Automatization reduces administrative burden and allows staff to focus on the core principles of review.

Implementation Strategies:

- Build staffing and capacity for data management, analysis, and reporting through the new Division of Planning, Analysis, and Information Management (DPAIM).
- Incorporate assistive, predictive, and prescriptive technology to provide better insight and transparency into CSR's decision-making.

Target Outcomes:

- Best-of-breed automation technology (e.g., cobots, robotic process automation, artificial intelligence/machine learning) are incorporated into peer review processes.
- Year-over-year reduction of tedious, manual peer review tasks to allow for staff to focus on mission critical activity, which requires human judgment.

Objective 4.6: Evaluate peer review quality and reliability through process and outcome assessments.

A nimble, responsive, and adaptive peer review system must include processes for self-evaluation and corrective adjustments. CSR is committed to continuous assessment of the review process and outcomes to ensure we are achieving the highest outputs in terms of reliability and quality.

Implementation Strategy:

- Develop better measures for scientific review group process that are relevant to review (e.g., scope, collective reviewer expertise), as well as short-term outcome measures of scientific review group function (e.g., reduced influence of scientific camps, quality of discussions, reviewer engagement).

Target Outcome:

- Peer review process/outcome measures are developed, implemented, and used to inform scientific review group function and quality and adjust as necessary.

GOAL 5

Achieve our mission through transparency, engagement with the scientific community, and a data-driven approach to decision-making.

The majority of our initiatives and goals depend on engagement with the scientific community. A healthy relationship and open communication engender stronger ties and increased trust. Beyond building trust, increased communication with stakeholders related to CSR's initiatives can lead to a stronger peer review system by capitalizing on the input and experiences of the external scientific community.

Goal 5: Objectives

Achieve our mission through transparency, engagement with the scientific community, and a data-driven approach to decision-making.

Objective 5.1: Develop outreach approaches and dissemination plans to effectively communicate and receive feedback on CSR's initiatives and activities.

Our key principles of transparency in data-driven decision making and open, multi-directional communication underly our approach to building outreach and engagement with the scientific community. We have employed numerous approaches to facilitating engagement with key stakeholders both within NIH and within the general public, including producing videos and webinars about CSR-relevant activities to both applicants and reviewers, engaging in partnerships with other NIH ICs for outreach at national and international meetings, and expanding our presence on social media platforms. Our implementation strategies focus on growing our capacity to engage with the public to increase understanding of CSR's mission and activities and further advance our goals and objectives.

Implementation Strategies:

- Build the capacity and infrastructure of the Office of Communications and Outreach.
- Expand use of web and social media outlets to facilitate CSR's communications and outreach strategies.
- Increase outreach to the scientific community by expanding on CSR's communication efforts with the goal of conveying messages in a transparent, clear, concise, and consistent manner to foster trust at every level.

Target Outcomes:

- Increase staffing of the Office of Communications and Outreach to develop and implement more proactive communication campaigns.
- Use data analytics to more effectively use web and social media outlets to reach target audiences.
- Increase outreach to institutions with relatively low levels of NIH funding.
- Increase outreach to minority-serving institutions.

Objective 5.2: Collaborate and develop partnerships with other NIH institutes and centers.

Through collaboration with funding institutes and centers, we can achieve improvements in peer review and better review outcomes. In pursuing some of the initiatives outlined above, CSR will benefit from the wealth of experience at other NIH ICs. In the other direction, CSR's expertise in peer review can be effectively leveraged by funding institutes and centers when developing new funding opportunity announcements (FOAs) to achieve better review outcomes. Additionally, partnership with other ICs can help CSR better communicate with the external scientific community and extend the reach of our communications.

Implementation Strategies:

- Advise on FOA development to ensure productive review outcomes.
- Involve appropriate IC stakeholders in CSR peer review initiatives.
- Strengthen ties/collaborations with communication offices at other ICs to broaden CSR ideas about how to accomplish specific communication goals for internal and external audiences.
- Coordinate with communication programs at other ICs to maximize CSR's outreach efforts.
- Collaborate with other communication offices to ensure effective dissemination of changes in CSR policy that affect program staff.

Target Outcomes:

- An increase in outreach events at scientific conferences accomplished in coordination with program staff from funding NIH ICs.
- One-on-one relationships developed between staff in the CSR Office of Communications and Outreach and communication directors at funding ICs.
- Identification of ICs with strong internal communications programs and development of relationships between them and the CSR Office of Communications and Outreach.

CONCLUSION

Peer review plays a critical role in improving health and well-being in the United States.

This strategic plan serves to set the direction for the Center for Scientific Review from 2022 to 2027, as we take concrete actions to make peer review the best it can be. We strive to provide transparency in our actions and planning to those we serve, including our immediate stakeholders in the biomedical research community and extending to the American public. As we make progress on our stated goals, we are committed to making public our assessments and progress.

Publication Number: 22-SR-8176
February 2022

Center for Scientific Review
National Institutes of Health
U.S. Department of Health and Human Services

6701 Rockledge Drive
Bethesda, Maryland 20892

https://public.csr.nih.gov

This publication was publicly funded by the NIH Center for Scientific Review. It is available for your use and may be reproduced in its entirety without permission from CSR. Citation of the source is appreciated, using the following language: Center for Scientific Review, National Institutes of Health, U.S. Department of Health and Human Services.