CCC's Response to the National Science Board–National Science Foundation (NSF) Commission on Merit Review (MRX) Request for Information (RFI) on Informing the MRX's Review of NSF's Merit Review Criteria, Policy, and Processes

This response is prepared by the Computing Research Association (CRA)'s Computing Community Consortium (CCC). CRA is an association of over 270 North American computing research organizations, both academic and industrial, and partners from six professional computing societies.

The mission of the CCC, a subcommittee of CRA, is to enable the pursuit of innovative, high-impact computing research that aligns with pressing national and global challenges. Please note any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the authors' affiliations, or of the National Science Foundation, which funds the CCC.

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1. The MRX is interested in identifying opportunities to improve NSF's current Merit Review criteria, policy, and processes. Importantly, this includes documenting and understanding any areas of misunderstanding, gaps, or lack of clarity regarding (a) the three Merit Review Principles which are the foundations of the Merit Review Process, (b) the two statutory Merit Review Criteria which are used to evaluate all proposals to NSF, and (c) the five Merit Review Elements NSF uses to assess each criterion; for instance: Are the Principles, Criteria, and Elements clear? Could they be improved upon? The MRX welcomes feedback on any or all of these, and particularly on the Broader Impacts Criterion. Chapter 3 of NSF's Proposal & Award Policies and Procedures Guide (PAPPG) defines terms in this Information Request. See https://new.nsf.gov/policies/pappg/24-1/ch-3-proposal-processing-review#amerit-review-principles-and-criteria-af2. Individuals responding to this request are encouraged to indicate whether their perspectives are informed by experience(s) preparing and/or reviewing proposals to NSF.

The Computing Community Consortium (CCC) at the Computing Research Association (CRA) holds visioning workshops and has Task Forces to focus on specific topics for the computing research community. One of our visioning workshop topics in 2023-2024 is Community Driven

Approaches to Research in Technology and Society (CDARTS). One of our Task Forces focuses on Challenges in Interdisciplinary Research. These visioning activities engaged 67 researchers from academia and industry from multiple subfields of computing, social sciences, and policy, and 17 practitioners from non-profits and civil society organizations across the United States through 6, hour-long virtual roundtables and a 1.5 day in-person visioning workshop. Through these interactions with the broader computing community, CCC identified the need to: (1) engage community partners in all parts of the research and review process and (2) ensure review processes take into account the institutional barriers to supporting, reviewing, and rewarding interdisciplinary research.

Our response to this RFI is informed by the visioning workshop report from the CDARTS workshop: cra.org/ccc/cdarts-workshop-report

And the Interdisciplinary Best Practices roundtables output on Catalyzing Interdisciplinary Computing Research Best Practices for Researchers: cra.org/ccc/interdisciplinary_best_practices_for_researchers

The Task Force discussed the barriers encountered in the merit review process when the selected reviewers are not representative of the different disciplines engaging in the research. Our first recommendation is to amend Section B. Selection of Reviewers of Chapter III: NSF Proposal Processing and Review. This section refers to subfields and we posit that interdisciplinary research needs the review from the perspectives of multiple disciplines, not subfields. We recommend an additional item specifically for such research:

Review of interdisciplinary research: “Select reviewers of interdisciplinary proposals so that their expertise covers the relevant disciplines and they have interdisciplinary research experience. Reviewers should be selected that have experience and an understanding of Broader Impacts of interdisciplinary research.”

Reviewers need to be prepared to review interdisciplinary research. The following guidance is suggested:

“Reviewers should seek to understand and comment on the potential contributions of the proposed research to each discipline, the degree to which the proposed research integrates the disciplines, and the potential for new research areas to emerge. Reviewers should be familiar with the potential for significant broader impacts that result from multidisciplinary research. Reviewers should be aware of and acknowledge their potential for bias of other disciplines before making decisions. Reviewers should be asked to describe the research challenges in their discipline and the expectations reflected in the publishing cultures of all relevant disciplines.”

For Merit Review Criteria for any interdisciplinary programs, we recommend adding 2 elements that address interdisciplinary research:

-How well does the proposal describe the synergies and opportunities in bringing multiple disciplines together to address the research challenges?
-Does the proposal account for the time and funds needed to make interdisciplinary research successful?

The CDARTS Workshop discussed the problems faced by community partners in participating in funded research projects. We encourage NSF to engage a 3rd party to get feedback from any community partners that proposals indicate they will engage with to identify how the researcher team could better work with them and evaluate what, if any, harms could occur. These impact reports can be used to inform future best practices and the review process of proposals. This will ensure communities have a voice in the review and funding process.

For research that involves community partners:
-Does the proposal include a plan to engage with community partners so they have a voice at all stages of the research project?
-What 3rd party mechanisms (i.e. a 3rd party evaluator, community-based advocate, etc.) do proposers have for community members to report issues they encounter?

2. NSF strives to conduct a fair, competitive, transparent Merit Review process for the selection of projects. To accomplish this, NSF relies on a process that considers both the technical aspects of a proposed project and its potential to contribute more broadly to advancing NSF's mission using the statutory Intellectual Merit and Broader Impacts Merit Review Criteria. MRX invites suggestions on the implementation of the Merit Review Criteria. We especially invite feedback that would (a) clarify how the Merit Review Criteria can be used in preparing and reviewing proposals, (b) ensure proposals, reviews, and funding decisions demonstrate full consideration of both criteria while maintaining openness to the full spectrum of potential activities under each, and (c) better recognize and support potentially transformative and high-risk/high-reward activities. Individuals responding to this request are encouraged to indicate whether their perspectives are informed by experience(s) preparing and/or reviewing proposals to NSF.

We cannot have a major societal impact in our research contributions without intentionally pursuing Broader Impacts. We are concerned that Broader Impacts are not taken seriously by review panels, and are often treated as perfunctory. NSF could help educate researchers writing proposals and reviewers by publicizing best practices in broader impacts and case studies of exemplars from past NSF-funded initiatives.

We repeat recommendations in our response to Question 1 because we think it is also relevant to Question 2:

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-Does the proposal include a plan to engage with community partners so they have a voice at all stages of the research project?
-What 3rd party mechanisms (i.e. a 3rd party evaluator, community-based advocate, etc.) do proposers have for community members to report issues they encounter?

3. MRX is interested in the experiences and perspectives of those who have considered submitting and/or submitted proposals in the past. We invite you to share your insights and describe any opportunities you believe would improve implementation of the Merit Review criteria, policy, and processes based on your experience as a proposer or investigator. This includes any experiences that may have encouraged or dissuaded you from submitting proposals to NSF. We are especially interested in learning (a) how NSF guidance (e.g., as provided in the NSF PAPPG, program solicitations, or other funding opportunity announcements), may have played a part in your decision(s) whether to submit proposals, and (b) how NSF might best support investigators interested in submitting a proposal to NSF. Individuals responding to this request are encouraged to indicate whether they submitted or decided not to submit a proposal, and whether these experiences occurred within the past five years.

Many of the interdisciplinary roundtable and CDARTS workshop participants that informed this response have experience submitting proposals to NSF. The roundtable organizers conducted a thematic analysis of roundtable transcripts and paired findings with established evidence-based practices, and many promising ideas emerged of how NSF could help researchers overcome the barriers that interdisciplinary research proposers often face when submitting proposals. This includes training for researchers and grant reviewers, and establishing proposal review processes carefully designed for interdisciplinary proposals. Researchers are typically trained in specific disciplines and have a bias toward prioritizing the norms and expectations of that discipline. Interdisciplinary proposals need reviewers who can speak to the innovations and contributions both within their disciplines while also respecting epistemologies and contributions of other fields. NSF can:

- Support training for researchers on developing and writing interdisciplinary proposals, and for reviewers on evaluating interdisciplinary proposals
- Develop and share assessment frameworks for interdisciplinary research proposals to help researchers from different disciplines align on research outcomes
- Support interdisciplinary research for longer periods of time to allow researchers to amortize the longer start-up times of interdisciplinary research, for example, by allowing for a lightweight renewal of successful interdisciplinary projects
- Support the team formation phase of interdisciplinary research, which includes facilitating connections and learning between researchers from different disciplines
- Provide seed grants that allow early-stage interdisciplinary teams to take risks and test out ideas with short funding applications and fast acceptance decisions
- Fund interdisciplinary workshops that allow researchers to learn about other disciplines, brainstorm ideas, and form new interdisciplinary teams
- Support additional travel for researchers to attend key workshops and conferences in different disciplines so they can stay up-to-date on research and disseminate their research more broadly

In terms of integrating community voices that may be impacted by the Intellectual Merit (e.g., novel AI systems; mobile app deployments; education products; accessibility systems) and Broader Impacts, community partners at our CDARTS workshop discussed how they are sometimes not adequately compensated for their labor to the project and that the typical academic and funding metrics (e.g., publications) are inappropriate metrics for their own experience and community progress. Community partners also expressed concerns that sometimes the innovative proposed solution (e.g., using a specific social media or technology) did not adequately address the societal need. In addition, “workshop participants also noted a changing power dynamic across the duration of the project, with community based collaborators being viewed as more valued at project set up time versus during the course of the project itself. Some noted that they cannot pull out of the project once this happens, and the lack of adequate whistleblowing or safety mechanisms for people to report such instances” [cra.org/ccc/cdarts-workshop-report Section 2.1]. To this end, we recommend in the review process:

- Research teams provide evidence of community work in co-designing research questions and contributions - including concerns of the community and an acknowledgement of the balance between innovation and addressing community needs;
- Fund community liaisons and resources for communities involved in research;
- Ensure there are clearly defined roles within the research team and with community partners on who is communicating, when, how often, and how challenges will be resolved. This would be akin to current Collaboration Plans, but should be designed in a way that community partners and lay populations understand and can co-create together.
- Provide 3rd party mechanisms for community partners to provide feedback about the research collaboration and provide this feedback to the research team in a way to make improvements and not adversely impact the collaboration. If a collaboration with a

community partner cannot continue on, the community partner should not lose resources.

4. MRX is interested in the experiences and perspectives of those who have reviewed proposals submitted to NSF. We invite you to share your insights and describe any opportunities you believe would improve implementation of the Merit Review criteria, policy, or processes based on your experience reviewing NSF proposals. Individuals responding to this request are encouraged to indicate whether they served on a panel and/or as ad hoc reviewers, and whether these experiences occurred within the past five years.

The researchers responding to this request have served on panels and as ad hoc reviewers in the past five years. We believe Broader Impacts and the impact of Intellectual Merit on community partners should be considered with the same depth as Intellectual Merit. While a proposer's past impact in terms of Intellectual Merit is currently measured (e.g. their publication record), someone's past Broader Impacts are not readily accessible to reviewers. NSF PMs should be able to view past PI experiences with community partners and recommend that they receive appropriate, comprehensive, in-person training to ensure they understand their commitment to their community collaborators.

We have also sometimes witnessed a tendency of panels to favor proposals where the proposers have already done a lot of the work before they even receive funding, which seems counter to the idea of supporting new research ideas and instead supporting more incremental research. Additionally, we have heard panelists bring in personal biases and project their own experiences on the proposers, thus voting down proposals because they are "not doable" or too risky. We encourage NSF to remind panelists to balance their own experiences and resources with the proposers' provided past work and resources, and encourage the taking of risks for proposals that could have a high pay-off if they are successful.

5. MRX is interested in exploring how NSF could better support awardees in demonstrating and documenting outcomes of their awards in advancing knowledge (Intellectual Merit) and benefiting society and contributing to the achievement of desired broader or societal outcomes (Broader Impacts). We invite you to share your insights on how NSF might better support awardees in demonstrating and documenting outcomes of their awards without unnecessarily increasing awardees' administrative burden of reporting. Individuals responding to this request are encouraged to indicate whether their suggestions are based on experiences as investigators, users of public outcomes reports, or another perspective.

Interdisciplinary research is high-risk, high-reward with broad societal impacts. It takes more time to do well. Roundtable researchers explained that good, meaningful interdisciplinary collaborations typically take 5-10 years to develop. Discipline-specific contributions may have

different time horizons and expectations. Also, Interdisciplinary collaborations require diverse fields to be adequately funded. The “further” fields are from each other, the more challenging it is to publish contributions because scholars are typically trained within a discipline, thus reviewing interdisciplinary work is challenging and faces more rejections. Recruiting and retaining research assistants is challenging because trainees need to be trained in multiple areas that increases training time, mentorship, and exposure to more failures.

We appreciate that NSF is acknowledging the importance of interdisciplinarity in solving the grand challenges in computing and our society. We ask NSF to always consider that interdisciplinary research is more challenging than discipline specific research when assessing for Intellectual Merit and Broader Impacts, specifically in the following ways:

- We encourage NSF to consider “Case Studies” from research teams and “Impact Reports” from community partners so that they can contribute their experiences to help inform future best practices and identify places where teams can receive training to improve these collaborations and project successes.
- NSF should investigate mechanisms by which vital but non-traditional partners in proposals can be appropriately compensated for their expertise, knowledge, and time.

Overall, interdisciplinary research should be evaluated differently. It produces contributions that may not be disseminated in “traditional” venues. If this is not already in review guidelines, consider collaboratively creating a guide with all stakeholders on how contributions will be considered for all merit reviews.

6. MRX welcomes any other comments on or suggestions for improving NSF’s current Merit Review criteria, policy, and processes. It also welcomes information about aspects of Merit Review criteria, policy, and processes that are currently working well.

In our response to this RFI, we request that the following 2 points be considered essential components of the merit review process for research: (1) include reviewers that are representatives of the interdisciplinary teams and from relevant community partners, and (2) consider the development of better ways to measure the outcomes of interdisciplinary teams and community impact so that it is fair and equitable to all parties involved.