CRA Computing Research Association

CCC Computing Community Consortium Catalyst

CRA BEST PRACTICES DOCUMENT

Catalyzing Interdisciplinary Computing Research

Best Practices for Funders

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Many societal challenges can benefit from computing research, but large-scale societal impact is only achievable if computing researchers work with experts across disciplines. Despite decades of research on the best ways to conduct interdisciplinary work and the widespread acceptance that the work is important, researchers attempting interdisciplinary work still face significant challenges.

To address this topic, the Computing Research Association (CRA) and its Computing Community Consortium (CCC) facilitated six round table discussions with 40 subject matter experts[1] on interdisciplinary computing practices across academia, industry, and government to identify the challenges and needs of the computing community to catalyze interdisciplinary research. The organizers of the roundtable discussions conducted a thematic analysis of roundtable transcripts and paired findings with established evidence-based practices. From these roundtable discussions and relevant literature, the authors created this document along with interdisciplinary best practices documents for Computing Researchers[2] and Organizational Leadership.[3]

This paper summarizes our recommendations for funders, including government agencies, industry, philanthropic donors, and non-profit organizations.

Overall, funders should:

- Provide funding mechanisms to help researchers get started with interdisciplinary research.
- Help teams overcome the barriers that interdisciplinary research proposals often face.
- Initiate new funding mechanisms to incentivize interdisciplinary research more broadly.

Provide Funding Mechanisms to Help Researchers Get Started with Interdisciplinary Research

Researchers often face challenges in exploring interdisciplinary research directions and identifying, reaching out, and working with potential collaborators from other disciplines, especially if they do not have funding or institutional support, or have potential collaborators with different levels of commitment and interest.

Funders can:

- **Support training for researchers** on best practices for performing interdisciplinary research.
- **Fund interdisciplinary workshops** that allow researchers to learn about other disciplines, brainstorm ideas, and form new interdisciplinary teams.
- **Support the team formation** phase of interdisciplinary research through planning grants and 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.

Help Teams Overcome the Barriers That Interdisciplinary Research Proposals Often Face

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.

Funders can:

- **Select review panels of interdisciplinary proposals strategically** so that their expertise covers the relevant disciplines and they have interdisciplinary research experience. Reviewers should understand 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 aware of and acknowledge their potential for bias before making decisions. They should also understand the research and publishing cultures of all relevant disciplines.
- **Fund training for researchers** on developing and writing interdisciplinary proposals, and for reviewers on evaluating interdisciplinary proposals.
- **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.
- **Develop and share assessment frameworks for interdisciplinary research proposals** to help researchers from different disciplines align on research outcomes.
- **Fund interdisciplinary research for longer time periods** (3 years or more) to allow researchers to amortize the longer start-up times of interdisciplinary research, for example, by allowing for a lightweight renewal of successful projects.

Initiate New Funding Mechanisms to Incentivize Interdisciplinary Research More Broadly

Funders should incentivize and support more forms of interdisciplinary research across a broader range of disciplines.

Funders can:

- **Consider the levels of support and resources needed to foster different types of interdisciplinary research collaborations over the long term**, recognizing that there may be more significant differences in research cultural norms, language, and methodologies, across certain disciplines. For example, interdisciplinary research across computing, engineering, and natural or physical sciences may encounter fewer challenges than interdisciplinary research across computing and the social sciences where researchers may need more time to learn and align on research methods and outcomes.
- **Fund both basic and applied interdisciplinary research** even though the need for interdisciplinary research is often easier to justify in the context of applications.
- **Encourage interdisciplinary teams of small-medium sizes and inclusive of junior researchers to broaden participation across a breadth of institutions.** Large-scale efforts and centers tend to fund a small number of researchers at top-ranked universities which can make it difficult for other interdisciplinary teams to obtain funding for their research.
- **Encourage international research teams and reduce barriers to obtaining funding** to foster research informed by more diverse perspectives. Clearly communicate processes for supporting international collaborators.
- **Expand programs that prepare PhD students and early-career researchers for interdisciplinary research,** such as developing interdisciplinary curricula, interdisciplinary mentorship programs for PhD students, and interdisciplinary summer schools and training PhD students and postdoctoral researchers. Funders could expand existing programs to encourage more interdisciplinary pathways. Consider the National Science Foundation (NSF) Career program as a model to support not only individual early-career researchers but also early-career interdisciplinary teams.

[1] In the creation of this document, we thank the roundtable participants for their time and feedback. Contributors list: http://cra.org/ccc/contributors_interdisciplinary_best_practices_for_funders
[2] cra.org/ccc/interdisciplinary_best_practices_for_researchers
[3] cra.org/ccc/interdisciplinary_best_practices_for_leadership

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