

NSF Regional Grants Conference
**NSF Support for Potentially
Transformative and Interdisciplinary
Research**

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Panelists

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“Take-home” message - PTR

- **Proposals for potentially transformative research (PTR) are encouraged in all NSF programs.**
- **NSF reviewers and program staff are all expected to help identify PTR proposals.**
- **NSF can, and will, support risky proposals that have the potential for transformative research.**

Contact your Program Officer

What is Transformative Research?

- ***Transformative research can be hard to define.***
NSF’s current working definition:

– **Transformative research** involves ideas, discoveries, or tools that radically change our understanding of an important existing scientific or engineering concept or educational practice or leads to the creation of a new paradigm or field of science, engineering, or education. Such research challenges current understanding or provides pathways to new frontiers.

Transformative Research Working Definition (Cont.)

- **Transformative research results often do not fit within established models or theories and may initially be unexpected or difficult to interpret; their transformative nature and utility might not be recognized until years later.**
- **Possible characteristics of transformative research:**
 - may challenge conventional wisdom;
 - could lead to unexpected insights that enable new techniques or methodologies;
 - might redefine boundaries of science, technology, engineering, education

What might Constitute Potentially Transformative Research?

- **Note that the definition does not restrict PTR to only those truly paradigm-changing breakthroughs often mentioned in this context (relativity, plate tectonics, etc.). Some examples:**
 - Using magnetic resonance imaging to monitor brain function, which greatly expanded the limits of behavioral research
 - Using polar ice sheets as neutrino detectors, originally tested in Greenland through an NSF SGER award
 - Research into large-scale, hypertext web searches that eventually led to current state-of-the-art search engines.
- **Further illustrative examples will be available on the NSF web pages, along with a list of FAQs**

Challenges and Expectations for NSF funding of PTR

- Many exciting projects cannot be funded with the low NSF success rate: proposals are not rejected *because* they are PTR but because they were not competitive amongst proposals received
- High risk research may, of course, fail: the amount of risk acceptable to a given program can vary widely
- Judgment of high risk/high return versus low risk/low return
- Not all PTR is risky: some is serendipitous
- Risky PTR proposals compete with excellent proposals for fundamental research that is guaranteed to advance a field (low risk, high return)

Challenges and Expectations for NSF funding of PTR (cont.)

- Perceptual disconnect: surveys show PIs consistently consider their work to be PTR, but when reviewing they find few PTR proposals;
- Although PTR can be hard to identify, reviewers and the community are increasingly aware of, and sensitive to, this need;
- Proposals are not automatically more worthwhile just because they are PTR;
- Need to maintain a balanced portfolio which includes fundamental productive research and a managed amount of PTR, risky and otherwise.

Possible NSF Mechanisms which can be used to support PTR

- Some funding opportunities will mention this specifically;
- Some proposals identified by the merit review as PTR can be supported by special arrangement, perhaps after negotiation between the PO and the PI to adjust the project scope;
- RAPID and EAGER;
- Creativity extensions or accomplishment based renewals;
- There are very different approaches and preferences in different directorates, offices, and divisions;

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“Take-home” message - IDR

- **Disciplines are continually emerging, melding, and reinventing themselves.**
- **NSF can play a key role in stimulating and supporting cutting-edge interdisciplinary research (IDR) discoveries.**
- **NSF will foster a culture that welcomes and actively enables support for promising IDR.**

What is Interdisciplinary Research?

- ***NSF follows the National Academies' definition...***
 - **Interdisciplinary Research (IDR)** is a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice.

Committee on Facilitating Interdisciplinary Research; Committee on Science, Engineering, and Public Policy (2004). *Facilitating interdisciplinary research*. National Academies. Washington: National Academy Press, page 2.

Possible NSF Mechanisms which can be used to support IDR

- NSF has a number of programs that are explicitly interdisciplinary and receive IDR proposals.
- Unsolicited proposals may also be interdisciplinary and not clearly fit within a single program.
- There are very different approaches and preferences in different directorates, offices, and divisions;

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For More Information

Ask Early, Ask Often!

<http://www.nsf.gov/staff>

<http://www.nsf.gov/staff/orglist.jsp>