This document has been archived.

NATIONAL SCIENCE FOUNDATION
2415 EISENHOWER AVENUE
ALEXANDRIA, VIRGINIA 22314

NSF 20-041

Dear Colleague Letter: Exploring the NSF 2026 Idea Machine

February 4, 2020

Dear Colleagues:

NSF seeks to further explore the pool of ideas submitted to the NSF 2026 Idea Machine, for the purpose of framing new potential areas for NSF investment. This Dear Colleague Letter (DCL) invites submission of proposals for Conferences, and EArly-concept Grants for Exploratory Research (EAGERs), following the themes that emerged in the top group of Idea Machine entries.

BACKGROUND

In 2016, the National Science Foundation (NSF) unveiled a set of "Big Ideas," 10 bold, long-term ideas that identify areas for future investment at the frontiers of science and engineering (see NSF's 10 Big Ideas). The Big Ideas represent unique opportunities to position our Nation at the cutting edge of global science and engineering leadership by bringing together diverse disciplinary perspectives to support convergence research. Investing in bold, foundational research questions that are large in scope, innovative in character, originate outside of any particular NSF directorate, and require a long-term commitment is the goal of NSF 2026, one of NSF's 10 Big Ideas. Framed around the year 2026, the Nation's 250th anniversary, NSF 2026 in turn launched the NSF 2026 Idea Machine, a prize competition seeking compelling ideas for fundamental research in science and engineering to be pursued in the coming years. The contest invited entrants to describe an emerging science, engineering, or learning research challenge that they thought should be addressed. It was open to the general public, inviting input from both experienced stakeholders and new and unconventional partners. The NSF 2026 Idea Machine received 800 entries from nearly every state in the country -- including submissions from established researchers, undergraduate and graduate students, teachers on behalf of their classes, and high school and middle school students. The entries were reviewed first by Program Officers and other staff from across NSF, then by the NSF 2026 Working Group and finally by a Blue Ribbon Panel of external experts. The resulting group of narrowed entries (listed individually as an appendix to this DCL) were each invited to submit a video pitch. The 33 ideas were selected for their timeliness, potential scientific and

This document has been archived.

societal impacts, and potential for inter-agency, international, or public-private partnerships.

This DCL encourages the submission of proposals that engage interested stakeholders to enrich the research themes identified through the NSF 2026 Idea Machine and develop associated research agendas.

SUMMARY OF THE OPPORTUNITY

The submitted Idea Machine entries were in the form of short concept outlines and videos rather than full-length research proposals. To develop these conceptual descriptions into actionable research agendas that include sets of specific research questions, NSF seeks proposals for catalytic activities in the form of:

- Conferences that bring together those interested in shaping any or a group of these top 33 broad ideas into actionable research themes, or new long-term research programs.
- EAGER projects to extend, develop and test concepts from among the top 33 ideas that are ripe for early stage, transformative research.

Opportunities for participation by undergraduate and graduate students and postdoctoral fellows, K-12 students, industry representatives, and others are encouraged. NSF welcomes proposals that include efforts to broaden participation of underrepresented groups (women, minorities, and persons with disabilities) in the development of the research agendas. Reflecting the Idea Machine concept, NSF seeks proposals on topics that cross disciplinary boundaries.

PREPARATION INSTRUCTIONS

Each proposal submitted in response to this DCL should be grounded in a compelling, cross-disciplinary research challenge in line with one or more of the top-ranked Idea Machine entries. The proposal should address the current state of the research challenge and describe an integrated strategy for addressing the challenge. Proposals must identify which concepts from among the 33 entries the activity proposes to enrich or extend.

Proposals submitted in response to this DCL should be prepared and submitted in accordance with the guidelines contained in the NSF Proposal & Award Policies & Procedures Guide (PAPPG) and the instructions provided below.

NSF 2026 CONFERENCE

These awards will provide support for projects with durations of up to one year and budgets of less than $100,000. PIs should clearly outline the anticipated target audience to be engaged in the proposed conversation(s) and the plan to disseminate the findings after the conference(s). Convening events can take the form of workshops, symposia, or other types of

This document has been archived.

meetings, and can include multiple sequential events as long as the proposed activities request a budget of less than $100,000 in total. PIs are encouraged to contact NSF by sending an email to NSF2026IM@nsf.gov and ask about the suitability of the proposed conference prior to submission of a proposal.

See PAPPG Chapter II.E.7 for specific instructions about preparing Conference proposals (see https://www.nsf.gov/bfa/dias/policy/ for information about the PAPPG).

NSF 2026 EAGERS

For a project to be considered for EAGER funding through this opportunity, a 2-page Research Concept Outline (RCO) must be emailed 60 days prior to proposal submission to NSF2026IM@nsf.gov. The RCO must be a PDF file that clearly describes the idea of the EAGER and illustrates how the project extends and deepens one or more of the concepts found among the 33 entries. PIs are also required to clearly articulate the anticipated high-risk and high-rewards aspects of the proposed activity. Based on those summaries, EAGER proposals will be invited, if appropriate.

See PAPPG Chapter II.E.2 for specific instructions on preparing EAGER proposals.

Proposers should upload the invitation letter in the single copy document section of the proposal. NSF 2026 EAGER proposals received without prior discussion with, and subsequently followed by a written invitation from a Program Officer, will be returned without review.

DEADLINES

Proposals and research concept outlines should be submitted by 5:00 PM submitter's local time on the dates shown below:

Conference proposals: March 15, 2020

EAGER Research Concept Outlines: March 1, 2020

EAGER proposals: May 15, 2020

All proposals must be submitted to the NSF 2026 program in the Office of Integrated Activities (OIA) through Fastlane. The title must begin with "NSF2026:" Please note that even though proposals must be submitted to OIA, once received the proposals will be managed by a cross-disciplinary team of NSF Program Directors.

POINTS OF CONTACT

All NSF directorates and offices support research in these areas. However, the submission

This document has been archived.

process is being coordinated NSF-wide by the Office of Integrated Activities. Therefore, inquiries about the DCL and questions about submission of NSF 2026 Conference and EAGER proposals should be directed to NSF2026IM@nsf.gov. The top-ranked 33 entries are listed below, with links to both a written description and a short video summary.

Sincerely,

Suzanne Iacono, Head,
Office of Integrative Activities (OIA)

Joanne S. Tornow, Assistant Director
Directorate for Biological Sciences (BIO)

Erwin Gianchandani, Assistant Director (Acting)
Directorate for Computer and Information Science and Engineering (CISE)

Karen Marrongelle, Assistant Director
Directorate for Education and Human Resources (EHR)

Dawn Tilbury, Assistant Director
Directorate for Engineering (ENG)

William E. Easterling, Assistant Director
Directorate for Geosciences (GEO)

Anne L. Kinney, Assistant Director
Directorate for Mathematical and Physical Sciences (MPS)

Arthur Lupia, Assistant Director
Directorate for Social, Behavioral and Economic Sciences (SBE)

Rebecca L. Keiser, Office Head
Office of International Science & Engineering (OISE)

References:

- NSF 2026 website: https://www.nsf.gov/news/special_reports/big_ideas/nsf2026.jsp
- PAPPG: https://www.nsf.gov/publications/pub_summ.jsp?ods_key=pappg

Appendix: List of top-ranked 33 submissions to NSF 2026 Idea Machine

1. Appear EDU
2. A World without Waste
3. Creating Artificial General Intelligence
4. Creating Sustainable Education Pathways

This document has been archived.

5. Bioinspired Energy Utilization
6. Bridging the Atom-to-Global Scale Gap
7. Designing Ecosystems for the Future
8. Emergence: Complexity from the Bottom Up
9. Engineered Living Materials
10. Equity & Beneficence in Sociotech System
11. From Thinking to Inventing
12. Geomimicry
13. Globalization of Science Results with AI
14. Global Microbiome in a Changing Planet
15. Harnessing the Human Diversity of Mind
16. Human vs AI - Gamers Helping Scientists
17. Imagine a Life with Clean Oceans
18. Integrated Human-Machine Intelligence
19. Large Landscape Resilience by Design
20. Mechanical Morality
21. Promoting Empathy-Based AI
22. Public Carbon Capture and Sequestration
23. Reinventing Scientific Talent
24. Repurposing, Recycling, Renewable Energy
25. Reversibility: Future of Life on Earth
26. Saving Coral Reef Ecosystems
27. Terraforming Earth
28. Theory of Conscious Experience
29. The STEM Teaching and Learning Incubator
30. Understand Scaling of Embodied Cognition
31. Universal Similitude Across Scales
32. Unlocking the Future of Infrastructure
33. #Why Not Me: STEM Diversity Drivers