Track 1 Deadline: April 8, 2025
All Tracks: Sept 9, 2025

NSF 24-564
Revolutionizing Engineering Departments

IUSE/Professional Formation of Engineers (IUSE/PFE:RED)

Division of Undergraduate Education

Division of Engineering Education and Centers

Logistics

- Please stay muted unless you are speaking
- Use Zoom chat to submit questions during the lecture portion
- Use the ”reactions” > “raise hand” feature to ask a question live
- Real-time captions are available within Zoom

- The presentation slides and webinar recording, excluding Q&A, will be available on the RED program site as soon as possible following the webinar.

Your program officer team

ENG/EEC

Engineering Education Cluster

- Alice Pawley
- Matthew Verleger

EDU/DUE

IUSE

- Christine Delahanty

Email any of us at
eer-programs@nsf.gov

NSF 24-564: Revolutionizing Engineering Departments (1)

- Started in 2014 in the aftermath of engineering education centers and coalitions
- Goal: to support transformational, sustainable change at department level focusing on middle two years of undergraduate bachelors 'degree programs.

NSF 24-564: Revolutionizing Engineering Departments (2)

IUSE/Professional Formation of Engineers (IUSE/PFE:RED)

- "IUSE" = Improving Undergraduate STEM Education
  - Promote novel, creative, and transformative approaches to generating and using new knowledge about STEM teaching and learning to improve STEM education for undergraduate students.
- "PFE" = Professional Formation of Engineers
  - *the formal and informal processes and value systems by which people become engineers.*
  - More description online in RIEF solicitation (NSF 20-588 - https://www.nsf.gov/funding/opportunities/pfe-rief-pfe-research-initiation-engineering-formation)

NSF 24-564: Revolutionizing Engineering Departments (3)

4 tracks:

1. Planning: build capacity to apply for subsequent Track 2, 3, or 4.
2. Adaptation & Implementation: adapt and implement evidence-based organizational change strategies and actions in the local context.
3. Innovation: develop new, revolutionary approaches and change strategies that enable the transformation of undergraduate engineering education.
4. Innovation Partnership: Innovation projects developed across multiple institutions, with particular interest in projects that support two-year institutions in partnership with other eligible institutions.

NSF 24-564: Revolutionizing Engineering Departments (4)

4 tracks:

1. Planning: build capacity to apply for subsequent Track 2, 3, or 4.
2. Adaptation & Implementation: adapt and implement evidence-based organizational change strategies and actions in the local context.
3. Innovation: develop new, revolutionary approaches and change strategies that enable the transformation of undergraduate engineering education.
4. Innovation Partnership: Innovation projects developed across multiple institutions, with particular interest in projects that support two-year institutions in partnership with other eligible institutions.

Planning grants in PAPPG (1)

- You can submit planning grants as unsolicited proposals to “NSF 24-1”.
  - Contact the program officer to whom you want to direct it *first*. (Before the concept outline.)
- Planning grants would follow just what is described in PAPPG.
  - “initial conceptualization, planning and collaboration activities that aim to formulate new and sound plans for large-scale projects in emerging research areas for future submission to an NSF program.”
  - Up to $100K/year, up to 2 years.

https://www.nsf.gov/policies/pappg

Planning grants in PAPPG (2)

- Concept outline submitted 30 days before due date to cognizant PD by email (or ProSPCT).
- Proposal preparation:
  - Include return email from PD that project can go ahead
  - Project description limited to 8 pages
  - Other normal aspects of proposal - project summary, references, NSF bios in new format, C&P, synergistic activities list, budget, budget justification, facilities and equipment, mentoring plan for grad students and postdocs, DMP
- Submit through Research.gov
- Review:
  - Merit review criteria, can be internally reviewed

https://www.nsf.gov/policies/pappg

RED Planning grants (1)

- "Program Solicitation": deviations from PAPPG
  - Goal: build capacity to apply for subsequent RED Track 2, 3, or 4 proposal specifically.
- Use it to help with next proposal:
  - Build and grow your team;
  - Support handling logistical and cultural challenges of a team's writing a proposal together;
  - Handle challenges in figuring out your next idea, like:
    - Collect data to show you need a RED;
    - Develop a research plan (and skills);
    - Gain management or organizational change skills
    - Figure out how to "assess success"
  - Pay for time to participate in these events (like NTT or CC faculty)

Planning (Track 1)
Institutions of special interest to NSF
$75K/year, $150K total
2 years max
Concept outline approval 8 page project description Required RED advisor Can be internally reviewed

https://www.nsf.gov/policies/pappg

RED Planning grants (2)

Concept outline at least 30 days before deadline

- Emailed to your program officer
- To include:
  - The intended duration and approximate budget for the project.
  - A high-level overview of the Intellectual Merit and Broader Impacts (explicitly) of a RED Track 2, 3, or 4 project that this planning project could enable.
  - How this planning project will provide the preliminary supports necessary for development of a larger proposal.
    - *(Like, what will you do with this money and this time?)*

If you haven't sent one already – aim for the Sept deadline.

Planning (Track 1)
Institutions of special interest to NSF
$75K/year, $150K total
2 years max
Concept outline approval 8 page project description Required RED advisor Can be internally reviewed

https://www.nsf.gov/policies/pappg

RED Planning grants (3)

Limit on who can apply:

- two-year institutions that support transfer students
- institutions in EPSCoR jurisdictions,
- Primarily Undergraduate Institutions (PUIs), or
- Minority Serving Institution (MSIs).

Limits on who can be PI:

- PI must be department chair/head or equivalent, in engineering, or teaching lots of engineers

Limits on timing and budget:

- $75k/year x 2 years
- Team must come to annual PI meeting

Planning (Track 1)
Institutions of special interest to NSF
$75K/year, $150K total
2 years max
Concept outline approval 8 page project description Required RED advisor Can be internally reviewed

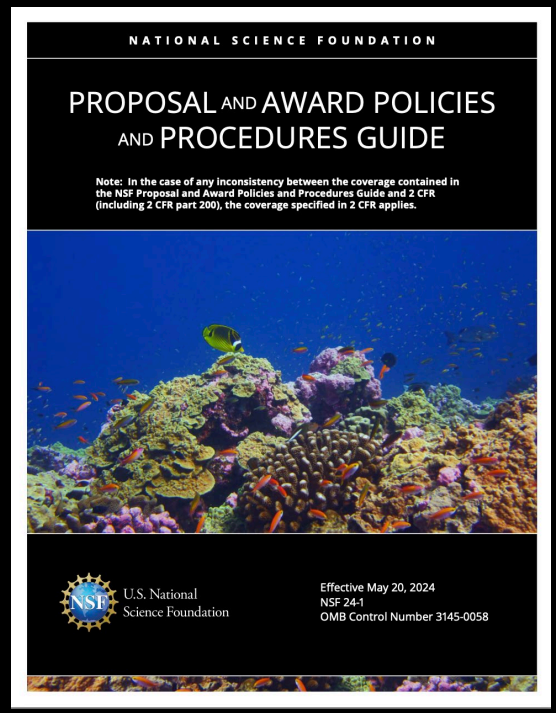
https://www.nsf.gov/policies/pappg

RED Planning grants (4)

These components are required:

- Project description (in 8 pages):
  - Vision for Revolutionizing the Engineering Department (what will *next* proposal do?)
  - Need for Planning Support
  - Project Plan
    - Goals and Objectives
    - Specific Actions
    - Barriers
    - Current or Former RED Recipient Advisor
- A way to assess project's success
- Supplementary Documentation
  - List of project participants

Planning (Track 1)
Institutions of special interest to NSF
$75K/year, $150K total
2 years max
Concept outline approval 8 page project description Required RED advisor Can be internally reviewed



https://www.nsf.gov/policies/pappg

NSF 24-564: RED summary table

Four tracks:

	Planning (Track 1)	Adaptation & Implementation (Track 2)	Innovation (Track 3)	Innovation Partnerships (Track 4)
Institutional limits	Institutions of special interest to NSF	No limit	No limit	At least 2 institutions
Funding limit	$75K/year, $150K total	Up to $1M	Between $1M and $2M	Between $1.5M and $2.5M
Timeframe	2 years max	Up to 5 years	Up to 5 years	Up to 5 years
Deviations from PAPPG	Concept outline approval 8-page project description Required RED advisor Can be internally reviewed	Specific sections required, with specific content Different required Letters of support and content Required RED Advisor Required evaluation plan to assess success Additional merit review criteria	Specific sections required, with specific content Different required Letters of support and content Required RED Advisor Required evaluation plan to assess success Additional merit review criteria	Specific sections required, with specific content Different required Letters of support and content Required RED Advisor Required evaluation plan to assess success Additional merit review criteria

Merit Review Criteria

Why is this project worth taxpayers' investment?

Intellectual Merit (1)

Encompasses the potential to advance knowledge.

What is your argument that this is worth taxpayers' investment?

1. IM - It's a great idea, with a great plan, as evidenced by grounding in existing research, data, and norms

Intellectual Merit (2)

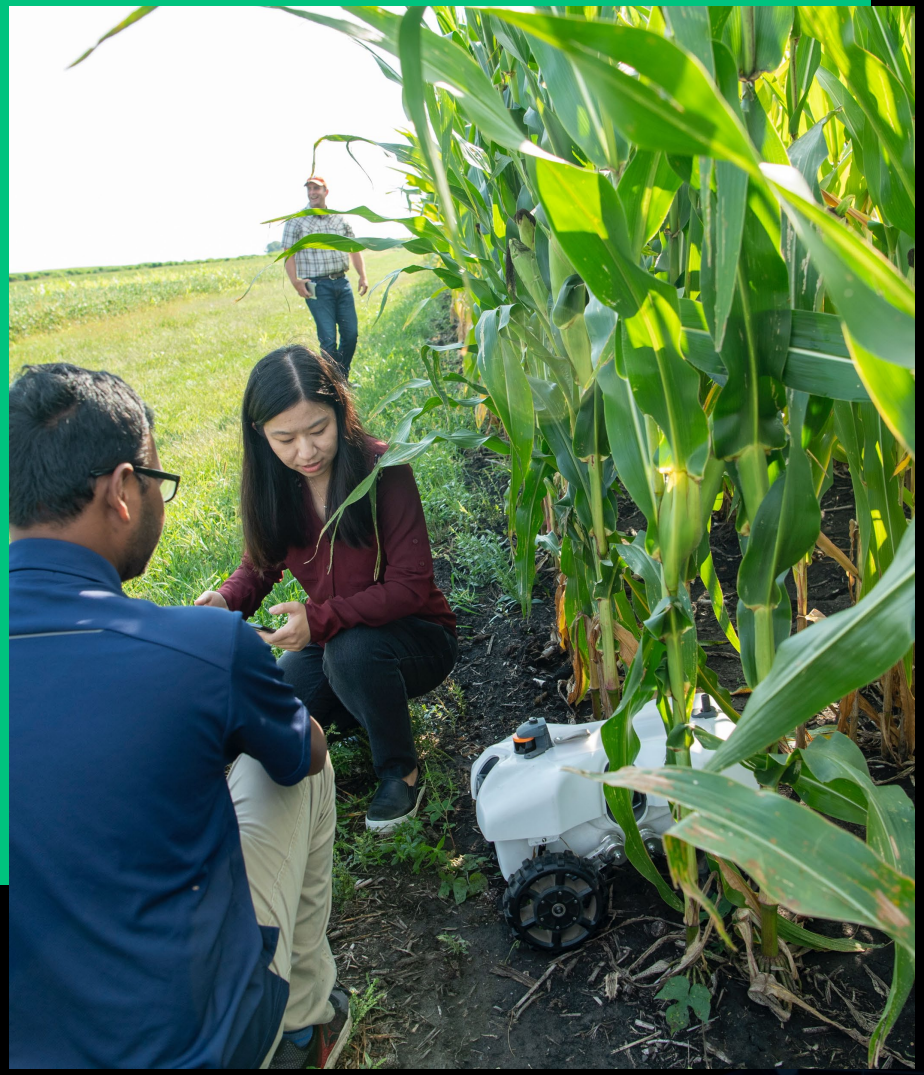
- Should this be done?
  - Will it advance knowledge and understanding?
  - Does it matter within the field and across fields?
  - Does it constitute creative, original, or potentially transformative research?
  - What is the significance of the expected contributions?
- Can this be done? (How well conceived and organized is the proposed activity?)
  - Soundness and feasibility of approach, evaluation, research plan given the resources requested and resources available at the institution
  - How qualified is the team to conduct the proposed research?
  - Will the team's plan curate data appropriately, mentor staff appropriately?
  - Does the team have access to necessary equipment and facilities?

Broader Impacts (1)

What is your argument that this is worth taxpayers' investment?

1. BI – It will benefit society in specific, concrete ways.
   - Inclusion – broadening participation
   - Improve STEM education at any level
   - Increase public science literacy and engagement with STEM
   - Improving societal well-being
   - Developing a better global workforce
   - Build partnerships between academia and industry or others
   - Improve national security
   - Increase economic competitiveness
   - Enhance infrastructure for research and education

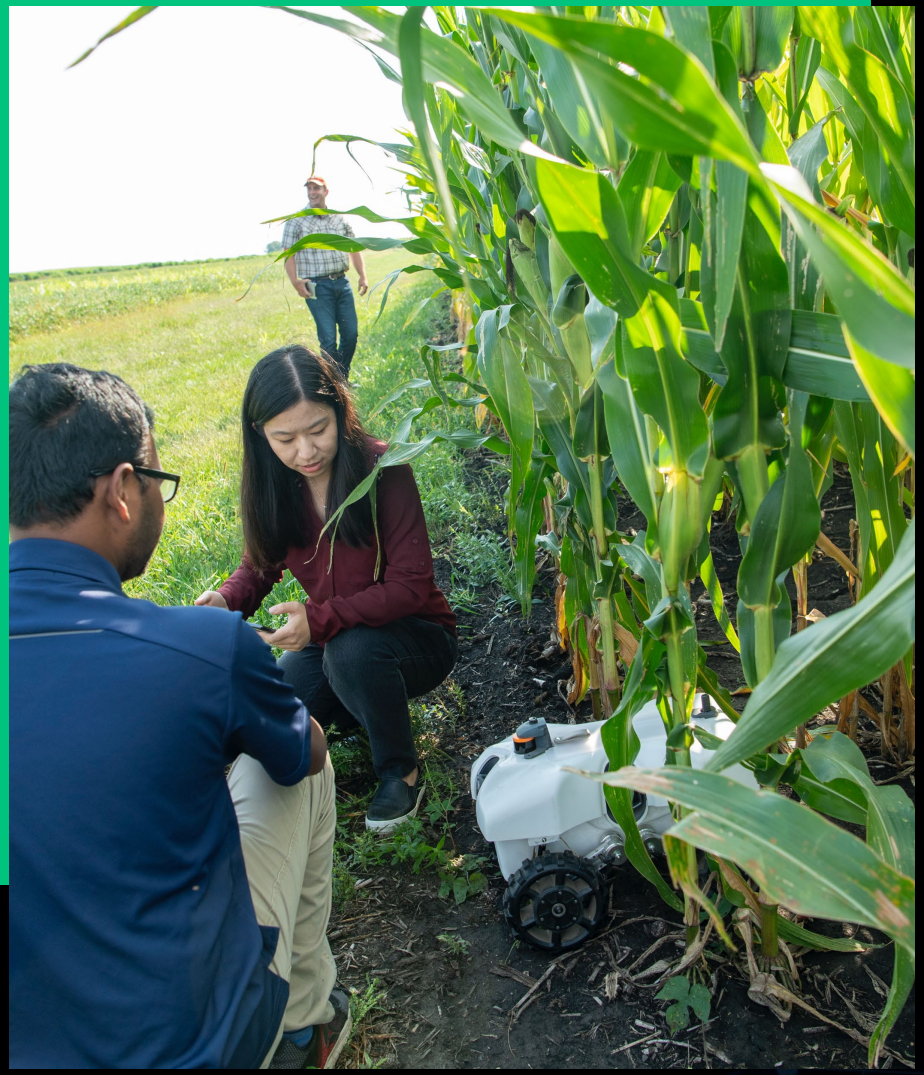
https://www.nsf.gov/funding/learn/broader-impacts



Broader Impacts (2)

Accomplished through

- the research itself;
- activities that are directly related to specific research projects;
  AND / OR
- activities that are supported by, but complementary to the project.



Merit review criteria - summary

Intellectual merit

1. What is the potential for the proposed activity to advance knowledge and understanding within its own field or across different fields?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impact

1. What is the potential for the proposed activity to benefit society or advance desired societal outcomes?
2. To what extent do the proposed activities suggest and explore creative, original or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized and based on sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team or institution to conduct the proposed activities?
5. Are there adequate resources available to the principal investigator (either at the home institution or through collaborations) to carry out the proposed activities?

Merit review criteria – for a planning grant (1)

Intellectual merit

1. What is the potential for the proposed activity to advance knowledge and understanding within its own field or across different fields?
2. Probably in the vision for the next proposal (track 1<X<5)
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impact

1. What is the potential for the proposed activity to benefit society or advance desired societal outcomes?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized and based on sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team or institution to conduct the proposed activities?
5. Are there adequate resources available to the principal investigator (either at the home institution or through collaborations) to carry out the proposed activities?

Merit review criteria – for a planning grant (2)

Intellectual merit

1. What is the potential for the proposed activity to advance knowledge and understanding within its own field or across different fields?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3.
4.
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impact

1. What is the potential for the proposed activity to benefit society or advance desired societal outcomes?
2. To what extent do the proposed activities suggest and explore creative, original or potentially transformative concepts?
5. Are there adequate resources available to the principal investigator (either at the home institution or through collaborations) to carry out the proposed activities?

IM – literature, grounding; BI – right stakeholders, participation, for convergent ideas

Why will the activities you currently plan to spend the money and time on be successful in helping you revolutionize your department?

How grounded in theory, best practices, change management, building teams, etc?

(A little bit on the vision, but not so much about the *next proposal!)*

Merit review criteria – for a planning grant (3)

Intellectual merit

1. What is the potential for the proposed activity to advance knowledge and understanding within its own field or across different fields?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. [illegible]
5. [illegible] collaborations) to carry out the proposed activities?

Broader impact

1. What is the potential for the proposed activity to benefit society or advance desired societal outcomes?
2. To what extent do the proposed activities suggest and explore creative, original or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized and based on sound rationale? Does the plan incorporate a mechanism to assess success?

What are the activities you're going to do, and why does the literature, or your data, suggest those are worthwhile and likely to accomplish what you want them to?
(Not about the *next proposal!)*

or through collaborations) to carry out the proposed activities?

Merit review criteria – for a planning grant (4)

Intellectual merit

1. What is the potential for the proposed activity to advance knowledge and understanding within its own field or across different fields?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5.

Broader impact

1. What is the potential for the proposed activity to benefit society or advance desired societal outcomes?
2. To what extent do the proposed activities suggest and explore creative, original or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized and based on sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team or institution to conduct the proposed activities?

Around the planning activities for now, but hopefully you will use the grant to figure out who these need to be for the next proposal too.

Project description, prior NSF support, biosketches, synergistic activities

Merit review criteria – for a planning grant (5)

Intellectual merit

1. What is the potential for the proposed activity to advance knowledge and understanding within its own field or across different fields?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized, and based on a
4.
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Broader impact

1. What is the potential for the proposed activity to benefit society or advance desired societal outcomes?
2. To what extent do the proposed activities suggest and explore creative, original or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well-organized and based on sound
4.
5. Are there adequate resources available to the principal investigator (either at the home institution or through collaborations) to carry out the proposed activities?

For the planning grant activities! (And then building capacity for the next proposal!)
Budget, budget justification, facilities & equipment description, DMSP

Data Management and Sharing Plan

- ENG standard
  - Products of research
  - Data formats and standards
  - Dissemination, access and sharing of data
  - Reuse, redistribution and production of derivatives
  - Archiving of data

- https://www.nsf.gov/eng/data-management-plans
- IRB approval necessary for research involving human subjects before institutions receive awards – so start your application now

Mentoring plan

- For both postdoctoral researchers and graduate student researchers
  - Budget: B. Other Personnel or F. Participant Support Costs
- Limited to one page total
  - (even if both graduate students and postdoctoral scholars are on project)
  - Excess content can be included within Project Description page limit.
- Reviewed under the Broader Impacts criterion
  - Does the plan effectively address both research mentoring and broader career and professional development?
  - Will the mentoring activities support the development of skills and competencies needed for the proposed project? For the trainee's continuing professional growth?
  - Will the mentoring activities help grad students graduate and postdocs advance to their next career step?
  - Does the plan reference the annual use of Individual Development Plans (IDPs) for trainees receiving "substantial" support?

Research or Impacts on Tribal Lands

- Special requirements if you are proposing a project relating to Tribal Nations.
  - Proposals that may impact the resources or interests of a federally recognized American Indian or Alaska Native Tribal Nation (Tribal Nation) **will not be awarded** by NSF without prior written approval from the official(s) designated by the relevant Tribal Nation(s).
  - Proposers seeking NSF funding for such proposals **must…** Include **at least one** of the following:
    - (i) a copy of the written request to the relevant Tribe(s) to carry out any proposed activity/activities that may require prior approval from the Tribal Nation(s);
    - (ii) written confirmation from the Tribal Nation(s) that review and approval is not required; or
    - (iii) a copy of a document from the relevant Tribal Nation(s) that provides the requisite approval.

    All such documentation must be uploaded into "Other supplementary documents" in Research.gov. If only (i) is provided, the proposer will still be required to submit either (ii) or (iii) before NSF will make an award decision.

Common mistakes

1. Focusing too much on the next proposal (1)

Yes, you have to provide vision of how things could be different

BUT…

- When your team is working better together, its vision could change
- Maybe your data you collect will tell you your problems are different
- If you take too much time to fill out your vision, you will run out of space to say what you are going to *do.*

Have a sense of what the next track should be, and the vision, but leave open how it might change.

1. Focusing too much on the next proposal (2)

Broader impacts of a planning grant are not the same as the broader impacts of the *next* proposal.

Instead of publications etc… think:

- Who are the right campus partners now for the next grant to be competitive?
- How are you involving the department's faculty in authentic shared governance activities regarding the curriculum such that they will buy in to the additional work you are giving them? How will you incentivize their participation, and how will that continue after the grant is over?

2. Taking much space to tell the reviewers the wrong things

- Only talking about broader impacts waaaaaaaaay down the road
- Only describing the magnitude of problems nationally or globally (but not at their own institutions)
- Describing facilities and equipment that have nothing to do with the proposed project
- In the explicit IM and BI sections, getting contributions in the wrong place, and missing obvious contributions. (Line them up with NSF's descriptions and questions!)

At the end of the day, the reviewers need to be able to say that the project is worthwhile and well conceived along IM and BI criteria, and worth the investment. *Help them see that this is true.*

3. Taking not enough space to tell reviewers the right things

- What is your revolutionary idea (explicitly) and why is it worth doing at your institution?
  - (Even Track 2 should be revolutionary, even though they've been done…)
- What (specifically) are you going to do with the time and money you receive? When?
- What are the stakeholders who you will need to involve (including students?!?), and how will you involve them?
- Where are the descriptions of things that the solicitation says are required?
- What will happen if the PI leaves your institution before the next proposal is submitted?
- How will you need to prepare the institution's leadership to pick up financial responsibility down the road if the next project is successful? (I.e. how is institutionalization part of your planning project's goals and activities now?)

4. Focusing on curriculum, not culture.

- People don't change how they do things because it's a good idea, or it's the right thing to do. So how will you involve people now such that the next proposal will be competitive, and if funded, successful?
- "Incentivizing faculty" doesn't just mean "give them some discretionary funds so they'll come to the workshop." How will the proposal handle their workloads?
- Who are experts you can draw on who can help a department see its own culture and want to change it?
- How will you involve undergraduate students?

5. Leaving out why they're not doing this good idea now.

If it is such a good idea why aren't you doing it anyway?

- The need should not be based on the global significance or importance of the problem the team ultimately wants to solve;
- Instead, it should be about what conditions currently exist locally that a Track 2, 3, or 4 RED grant should be able to help change.

- "Need for planning support" should describe the need that the planning grant money and time will be able to meet. (Obviously.)

Best practices

1. See what previous RED projects have done, and learn from them.

REDPAR as a resource - https://www.nsf-redprojects.org

Published papers should be in NSF's PAR - "Public Access Repository" – read and reference them in your proposal. - https://par.nsf.gov

Reach out to similar/related institutions or projects for help getting an advisor

Contact your program officer if you get stuck.

2. Make a page budget

Project description	8 pages. How to distribute?
Vision for Revolutionizing the Engineering Department	
Need for Planning Support	
Goals and Objectives – measurable, with a way to tell if you've met them	
Specific Actions – what you will do with the money and time	
Barriers and how your design overcomes them	
Current or Former RED Recipient Advisor, their qualifications, and what they'll do for you	
A way to assess project's success	

2. Make a page budget - mistakes

Project description	8 pages. How to distribute?
Vision for Revolutionizing the Engineering Department	People spend too much time here
Need for Planning Support	They describe this as “it’s such a good idea”
Goals and Objectives – measurable, with a way to tell if you’ve met them	They repeat things from the vision, forgetting these relate to the planning.
Specific Actions – what you will do with the money and time	Not enough detail and specifics here. Who, what, where, why, how, when?
Barriers and how your design overcomes them	Only as much as it takes to stay in the page limit
Current or Former RED Recipient Advisor, their qualifications, and what they’ll do for you	Name drops, but leaves responsibilities for the budget justification
A way to assess project’s success	Overlooks entirely even though PAPPG requires.

2. Make a page budget – a better way

Project description	8 pages. How to distribute
Vision for Revolutionizing the Engineering Department	0.5 pages? Supported by data, could take a little more.
Need for Planning Support	1 pages ? – specific to your institutions, with data
Goals and Objectives – measurable, with a way to tell if you've met them	0.5-1 pages?
Specific Actions – what you will do with the money and time	3 pages!
Barriers and how your design overcomes them	1 page
Current or Former RED Recipient Advisor, their qualifications, and what they'll do for you	0.5 page
A way to assess project's success	0.5-1 page?

3. Involve the right experts from the beginning.

- Find good partners who can help improve your proposal. Give them meaningful leadership work.
  - RED advisors – use REDPAR as a resource.
  - Educational researchers, social scientists, change management experts
  - People who help teams learn to grow together
  - People who understand what “culture” means and how to change it

4. Ask your program officers questions

- Book us through our Bookings page or by emailing eer-programs@nsf.gov
- Send a 1-page description of your idea before the meeting (include a description of how you plan to spend the money and time).
- Listen to the feedback, and make revisions based on it.
- Try to get a subsequent meeting to follow-up!

What do I do about the EOs?

- The RED solicitation currently hasn't changed.
- The merit review criteria haven't changed.
- The community of reviewers and what they care about in a good proposal haven't changed.
- Your institution has always received the award – and have to be ok with what you're submitting (as always).
- When in doubt, lean into the language of the NSF law.
  - https://www.law.cornell.edu/uscode/text/42/chapter-16
- Keep an eye on the NSF FAQ page – updated every Friday – and ask questions of your program officer when things change.
  - https://www.nsf.gov/executive-orders

Final thoughts

- NOTE THE TITLE REQUIREMENTS – "IUSE/PFE:RED Planning" as prefix
- Track 1 deadline – April 8
  - 30-day window for concept outlines has passed
- Track 1, 2, 3, 4 deadline – September 9
  - Submit concept outline well before August 9 because that's NSF's closeout period.
- Solicitations can change but NSF will provide notice well before deadlines.
- We will (try to) offer webinars on the other tracks later in the year (summer? August?)
- Grant-writing, grant management, and other resources available at the Engineering Education Community Resource: http://engineeringeducationlist.pbworks.com

Thank you!

Send questions to eer-programs@nsf.gov

We'll stop the recording, and move now to Q&A.

Questions and answers from the chat

Q&A (1)

- Is there a "Study" phase prior to Track 3?
  - That is what the Track 1 (planning) grants are for.
- Is Software Engineering / Computer Science education appropriate for this program?:
  - Software engineering -yes.
  - CS - it's a bit institutionally dependent, but could be. email us with your situation.
- What and how are practicing engineers part of the proposals?
  - They may be a stakeholder you want to include in discussing how you want to change your department.
- Are Tracks 3 and 4 permitted without first going through a RED Planning Grant?
  - Yes.
- Any hints on how we can find a RED advisor?
  - Look up funded proposals on https://www.nsf-redprojects.org and send the project team members an email, early on in your development process.

Q&A (2)

- When will we hear back about the RED proposals currently under review?
  - We're working on getting them all reviewed. We had panels setup in late January when all NSF panels were cancelled through the end of February. That delay caused a massive hiccup in the system. We will hopefully have a decision made with plenty of time for you to revise before the September deadline if necessary.
- Is the broader impacts criterion still the same as before? I thought certain DEI wordings were no longer allowed to be included in the proposal.
  - The BI impact criterion has not changed (and is actually written into law about NSF - https://www.law.cornell.edu/uscode/text/42/1862p-14). NSF is still developing guidance about the DEI-related EOs align (or don't align) with that law.
- I understand that planning grants must be led by 2-year college partners. // Can tracks 3 or 4 be led by a 4-year partner of a 2-year college?
  - Yes, but the 2-year partner should be an active participant in making the change, not just a mostly passive feeder to a 4-year program.

Q&A (3)

- Does a RED proposal need to identify the stakeholders for the final outcome of the proposal?
  - “Need to” - not technically. Should it - probably. Review panels want to know that you’ve identified all your stakeholders and engaged them in a productive way. Or that you know you don’t know your stakeholders and have a plan for identifying them.
- Since these departmental changes are curriculum-related, they may involve ABET. Do you have any advice on how to navigate this?
  - You need to consider ABET in your redesign, but also recognize that ABET will approve a pretty wide bandwidth of models if you’re thoughtfully evaluating it correctly and doing continuous improvement. (See some of the unique programs that already exist.)