Developing Grant Proposals

Purdue grant writing strategies and assistance

Sally Bond
Assistant Director of Research Development Services
Proposal Coordination
Office of the Vice President for Research and Partnerships
Grant Writing Assistance and Resources

Grant Writing Support

Welcome to the Research Development Services grant writing support site. Here you can access resources for your proposal development as well as request hands-on help from our team of grant writers. If you have any questions, contact sbond@purdue.edu
Research Development Services Website
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Getting Starting: Quick Overview

A Visual Guide to the Grants Process at Purdue

Where are you in the process?

Click on each flowchart box to find more information.

IDEA

Have funding opportunity?

YES

Is funding limited?

YES

E-Mail Sue Grimes
EVPRPlimited@purdue.edu

NO

Contact Pre-Award Center to begin budget development with a proposal specialist

Review funding options

NO

Review online resources

Submit a final proposal using institutional authority at Pre-Award Center

Want grant writing assistance?

YES

E-Mail Sally Bond
sbond@purdue.edu

NO
Shop your idea

Concept storylines to

When? Sooner is better

External proposals only

Any agency

Any award size
Ask for Grant Writing Help

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*Ask for Grant Writing Help*

[Image: Email icon with text: REQUEST A GRANT WRITER]
Ask for Grant Writing Help

Smart and Connected Communities (S&CC)

PROGRAM SOLICITATION
NSF 19-564

REPLACES DOCUMENT(S):
NSF 18-528

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NSF 19-564

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NSF 18-528
Ask for Grant Writing Help

Smart and Connected Communities (S&CC)

Program Solicitation
NSF 18-564

Replaces Document(s):
NSF 18-564

National Science Foundation
Directorate for Computer and Information Science and Engineering
Directorate for Engineering
Directorate for Social, Behavioral, and Economic Sciences
Directorate for Integrative Cross-disciplinary Research

Letter of Intent Due Date: December 14, 2018
Proposals Due Date: January 15, 2019

Preparation for a Successful Meeting
with Your Program Officer

You are more likely to receive valuable insight into the funding potential of your idea if you follow these steps:

1. Make certain that your idea is advance.
2. Email the "Hold a Call" email to your program officer.
3. Request a phone appointment.
4. Develop your research plan using the template below.
5. Meet with the Office's Research and Partnerships.

Why a one-pager? A concise summary of your idea that starts with a compelling objective. You will need to consider our resources, highlighting the top of your proposal, and be clear and concise. This preparation will ensure that your proposal is not multiple pages and represents a proper version that can be revised. This will be the most effective one-page project that will be reviewed.

To the Program Officer:

SMARTER

Start with a statement:
- What is the problem?
- What is the solution?
- What is the impact?

Briefly mention why this team is ideal for the project.

For All Other Funding Agencies Use Concept Page:

Start with a statement:
- What is the problem?
- What is the solution?
- What is the impact?

List your research objectives.

For NIH Use Specific Aim Page:

Start with a statement:
- What is the problem?
- What is the solution?
- What is the impact?

List your research objectives.

Office of the Executive Vice President for Research and Partnerships
Ask for Grant Writing Help
Ask for Grant Writing Help

Preparing for a Successful Meeting with Your Program Officer

You are more likely to receive valuable insight into the funding potential of you idea if you follow these steps:

- Make contact at least 3-6 months in advance.
- Send a "cold call": Send a one-page concept paper along with your agency's checklist and requested preapplication discussion.
- Develop your concept paper using the template. Submit written in the Office of Research and Partnerships for feedback. Be sure to follow the instructions on the checklist.

Why a one-page?:
- Identifies your idea's abstract — one that starts with a compelling question. — will have a clear and concise description, highlight the top of your proposed project.
- A one-page proposal typically captures the essence of your project at a glance.
- It will not be a "tadate" the program officer can access for program fit.

For NIH Use Specific Alumni Page

For All Other Funding Agencies Use Concept Page

A. Start with storyline:
- How is the current problem?
- How has the problem been addressed?
- What is the gap that still exists?
- How does your project address the gap?
- Briefly mention why this team is ideal for the project.

B. Outline a background objective for each aim.
- Your area is not the same. But many other areas may be.
- Test with paragraph on expected outcomes.

Office of the Executive Vice President for Research and Partnerships
Ask for Grant Writing Help
Ask for Grant Writing Help
Ask for Grant Writing Help
Proposal Preparation Process

Tailored and intentional plan

General 10-week project timeline:

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**Program Officer Input**

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**Proposed Outline**

| Discuss/refine outline structure |   |   |   |   |   |   |   |   |   |    |
| More detailed outline, if needed |   |   |   |   |   |   |   |   |   |    |
| Identify graphics needed |   |   |   |   |   |   |   |   |   |    |

**Partnerships**

| Recruit collaborative partners |   |   |   |   |   |   |   |   |   |    |
| Produce “talking points” brochure or website |   |   |   |   |   |   |   |   |   |    |
| Recruit industry affiliates |   |   |   |   |   |   |   |   |   |    |
| Recruit advisory board members |   |   |   |   |   |   |   |   |   |    |
| Collect letters of commitment |   |   |   |   |   |   |   |   |   |    |

**Management and Personnel**

| Identify basic management structure |   |   |   |   |   |   |   |   |   |    |
| Collect biosketches |   |   |   |   |   |   |   |   |   |    |

**Proposal Writing and Editing**

| Assign writing |   |   |   |   |   |   |   |   |   |    |
| Write section components |   |   |   |   |   |   |   |   |   |    |
| Compile 1st draft |   |   |   |   |   |   |   |   |   |    |
| Project team 1st edit |   |   |   |   |   |   |   |   |   |    |
| Any outside review input/edit |   |   |   |   |   |   |   |   |   |    |
| Editing iterations |   |   |   |   |   |   |   |   |   |    |
| Write summary or abstract |   |   |   |   |   |   |   |   |   |    |

*Red Text: Important to have agreement (and explicit text for problem overview) prior to proposal writing*
Key Strategies

Strategies for the strongest proposal submission

• tell a compelling story
• respond to solicitation
• answer “Why Purdue?”
• know your reviewer
• conduct internal review
## Build the Storyline

**Storyline first!**

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Red Text: Important to have agreement (and explicit text for problem and gap)

*If I had six hours to chop down a tree, I’d spend the first four hours sharpening the axe.*

~ Abraham Lincoln
Build the Storyline

Gap analysis

- tell a compelling story
- respond to solicitation
- answer
- know your audience
- conduct

Good science is a story that...
- begins with a problem
- provides coherence in narrative
- hooks reviewer so weaknesses are not fatal
- sets "north star"
Build the Storyline

Four key questions

• tell a compelling story
• respond to a limitation
• answer why
• know what
• conduct internal review

• What is the problem?
• What has been done already to address the problem?
• What is the gap that remains?
• How do you propose to address this gap?
Build the Storyline

Funnel of logic flow

• tell a compelling story
  • What is the problem?
  • What has been done already to address the problem?
  • What is the gap that remains?
  • How do you propose to address this gap?
The NIH is committed to translating basic biomedical research into clinical practice and thereby impacting global human health, and Francis Collins identifies high-throughput technology as one of five areas of focus for the NIH’s research agenda. For many diseases, researchers have identified successful novel therapeutics or research probes by applying technical advances in automation to high-throughput screening (HTS) using either biochemical or cell-based assays. Researchers are using genetic perturbations such as RNA interference or gene overexpression in cell-based HTS assays to identify genetic regulators of disease processes as potential drug targets. However, the molecular mechanisms of many diseases that deeply impact human health worldwide are not well-understood and thus cannot yet be reduced to biochemical or cell-based assays.

Ideally, researchers could approach disease from a phenotypic direction, in addition to the traditional molecular approach, by searching for chemical or genetic regulators of disease processes in whole model organisms rather than isolated cells or proteins. Moving HTS towards more intact, physiological systems also improves the likelihood that the findings from such experiments accurately translate into the context of the human body (e.g., in terms of toxicity and bioavailability), simplifying the path to clinical trials and reducing the failure of potential therapeutics at later stages of testing. In fact, for some diseases, a whole organism screen may actually be necessary to break new therapeutic ground; in the search for novel therapeutics for infectious agents, for example, it is widely speculated that the traditional approach of screening for chemicals that directly kill bacteria in vitro has been largely exhausted. Our work recently identified six novel classes of chemicals that cure model organisms from infection by the important human pathogen E. faecalis through mechanisms distinct from directly killing the bacterium itself. Anti-infectives with new mechanisms of action are urgently needed to combat widespread antibiotic resistance in pathogens.

Enabling HTS in whole organisms is therefore recognized as a high priority (NIH MR-08-024). Caenorhabditis elegans is a natural choice. Manually-analyzed RNAi and chemical screens are well-proven in this organism with dozens completed. Any existing assays can be adapted to HTS; instrumentation exists to handle and culture C. elegans in HTS-compatible multi-well. Its organ systems have high physiologic similarity and genetic conservation with humans. C. elegans is particularly suited to assays involving visual phenotypes—physiologic abnormalities and fluorescent markers are easily observed because the worm is mostly transparent. The worms follow a stereotypic development pattern that yields identically arising adults, such that deviations from wild-type are more readily apparent.

The bottleneck that remains for tackling important human health problems using C. elegans HTS is image analysis. It has been recently stated, “Currently, one of the biggest technical limitations for large-scale RNAi-based screens in C. elegans is the lack of efficient high-throughput methods to quantitate lethality, growth rates, and other morphological phenotypes.” Our proposal to develop image analysis algorithms to identify regulators of infection and metabolism in high-throughput C. elegans assays would bring image-based HTS to whole organisms, and have the following impact:
Preparing for a Successful Meeting with Your Program Officer

You are more likely to receive valuable insight into the funding potential of your idea if you follow these steps:

- Make contact early (at least several months in advance).
- Do not make a “cold call.” Email a one-page concept paper along with your agency biosketch and request a phone appointment to discuss.
- Develop your concept paper using the format below. Grant writers in the Office of Research and Partnerships can help you develop this text. Email sbond@purdue.edu to request help.

Why a one-pager? Distilling your ideas into a brief summary — one that starts with a compelling storyline — will best communicate project relevance, highlight the logic of your approach, and allow targeted rather than general feedback. Many program officers will not read more than one page since multiple pages represent a proposal review rather than an idea review. While you will not be told if you are “fundable,” the program officer can assess for program fit.

Storyline to Concept Paper

**For NIH Use Specific Aims Page**

- **Start with storyline:**
  - What is the human health problem?
  - What has been done already to address this problem?
  - What is the gap that still exists?
  - How do you propose to address this gap?

- Briefly mention why this team is ideal for the project.

- **Aim X: Use a bold, concrete objective for each aim.** Describe each aim in one to three sentences that convey why this work needs to be done as well as what and how.

- **End with paragraph on expected outcomes.**

**For All Other Funding Agencies Use Concept Page**

- **Start with storyline:**
  - What is the problem?
  - What has been done already to address this problem?
  - What is the gap that still exists?
  - How do you propose to address this gap?

- **List your goals/objectives.**

- **Describe why this team is ideal for the project.**

- **Overview methodology.**

- **Summarize impact of your success.**
Build the Storyline

One-page...taste of your entire grant in a single, bite-sized piece

It forces you to distill all aspects down to their essences and to find a way of piecing things together that is economical, coherent, logical, and compelling [...] is totally unforgiving, revealing problems in the clarity of your thinking and presentation, weaknesses in the logic of your research, vagueness in your methods, and failures in the all-important ‘so what?’ realm. Given the luxury of length, additional verbiage has a way of camouflaging weaknesses (at least from the writer but not so often from the reviewer).

—Robert Levenson, UC-Berkeley
Key Strategies

Addressing common trouble spots

- tell a compelling story
- respond to solicitation
- answer “What’s in it for us?”
- know your audience
- conduct internal review
- follow all instructions!
- outline before writing
Respond to Solicitation

Know the agency guidelines as well as solicitation
Respond to Solicitation

Sleuth what was funded previously to identify trends

• What type of science and how does it compare to yours?
• What was team composition?
• What type of education integration?
• What type of institution?
• What type of budget?
Respond to Solicitation

Agency websites often show what was previously funded.

www.nsf.gov

http://www.nsf.gov/
Respond to Solicitation

Each program page has “what has been funded” and map of recent awards.
Respond to Solicitation

Respond to Solicitation

**Respond to Solicitation**

Outline before you write. Be consistent with formatting.

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**Example of NSF-style proposal outline**

<table>
<thead>
<tr>
<th>I. RATIONALE [2-5 pages]</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Storyline</td>
</tr>
<tr>
<td>o What is the problem?</td>
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<tr>
<td>o What has been done already?</td>
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<tr>
<td>o What is the gap that still remains?</td>
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<tr>
<td>o What do you propose to do to address this gap?</td>
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</table>

<table>
<thead>
<tr>
<th>Goals and Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>List goals and objectives (per goal)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Team Partnership</th>
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<tbody>
<tr>
<td>Team expertise</td>
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<tr>
<td>Targeted teacher and/or community college faculty participants</td>
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<tr>
<td>Institutional commitment</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Broader Impacts</th>
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<tbody>
<tr>
<td>Curriculum accessed by underrepresented students through targeted teacher recruitment</td>
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<tr>
<td>Community-based research activities</td>
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<tr>
<td>Integrating research activities into computing-related courses in local high schools</td>
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<tr>
<td>Role models from HBCU partner on HUBbing webinars</td>
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<tr>
<td>Presentation to parent-teacher organizations to include assessment results from DLRC-collected metrics</td>
</tr>
<tr>
<td>Presentations at both technology education conferences as well as K-12 STEM learning</td>
</tr>
</tbody>
</table>

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**2. NATURE OF TEACHER ACTIVITIES [3.5 pages]**

- Need clearly articulated research projects and activities
- Map to goals/objectives
- Teachers must be involved in research project for at least 6 weeks
- Must have orientation session at beginning of the program for the teachers to acquaint them with laboratory methods, safety procedures, analytical methods, etc.
- Address approach to research training being undertaken

<table>
<thead>
<tr>
<th>Research Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Include overview statement of spectrum of research projects</td>
</tr>
</tbody>
</table>

**Project 1**

- Provide detailed descriptions of examples of research projects
- Include who is doing what role
- Present plans that will ensure the development of RET participant-faculty interaction and communication
- How will you facilitate development of collegial relationships and interactions as teachers work closely in teams with university faculty and students?

**Project Timetable**

- Need Gantt-style chart such as this.
- Overview sentence

<table>
<thead>
<tr>
<th>Program Initiation</th>
<th>Year one</th>
<th>Year Two</th>
<th>Year Three</th>
<th>Year Four</th>
<th>Year Five</th>
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</thead>
<tbody>
<tr>
<td>Ongoing Evaluation</td>
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<td>Professional Development</td>
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<tr>
<td>Assessment</td>
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<tr>
<td>Evaluation and Assessment</td>
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<tr>
<td>Outreach</td>
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</tbody>
</table>

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**3. RESEARCH ENVIRONMENT [2.5 pages]**

- Describe the experience and record of involvement with K-12/community college education and research of the PI
- Describe faculty who may serve as research mentors. Consider table such as:

<table>
<thead>
<tr>
<th>Mentor Name</th>
<th>Dept/School</th>
<th>Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

- Describe institution
  - Include emphasis on cross-disciplinary partnership and past record of success in cross-disciplinary collaborations
Key Strategies

Addressing common trouble spots

• tell a compelling story
• respond to solicitation
• answer “Why Purdue?”
• know your audience

• win differentiators of expertise, facilities, prior work, campus environment
Key Strategies

Addressing common trouble spots

• tell a compelling story
• respond to solicitation
• answer “Why Purdue?”
• know your reviewer
• conduct internal review

• writing for expert and non-expert
• busy, rushed
• did not choose to read your proposal
Know Your Reviewer

Be kind...you are not writing for yourself.

• use formatting as a roadmap
• be generous with white space
• fix grammar and proof proposal
• write clearly...shorter sentences
Example of NSF-style proposal outline

1. **RATIONALE** [2.5 pages]
   - Storyline
     - What is the problem?
     - What has been done already?
     - What is the gap that still remains?
     - What do you propose to do to address this gap?

2. **Goals and Objectives**
   - List goals and objectives (per goal)

3. **Teamm Partnership**
   - Team expertise
   - Targeted teacher and/or community college faculty participants
   - Institutional commitment

4. **Broader Impacts**
   - Curriculum accessed by underrepresented students through targeted teacher recruitment
   - Community-based research activities
   - Integrating research activities into computing-related courses in local high schools
   - Role models from HBCU partners on EL/BAME webinars
   - Presentation to parent-teacher organizations to include assessment results from DLRC-collected metrics
   - Presentations at both technology education conferences as well as K-12 STEM learning

5. **NATURE OF TEACHER ACTIVITIES** [3.5 pages]
   - Need clearly articulated research projects and activities
     - Map to goals/objectives
   - Teachers must be involved in research project for at least 6 weeks
   - Must have orientation session at beginning of the program for the teachers to acquaint them with laboratory methods, safety procedures, analytical methods, etc.
   - Address approach to research training being undertaken

6. **Research Project**
   - Include overview statement of spectrum of research projects

   **Project 1**
   - Provide detailed descriptions of examples of research projects
     - Include who is doing what role
     - Present plans that will ensure the development of RET participant-faculty interaction and communication
     - How will you facilitate development of collegial relationships and interactions as teachers work closely in teams with university faculty and students?

   **Project 2**
   - Provide detailed descriptions of examples of research projects
     - Include who is doing what role
     - Present plans that will ensure the development of RET participant-faculty interaction and communication
     - How will you facilitate development of collegial relationships and interactions as teachers work closely in teams with university faculty and students?

   **Project Timetable**
   - Need Gantt-style chart such as this
   - Overview sentence

   **Program Initiation**
   - Year one
   - Year two
   - Year three
   - Year four
   - Year five

   **Departmental Transformation**
   - Year one
   - Year two
   - Year three
   - Year four
   - Year five

   **Evaluation and Assessment**
   - Year one
   - Year two
   - Year three
   - Year four
   - Year five

   **Program Evaluation**
   - Year one
   - Year two
   - Year three
   - Year four
   - Year five

   **Program Evaluation**
   - Year one
   - Year two
   - Year three
   - Year four
   - Year five

3. **RESEARCH ENVIRONMENT** [2.5 pages]
   - Describe the experience and record of involvement with K-12 community college education and research of the PI
   - Describe faculty who may serve as research mentors
     - Consider table such as:

     | Mentor Name | Dept/School | Expertise |
     |-------------|-------------|-----------|

   - Describe institution
     - Include emphasis on cross-disciplinary partnership and past record of success in cross-disciplinary collaborations
Know Your Reviewer

Parallel formatting provides a roadmap to help your reviewer

<table>
<thead>
<tr>
<th>Research Strategy (usually 12 pages) Option 2 with common preliminary studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Significance</td>
</tr>
<tr>
<td>B. Innovation</td>
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<tr>
<td>C. Approach</td>
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<tr>
<td>• Overview sentence on the team and the approach</td>
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<tr>
<td>Preliminary Studies (for all the aims together)</td>
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<tr>
<td>• For all the aims together</td>
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<tr>
<td>Title of Specific Aim #1 (verbatim from your specific aims section)</td>
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<tr>
<td>o Introductory paragraph</td>
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<tr>
<td>Research Design</td>
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<tr>
<td>Expected Outcomes</td>
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<tr>
<td>Potential Problems and Alternative Strategies</td>
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<tr>
<td>Title of Specific Aim #2 (verbatim from your specific aims section)</td>
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<tr>
<td>o Introductory paragraph</td>
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<tr>
<td>Research Design</td>
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<tr>
<td>Expected Outcomes</td>
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<tr>
<td>Potential Problems and Alternative Strategies</td>
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<tr>
<td>Title of Specific Aim #3 (verbatim from your specific aims section)</td>
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<td>o Introductory paragraph</td>
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<tr>
<td>Research Design</td>
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<tr>
<td>Expected Outcomes</td>
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<tr>
<td>Potential Problems and Alternative Strategies</td>
</tr>
<tr>
<td>Timetable</td>
</tr>
<tr>
<td>* Use Gantt chart</td>
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<tr>
<td>Future Directions (optional)</td>
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</table>
Know Your Reviewer

Avoid dense text by adding white space

The NEES collaboration created a total of 15 advanced equipment sites for experimental work dedicated to the reduction of the earthquake threat (Figure 4). The current experimental reach of the equipment ranges from the marine to the geotechnical to the structural environments and can address almost any technical question that may arise on issues related to the safety of the built-environment in earthquakes. Development of this massive array of experimental capabilities demanded an intense and sustained effort. In retrospect, it would appear that the leaders of research groups involved in the creation of the 15 sites were totally absorbed, as they should have been, in the proper development of a research and experimental capability across the U.S. Unfortunately, there were three unplanned and unintended results: 1) a negative perception among a portion of the research community that equipment access was not equitable; 2) most, if not all, of research work initiated has not yet been of a quality to transform the engineering community culture; and 3) the information technology infrastructure, which had initially inspired the NEES concept of a network of interconnected laboratories, has yet to reach its potential. The metaphor of a powerful fleet of battleships at anchor is not irrelevant to the current status. Our goal is to get the fleet moving in harmony.

Rapid advance in engineering knowledge and capability requires at least four ingredients: 1) a driving need; 2) a large community of well-educated professionals; 3) financial support; and 4) competing centers of research and development. As emphasized by the tragic disaster in the Tangshan, PRC, in May 1976, there continues to be a critical need for advances in earthquake-loss reduction. Considering the seismic histories of population centers such as San Francisco, Los Angeles, Kaanmusu, and Istanbul, there is no basis for expecting the earthquake threat to abate in the foreseeable future. In large measure because of the encouragement of the National Science Foundation since the early 1970’s, the U.S. is blessed with an impressively large community of professionals well trained in earthquake engineering and related sciences. The first two ingredients are very much in place. As long as the U.S. continues to have a strong economic profile and maintains its proven ability to plan beyond the immediate future, financial support for research and development in earthquake issues will continue. Our mission, then, is for NEES to take the lead in providing the competing centers of research and development to achieve catalysis of the existing essential ingredients as described below. The seminal idea for the NEES network was the creation of an experimental-research infrastructure with many visions and capabilities at different research centers connected with a single purpose through the opportunity provided by information technology. The objective of creating a successful equipment infrastructure has been achieved. A driving challenge now is to restructure what was intended to be the core of the system: the information technology that can enable the required catalysis of ideas.

Our overall strategy is designed to: 1) inspire the NEES researcher to pursue a more ambitious research agenda; 2) entice the rest of the research community to compete for the opportunity to benefit from the sites; 3) encourage academic researchers to interact with the professional engineers in order to accelerate the implementation of new knowledge in practice; and 4) develop a NEES community that will include not only engineers, corporations, governmental organizations (NGO) interested in protecting society from the harmful consequences of earthquakes.

A brief look at the history of civilizations will reveal that the nuclear ingredient in their development has been the “agora,” or the market. Using the opportunities provided by information technology, we plan to develop the intellectual equivalent of the agora in order to get the “fleet at anchor” moving at an ever-increasing pace. We will employ operational excellence, innovative computational tools, outreach that advances knowledge, and an environment for the catalysis of ideas. Among the qualitative and quantitative performance metrics for measuring our success and developing a compelling basis for continued operation are: 1) the satisfaction of users (including both physical and analytical researchers); 2) greater diversification of users, research sponsors, operations sponsors, outreach community, and the NEEShub community; 3) increased experimental capability in earthquake engineering, including the increased use of NEES equipment by remote users; 4) greater impact on codes, technical committees, professional societies, and research directions; and, eventually, 5) reduced losses from earthquakes.

The NEES collaboration created a total of 15 advanced equipment sites for experimental work dedicated to the reduction of the earthquake threat (Figure 4). The current experimental reach of the equipment ranges from the marine to the geotechnical to the structural environments and can address almost any technical question that may arise on issues related to the safety of the built-environment in earthquakes. Development of this massive array of experimental capabilities demanded an intense and sustained effort. In retrospect, it would appear that the leaders of research groups involved in the creation of the 15 sites were totally absorbed, as they should have been, in the proper development of a research and experimental capability across the U.S. Unfortunately, there were three unplanned and unintended results: 1) a negative perception among a portion of the research community that equipment access was not equitable; 2) most, if not all, of research work initiated has not yet been of a quality to transform the engineering community culture; and 3) the information technology infrastructure, which had initially inspired the NEES concept of a network of interconnected laboratories, has yet to reach its potential. The metaphor of a powerful fleet of battleships at anchor is not irrelevant to the current status. Our goal is to get the fleet moving in harmony.

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Strategic Plan

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Know Your Reviewer

Sloppy writing = sloppy science
Elemental mapping of animal tissues has been investigated, and results have been documented.

changed to:

We investigated elemental mapping of animal tissues and documented results.
Know Your Reviewer

Be concise. Less is better.

There are a growing number of scientists who believe the system is capable of addressing user demands.

(17 words)

A growing number of scientists believe the system can address user demands.

(12 words)
Know Your Reviewer

Use high-quality, easy-to-read graphics for conceptual and organizational info
## Program Initiatives

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Membership approved by Executive Council for working committees</td>
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<tr>
<td>Partner retreat</td>
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<tr>
<td>Create I-hub</td>
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<tr>
<td>Create Passport tracking</td>
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<tr>
<td>External Advisory Board meetings</td>
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<tr>
<td>Annual Alliance-wide conference</td>
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</table>

**Goal 1: Alliance-wide practices**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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<tbody>
<tr>
<td>Campus director monthly centralized training</td>
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<tr>
<td>Augmented training sets</td>
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<tr>
<td>Faculty/students training on I-hub</td>
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<tr>
<td>Cross-Alliance recruiting, including veterans</td>
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</table>

**Goal 2: Effective community college partnership facilitating transfer to four-year STEM programs**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-mentored domestic research experience at partner campuses</td>
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<tr>
<td>Co-mentored international research experience</td>
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<tr>
<td>Industry guest speakers</td>
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<tr>
<td>Cross-Alliance teaching symposia and workshops with community college faculty</td>
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</tbody>
</table>

**Goal 3: Aligning experiences with Tinto’s principles of iteration**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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</thead>
<tbody>
<tr>
<td>Map activities and identify gaps</td>
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<tr>
<td>Pair scholars with mentors</td>
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<tr>
<td>Create individualized portfolios</td>
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<tr>
<td>Map incentives to Passport Badges</td>
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<tr>
<td>Cross-Alliance international research cohort</td>
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<tr>
<td>Disseminate model-based best practices</td>
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</tbody>
</table>

**Goal 4: Research longitudinal model of Scholar development**

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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</thead>
<tbody>
<tr>
<td>Compile a list of Scholar attributes</td>
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<tr>
<td>Test and validate Scholar attributes</td>
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<tr>
<td>Collect Scholar data</td>
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<tr>
<td>Analyze Scholar data and portfolios</td>
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<tr>
<td>Conduct interviews with Scholars</td>
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</tbody>
</table>

**Evaluation and Assessment**

<table>
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<tr>
<th>Initiative</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
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</thead>
<tbody>
<tr>
<td>Formative site visits</td>
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<td>Formative focus groups/interviews</td>
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<td>Formative web-based surveys</td>
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<tr>
<td>Formative analysis and reporting</td>
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<tr>
<td>Summative data plan development</td>
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<tr>
<td>Summative quantitative data gathering</td>
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<tr>
<td>Summative analysis and final reporting</td>
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</table>
Key Strategies

Addressing common trouble spots

• tell a compelling story
• respond to solicitation
• answer “Why?”
• know your reviewers
• planned from beginning
• formal or informal
• conduct internal review
# Internal Review

New eyes on your draft before submission

## General 10-week project timeline:

<table>
<thead>
<tr>
<th>Analysis and Planning</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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</thead>
<tbody>
<tr>
<td>Distribute documents noted in RFP</td>
<td>✔</td>
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<tr>
<td>Identify previously successful proposals</td>
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<td>Identify PI</td>
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<tr>
<td>Notify Pre-Award Center for assigned specialist</td>
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</table>

### Problem Overview
- What is the problem
- What has already been done to address problem
- What gaps remain
- How we propose to address gaps

### Vision

### Goals

### Identify proposal win themes/discriminators

### Program Officer Input

<table>
<thead>
<tr>
<th>Contact PO</th>
<th>initial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team debrief on meeting</td>
<td>✔</td>
</tr>
<tr>
<td>Refine initial analysis/planning</td>
<td></td>
</tr>
</tbody>
</table>

### Proposed Outline

- Discuss/refine outline structure
- More detailed outline, if needed
- Identify graphics needed

### Partnerships

- Recruit collaborative partners
- Produce “talking points” brochure or website
- Recruit industry affiliates
- Recruit advisory board members
- Collect letters of commitment

### Management and Personnel

- Identify basic management structure
- Collect biosketches

### Proposal Writing and Editing

- Assign writing
- Write section components
- Compile 1\textsuperscript{st} draft
- Project team 1\textsuperscript{st} edit
- Any outside review input/edit
- Editing iterations
- Write summary or abstract

---

Red Text: Important to have agreement (and explicit text for problem overview) prior to proposal writing
Internal Review

Because sometimes what is obvious to you is not obvious to others
What are Broader Impacts?

Broader impacts are the potential to benefit society and contribute to the achievement of specific, desired societal outcomes. They may be accomplished through:

1. the research itself
2. activities directly related to research projects
3. activities supported by and complementary to the project

A broader impact statement describes benefits and outcomes—not logistics.

“Cords” of research, education and outreach, and diversity-related activities integrate through your project to deliver broader impacts. For instance:

- Fuller Participation of Women, Persons with Disabilities, and Underrepresented Minorities in STEM
- Improved STEM Education and Educator Development
- Increased Public Scientific Literacy
- Improved Well-Being of Individuals
- Development of a Diverse, Globally Competitive Workforce
- Increased Partnerships among Academia, Industry, Government, and Non-Profits
- Improved National Security
- Increased U.S. Economic Competitiveness
- Informed Public Policy
- Enhanced Research and Education Infrastructure

Broader Impacts and Education Plans

Example Broader Impact Statements from Funded NSF Proposals
Steps to Develop an Education and Workforce Development Plan
Tips for Broadening Participation and Diversity, Equity, and Inclusion Plans
Other Broader Impact Resources
Request a Broader Impact Consultation

* National Science Foundation Proposal and Award Policies and Procedures Guide
Templates and Step-by-Step Guidance
Drop-in Text for Resource/Facilities
Data Management Plans

DMP Development Resources

- Purdue Libraries Data Management Guidelines
- Purdue-Affiliated dmptool.org for data management plans templates, sample documents, and funder guidance.
- Purdue’s Research Repository (PURR) contains step-by-step instructions for completing the data management plan requirements and citable boilerplate text that can be inserted into your DMP.
- Data Storage Options at Purdue explains different data storage options available to the Purdue community.

Sample DMPs from funded Purdue projects

<table>
<thead>
<tr>
<th>NSF Division of Engineering Education and Centers (CISTAR 2017)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NASA Space Technologies Research Institutes (Dyke 2019)</td>
</tr>
<tr>
<td>NSF Division of Behavioral and Cognitive Sciences (Ma 2017)</td>
</tr>
<tr>
<td>NSF Division of Research on Learning (Ryu 2018)</td>
</tr>
</tbody>
</table>
Questions?