Writing a Competitive NSF CAREER Proposal

January 2025

Sally Bond
Director of Proposal Strategy and Development
Office of Research

PURDUE
UNIVERSITY

Connecting with Us

CAREER Distinctives and Process

Where do you want to be in 10 years?

What Makes a Good CAREER Proposal?

Not your typical NSF research proposal

- More “path” than project

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- Strategic fit with institution

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Not your typical NSF research proposal

- More “path” than project
- Strategic fit with institution
- Clearly transformative research direction
- Creative and well-integrated education plan

Research Path Not Project

Funds academic career development of new faculty

"Successful Principal Investigators will propose creative, effective research and education plans, developed within the context of the mission, goals, and resources of their organizations, while building a firm foundation for a lifetime of contributions to research, education, and their integration

(CAREER solicitation, page 4)

Research Path Not Project

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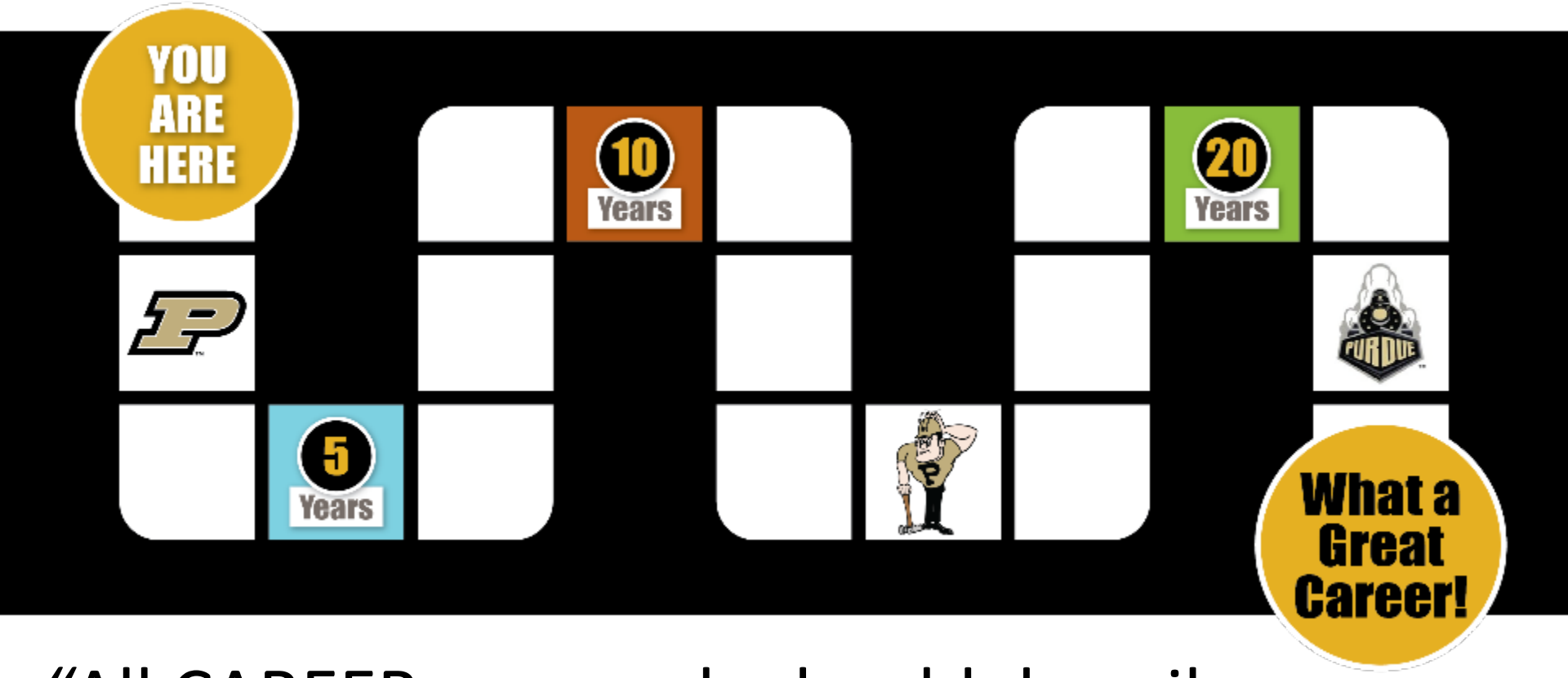
(CAREER solicitation, page 4)

Research Path Not Project

What is your strategic plan?



"All CAREER proposals should describe an integrated path that will lead to a successful career..." (CAREER solicitation, page 4)

Research Path Not Project

You want your review panel to say this too

…“has made an excellent case for how the proposed research and education plan will help her achieve her personal career vision.”

Reviews from Senay Purzer, Purdue CAREER

Engineering Education

Personal Career Vision…

- In what ways are you prepared to push the frontiers of knowledge?
- Where can you contribute to national needs and priorities?
- Where are you poised to be a thought leader?

Vision and Impact

My long-term goal is to greatly advance the prediction of hurricane hazard risk on monthly to seasonal timescales. The overall objective of this CAREER proposal, which lays the foundation for this long-term goal, is to understand the spatiotemporal variability of the oceanic subtropical highs and its link to variability in landfall. Beyond this proposal, the outcomes of this work can be combined with models for storm structure and hazards (wind, storm surge, and rainfall) to create predictive models for hazard risk on monthly to seasonal timescales.

-Dan Chavas, Purdue CAREER, EAPS

Long-Term Pathway

Be specific about what has been done, will be done, and will be done in future

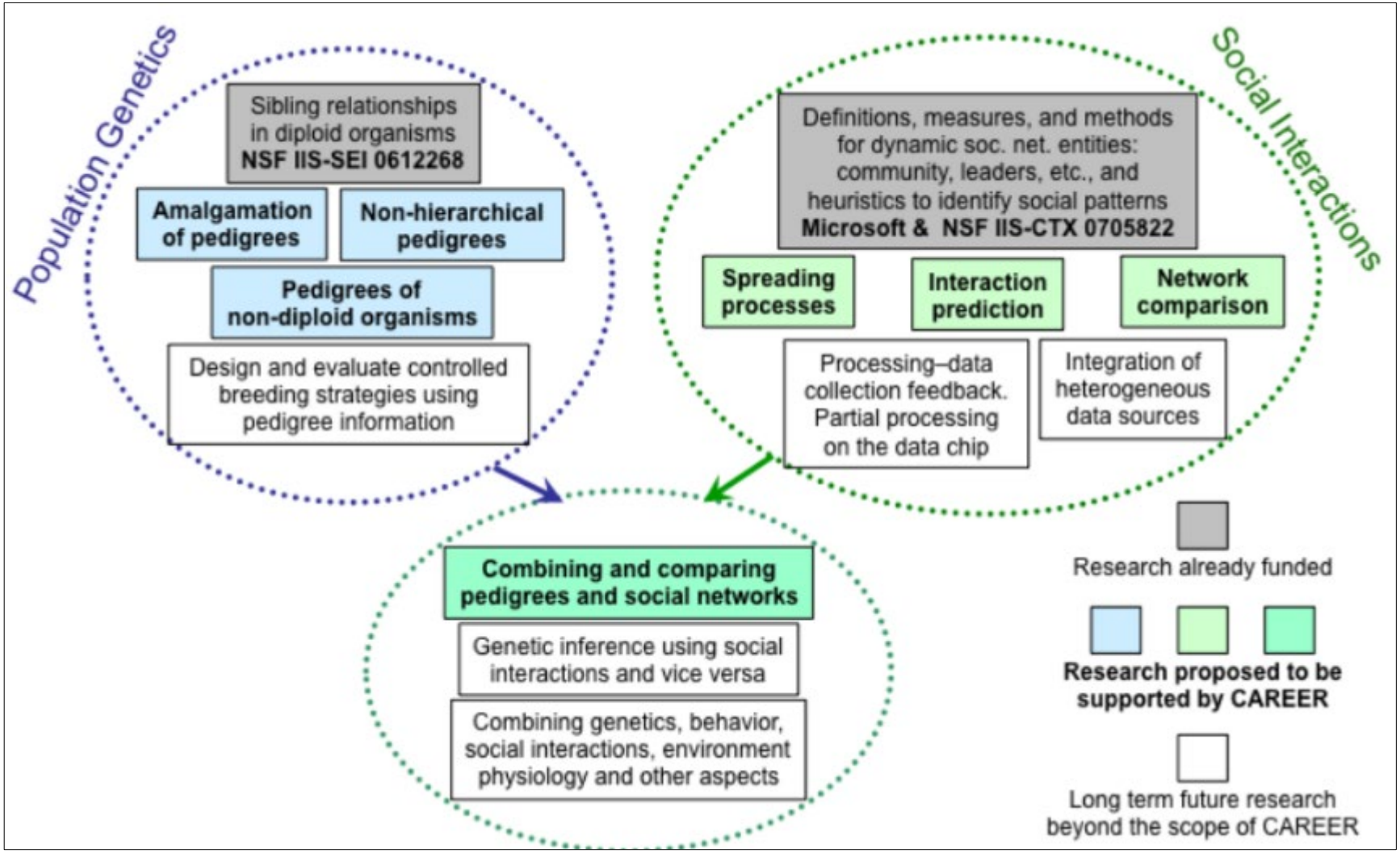
1.3 Career objectives

The long term career goal of the PI is to integrate excellence in the science and engineering of nano-structured semiconductor devices with education of future scientists and engineers. Achieving this goal will contribute significantly to the *fundamental knowledge about band, polarization, and strain engineering* of nitride nanostructures and will bring these materials to the level of maturity necessary for infrared commercial applications. The research plans detailed in this proposal naturally continue the PI's previous studies of infrared lasers, and current investigations of correlations between semiconductor structure and infrared optical properties. The proposed program will expand prior and ongoing work to a novel class of nanostructured devices, the nonpolar nitride infrared devices, devices that hold promise for new functionalities in the underdeveloped spectral regions of the infrared. By improving fundamental understanding of the physics and material science of nitride materials, this work will enable ultra-fast and versatile infrared light emitting and detecting devices that will ultimately enhance the performance and wide-acceptance of commercial infrared systems for spectroscopy, telecommunications, sensors, etc.

Oana Malis, Purdue CAREER, Physics

Long-Term Pathway

Be specific about what has been done, will be done, and will be done in future



Tanya Berger-Wolf CAREER (Univ of Illinois, Chicago)

Preliminary to Proposed to Future

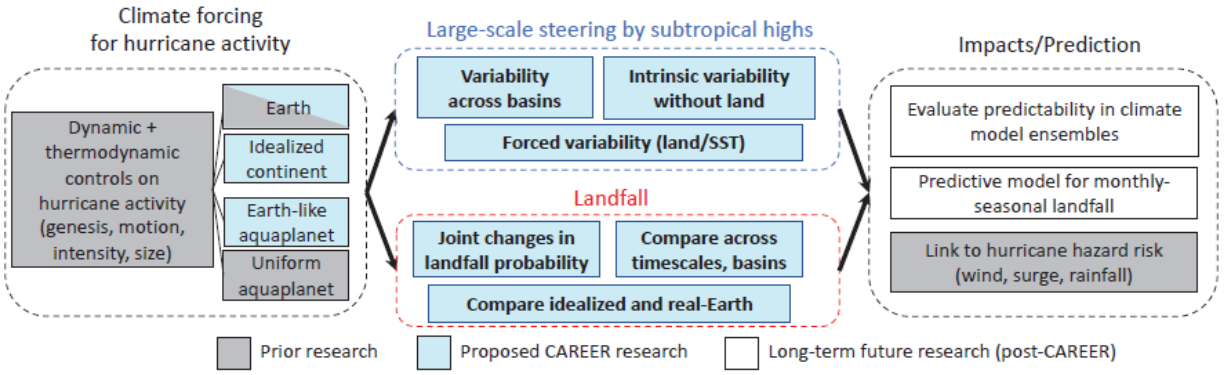


Figure 1: Schematic of the how this proposal fits into my long-term research goals.

Dan Chavas, EAPS

Reviewer: The PI has developed the idealized framework himself and has published from it, and is capable of advancing it in the future.

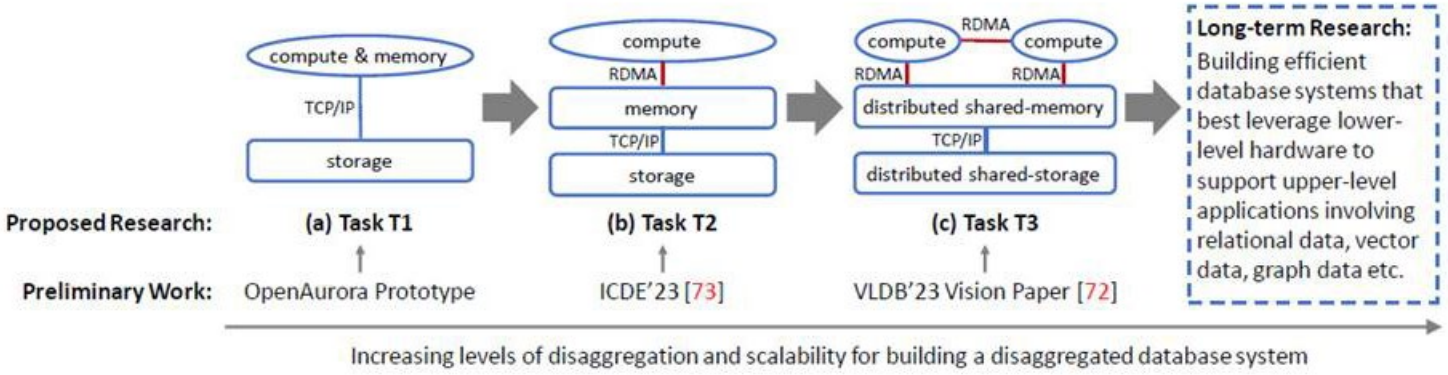
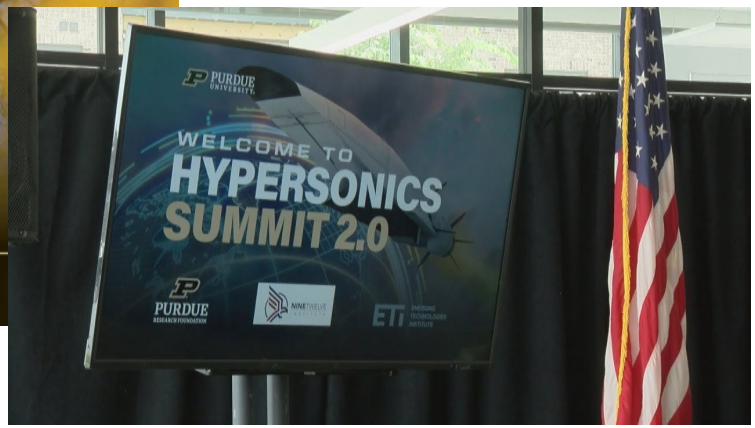


Figure 1: This proposal builds on my preliminary work and forms foundation for the long-term research

Jianguo Wang, CS

Reviewer: The PI has the necessary track record and provides a concrete and well thought-out research and evaluation plan.

Institutional Fit



INSPIRE!™

Transformative Research

Why is this work essential?

- Needs to be solved now?

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- Says who?

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- Facts and figures of cost to country/industry/communities

Transformative Research

Why is this work essential?

- Needs to be solved now?
- Says who?
- Radical change in understanding
- Facts and figures of cost to country/industry/communities
- Industries/communities positively impacted by your work

Transformative Research

Why is this work essential?

This research will have far-reaching effects, delivering new tools to tailor transformative mobility solutions to citizens' needs, decongest urban networks and expand mobility to underserved communities.

Amanda Stathopoulos CAREER 2019
Civil and Environmental Engineering
Northwestern University

Transformative Research

Why is this work essential?

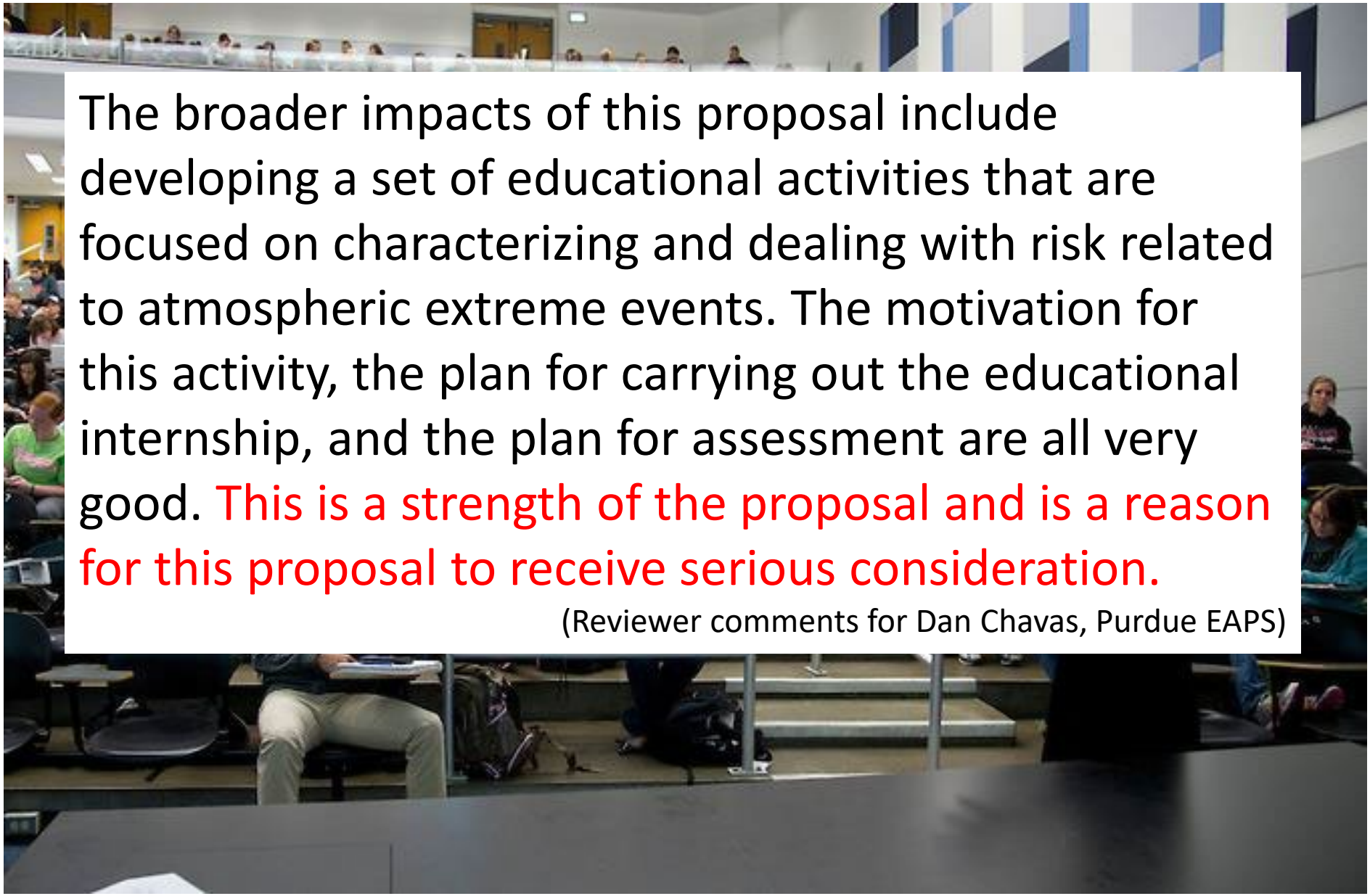
- Needs to be solved now?
- Says who?
- Radical chan[illegible]

Cannot be incremental

- [illegible]igures of cost to country/industry/communities
- Industries/communities positively impacted by your work

Integrating Education and Research

Leadership in Education Innovation

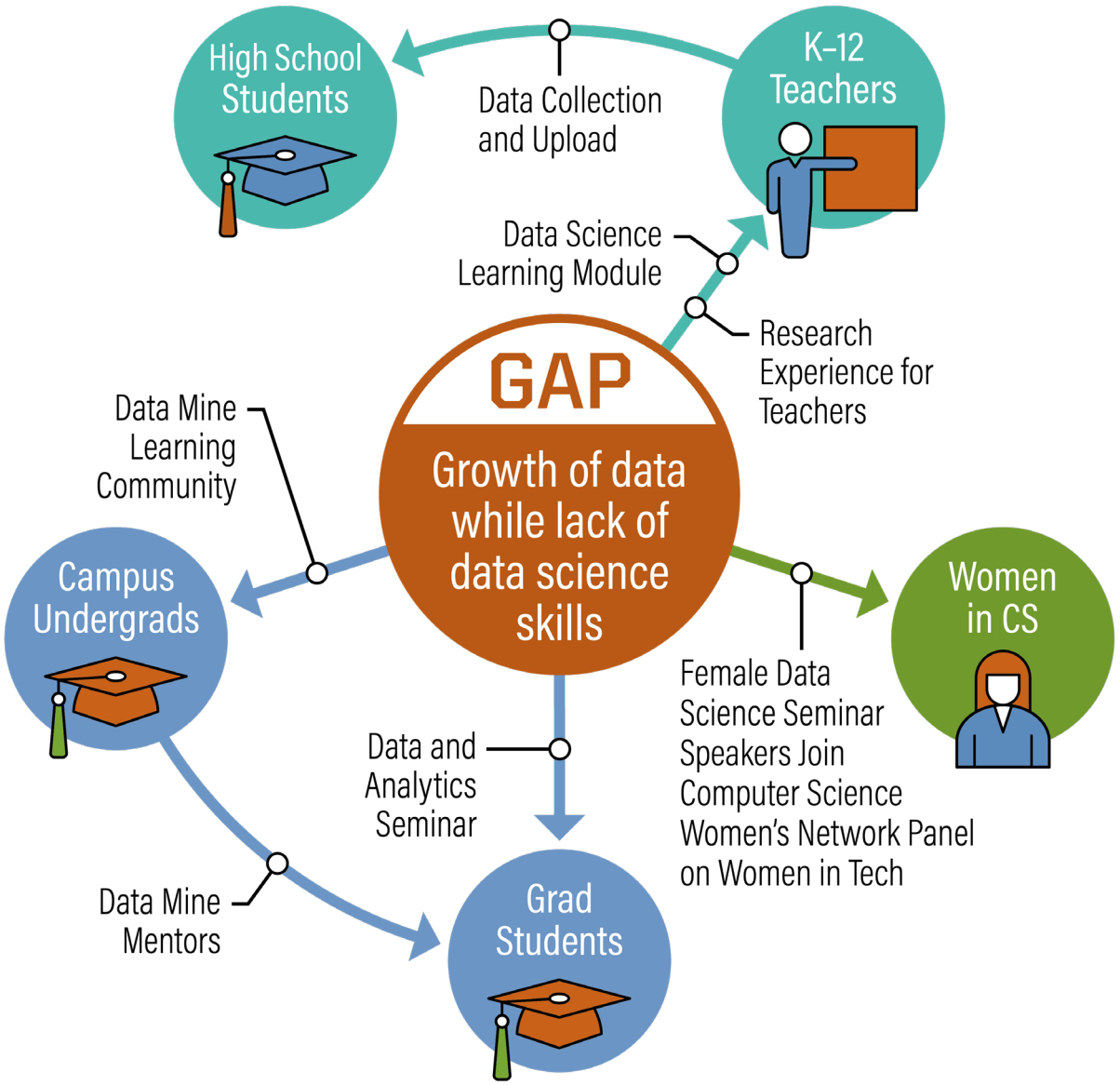


The broader impacts of this proposal include developing a set of educational activities that are focused on characterizing and dealing with risk related to atmospheric extreme events. The motivation for this activity, the plan for carrying out the educational internship, and the plan for assessment are all very good. This is a strength of the proposal and is a reason for this proposal to receive serious consideration.

(Reviewer comments for Dan Chavas, Purdue EAPS)

Where to Start?

Gap provides organizing rationale.

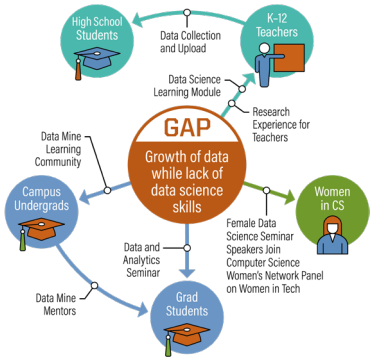


Based on the PI's past teaching experience at Purdue University, an important issue in current database education is that the course materials are heavily outdated since they are still based on conventional hardware. This issue was also emphasized in a recent panel on "The Future of Data(base) Education" in VLDB'21 [45, 46].

Jianguo Wang CAREER, CS

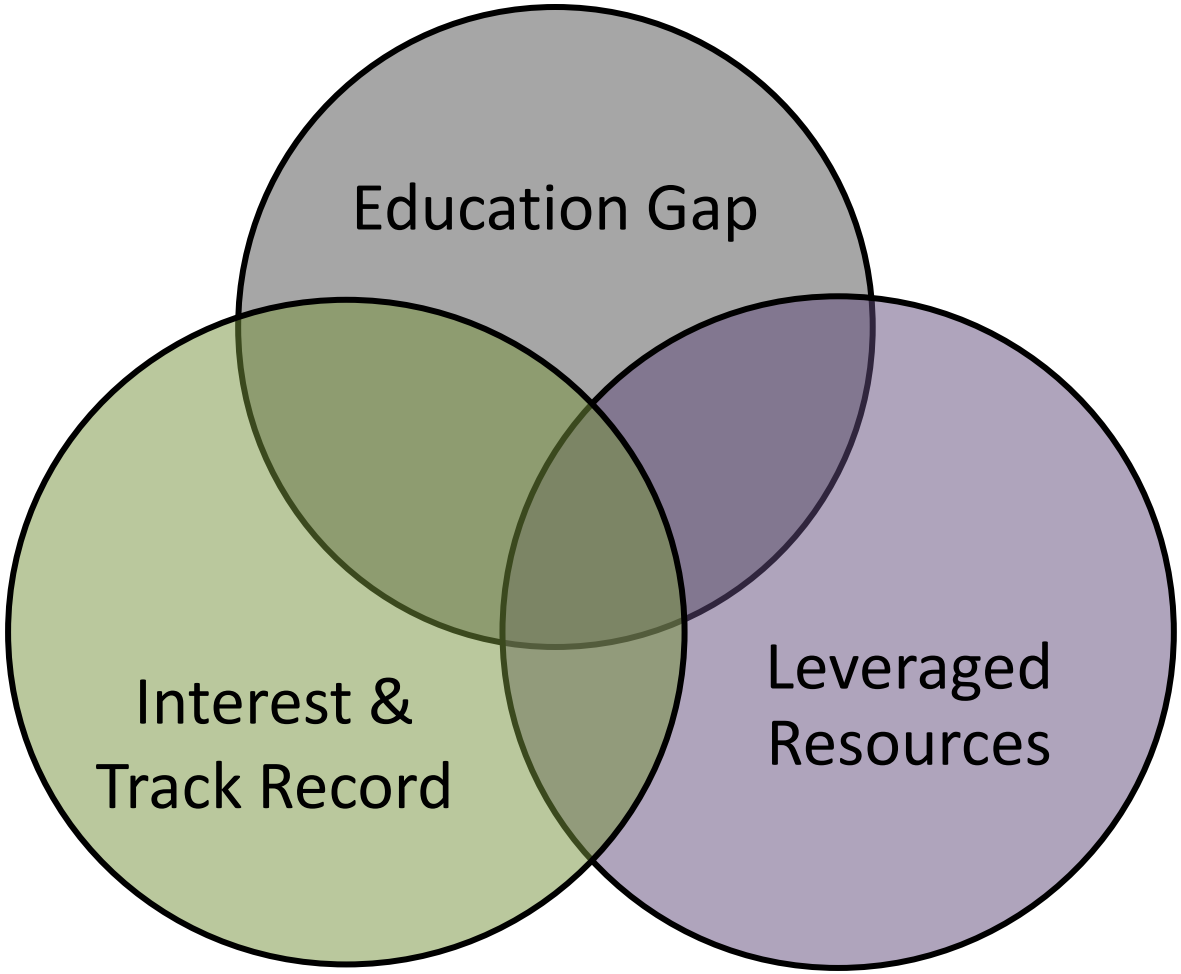
Top Tips

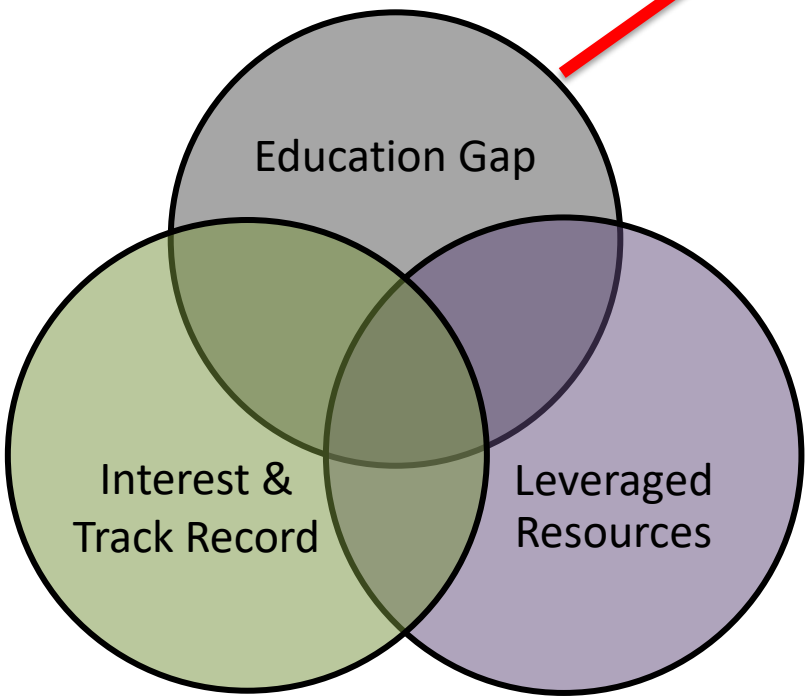
Integration is critical…cannot be an afterthought. Innovative but doable.



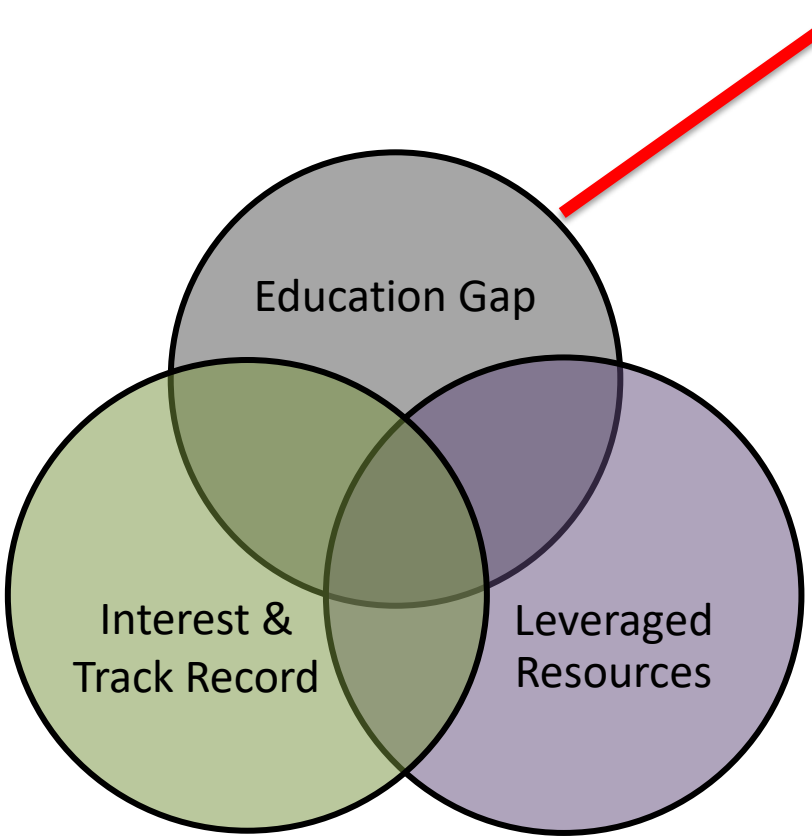
- Targets a documented gap
- Builds on your track record
- Does not “reinvent the wheel”
- Includes both solid and creative initiatives
- Will be sustainable
- Uses best practices
- Will be a reasonable workload

Example of Building on Your Gap





Grad students learn "microethics" of responsible research conduct such as publishing norms but lack "macroethics" of ethical and cultural issues surrounding their work's impacts on society.



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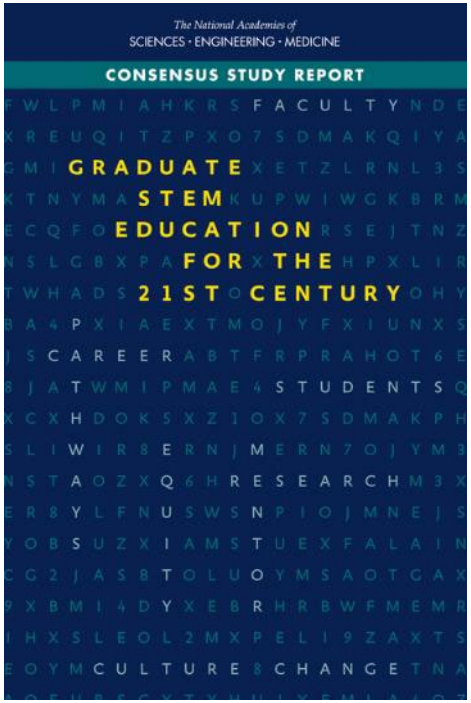
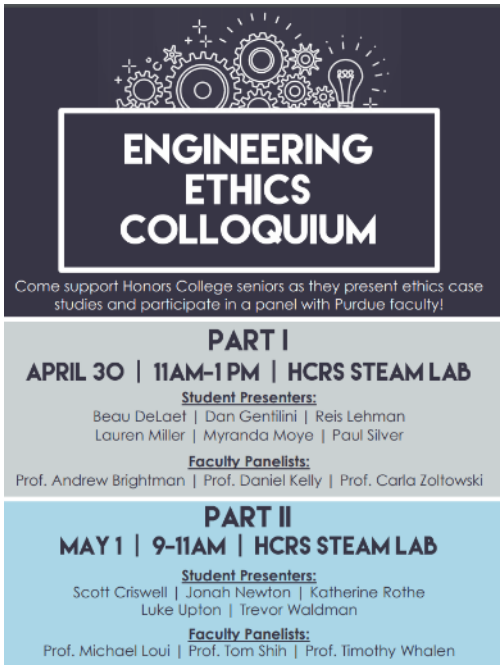
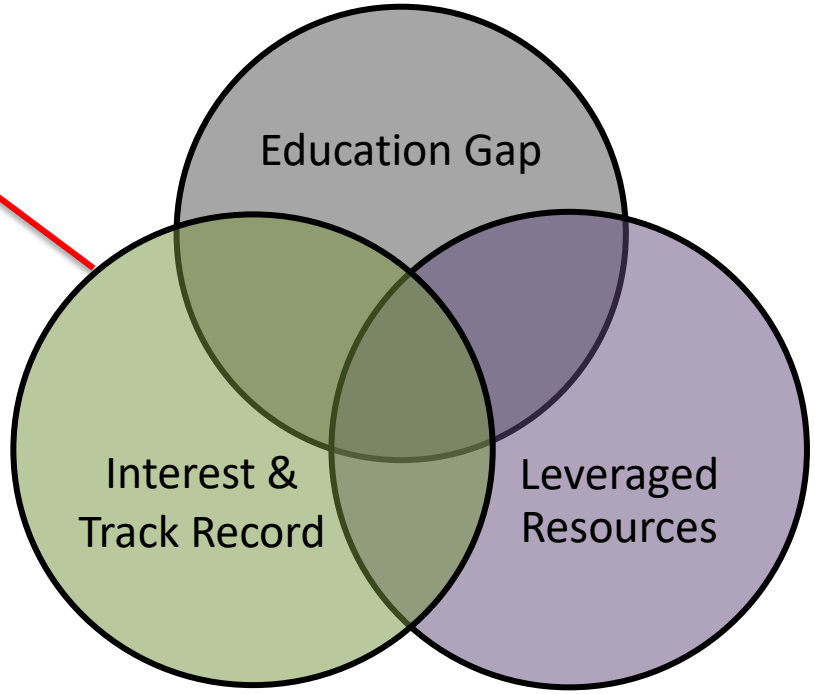


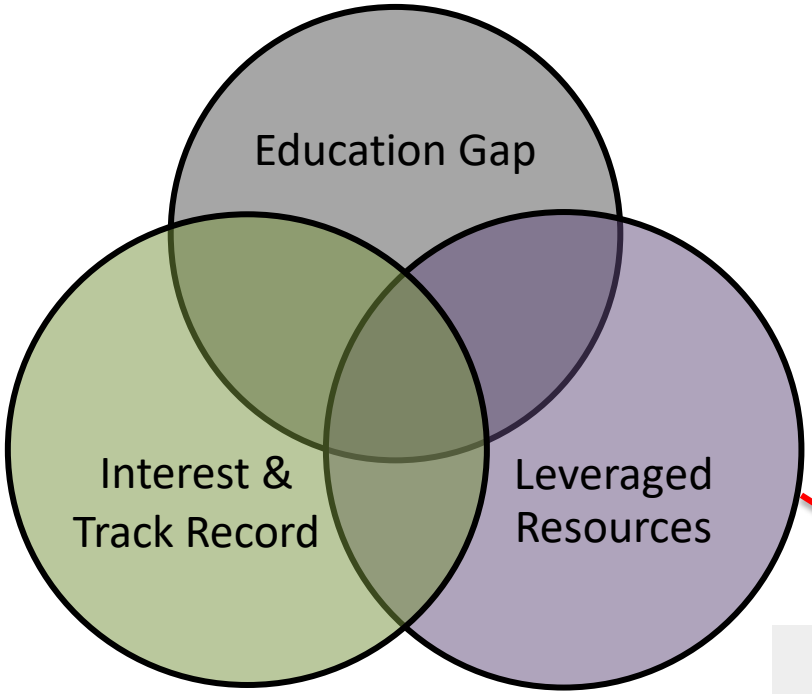
National Academies of Sciences, Engineering, and Medicine 2018. *Graduate STEM Education for the 21st Century.* Washington, DC: The National Academies Press.

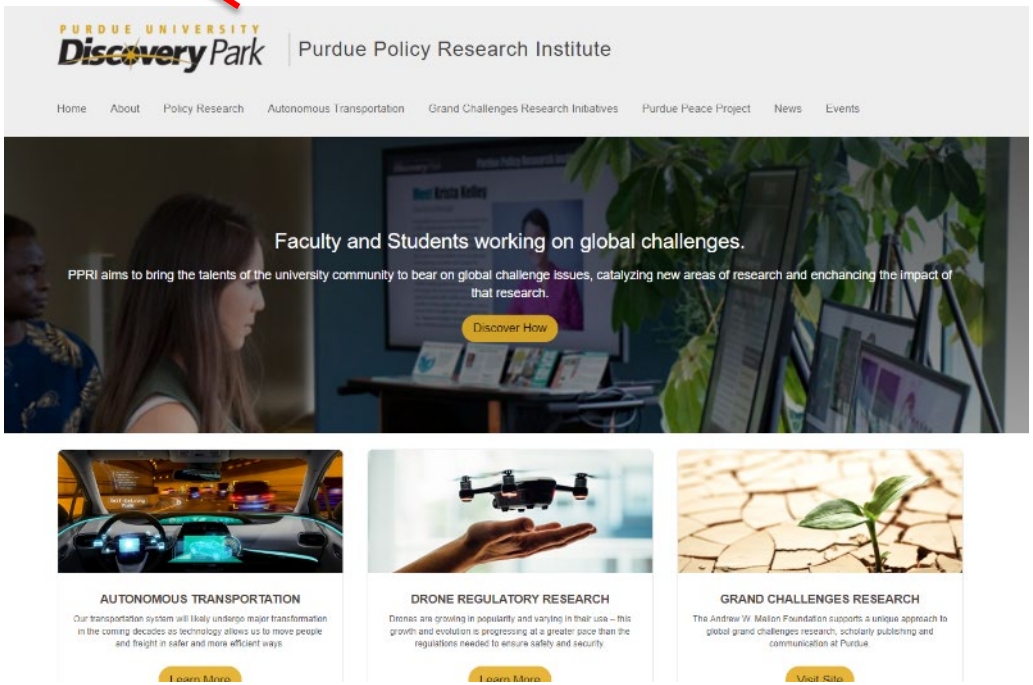
Previously collaborated (guest speaker) to incorporate societal implications and economic analysis into your undergrad engineering course.

Served as faculty panelist for Engineering Ethics Colloquium






Education Gap
Interest &
Track Record
Leveraged
Resources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Discovery Park
Purdue Policy Research Institute
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Policy Research
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Grand Challenges Research Initiatives
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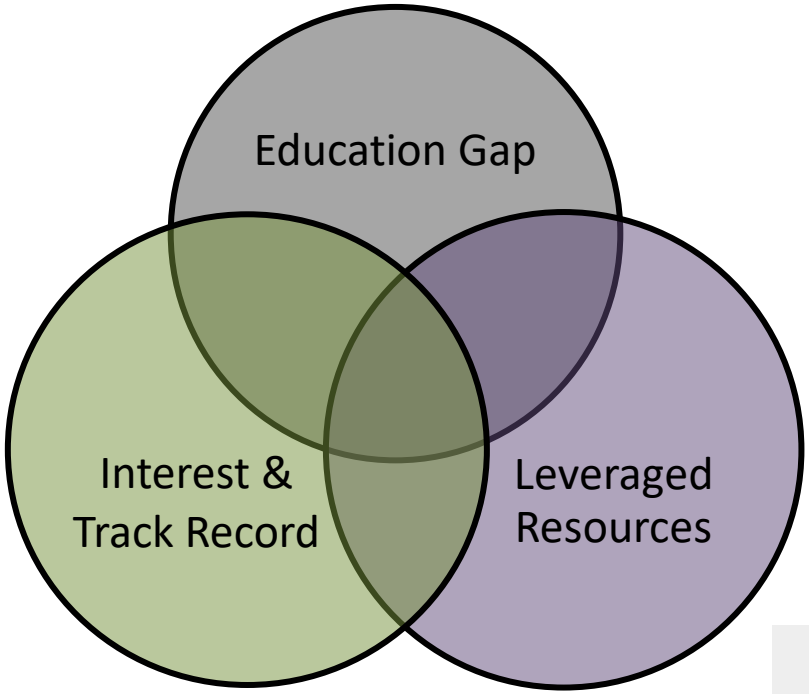
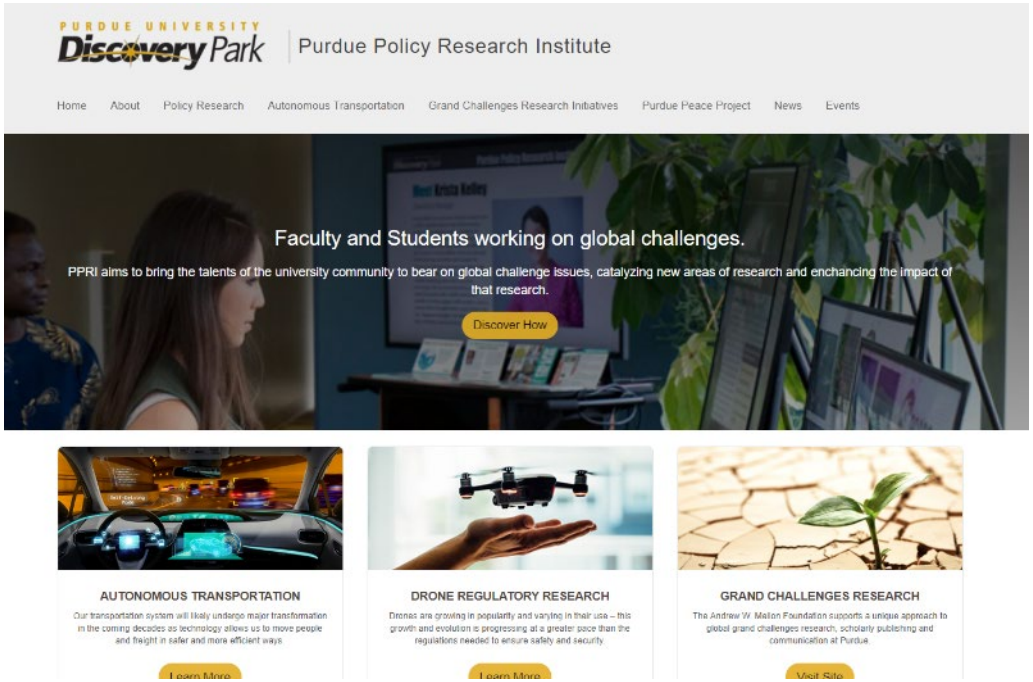
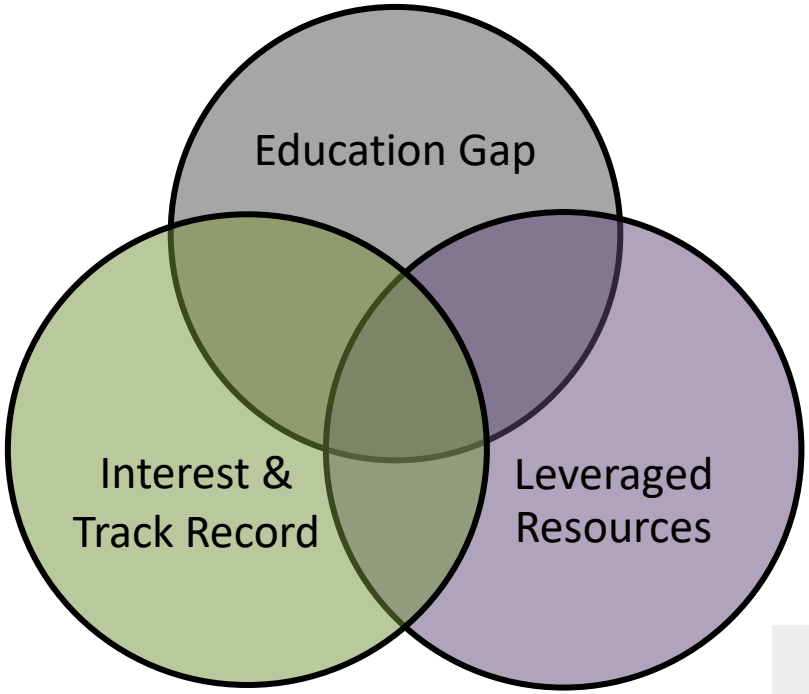
Faculty and Students working on global challenges.
PPRI aims to bring the talents of the university community to bear on global challenge issues, catalyzing new areas of research and enchancing the impact of that research.
Discover How
AUTONOMOUS TRANSPORTATION
DRONE REGULATORY RESEARCH
GRAND CHALLENGES RESEARCH



Purdue Policy Lab undergraduate honors class on *Policy Alternatives for Grand Challenges*

- **Collaborate to develop case study**
- **Grad students help as part of professional development**





Purdue Policy Lab undergraduate honors class on *Policy Alternatives for Grand Challenges*

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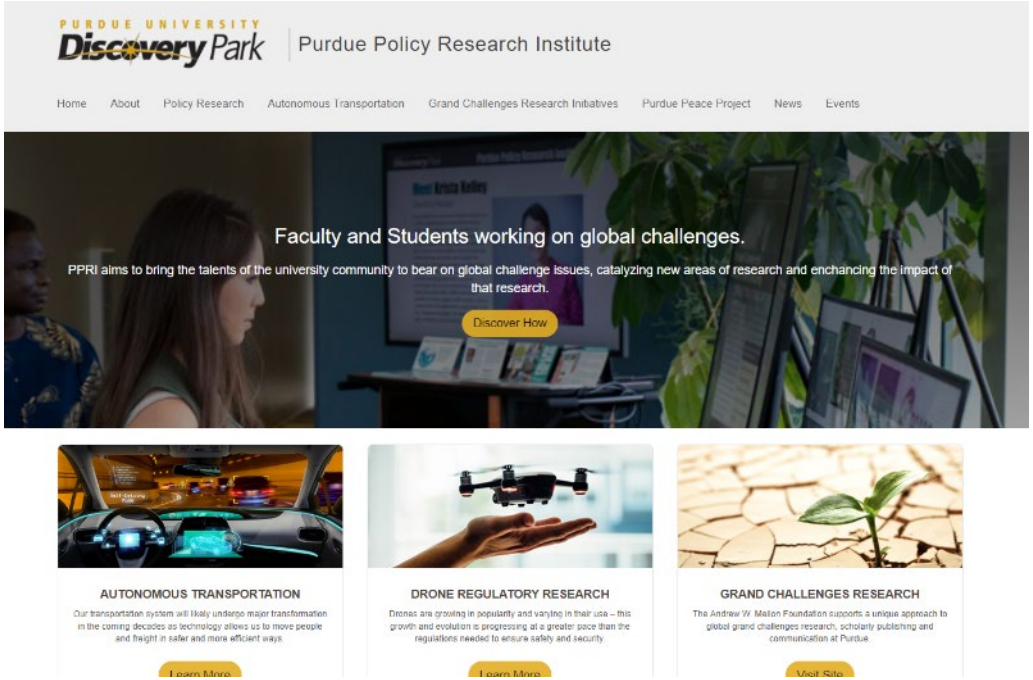
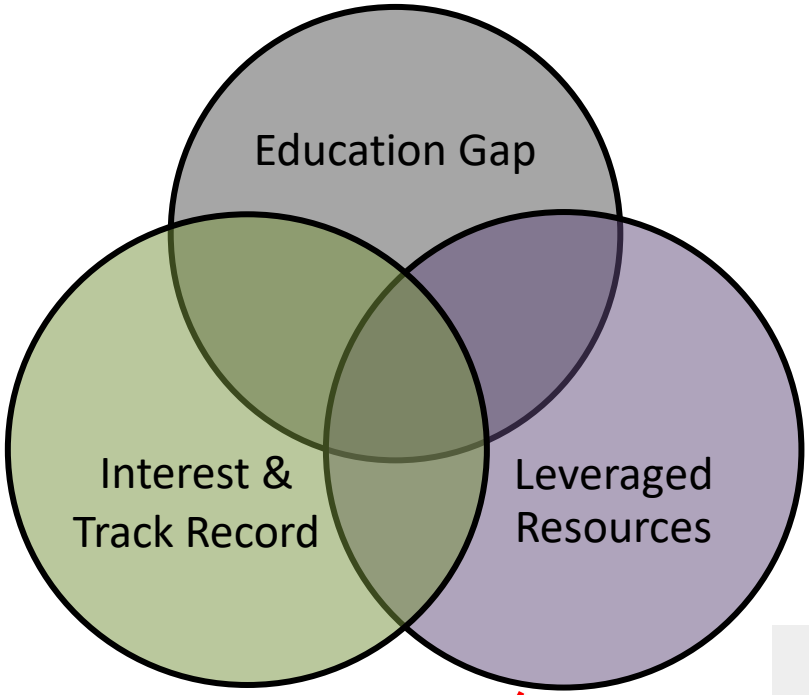
Collaborate with PPRI (with grad students) to author policy brief





PURDUE UNIVERSITY | Discovery Undergraduate Interdisciplinary Research Internship

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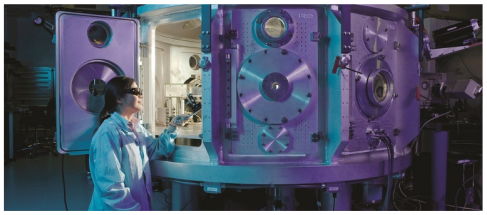

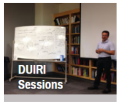

About DUIRI

Contact

Summer 2025: Now Accepting Faculty Project Proposals

Discovery Undergraduate Interdisciplinary Research Internship program seeking summer session proposals

Purdue-West Lafayette faculty are invited to submit project proposals for the Summer 2025 term under the Discovery Undergraduate Interdisciplinary Research Internship (DUIRI) program. DUIRI supports faculty-led undergraduate teams in investigating problems within the strategic areas of global security, global health, and global sustainability.

Project proposals should focus on these thematic areas. Each project should involve two or more distinct academic disciplines (represented by faculty from different departments, and ideally colleges) and two undergraduate students. Student teams will be responsible for pursuing their research projects, culminating with a poster presentation and 1-page abstract/summary of their results. Assuming all requirements are met, each participating student will earn a $5,000 summer scholarship from the DUIRI program. This will consist of $1,666 in cost-sharing from the faculty project supervisor(s), as well as $3,334 in support from DUIRI.

PURDUE UNIVERSITY Discovery Park | Purdue Policy Research Institute

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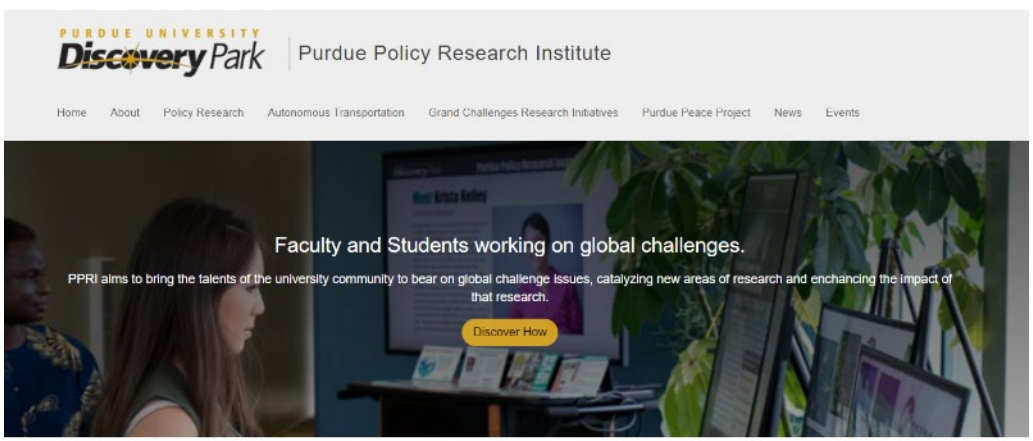


AUTONOMOUS TRANSPORTATION

Our transportation system will likely undergo major transformation in the coming decades as technology allows us to move people and freight in safer and more efficient ways.

Learn More

DRONE REGULATORY RESEARCH

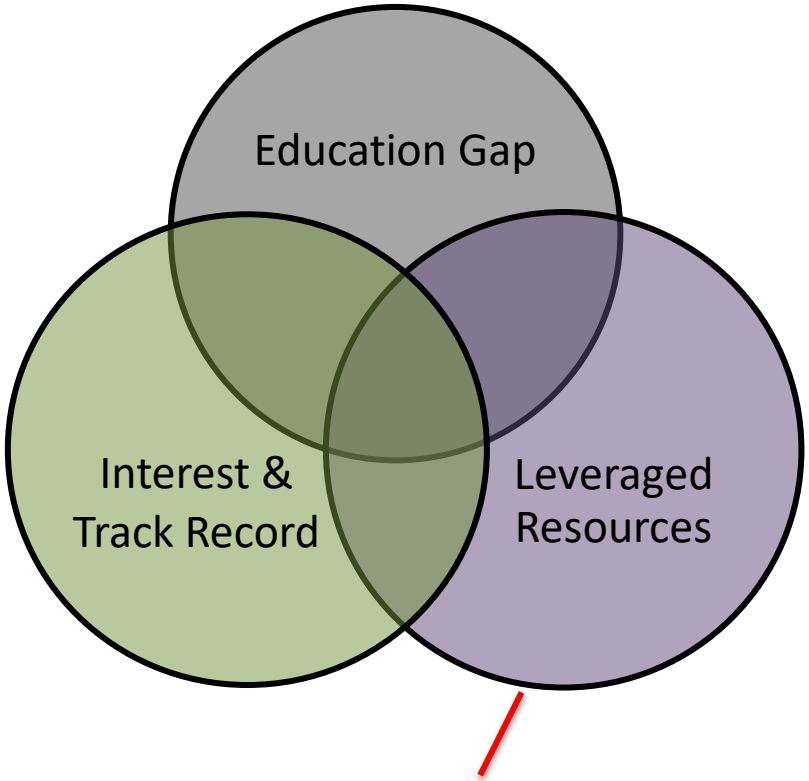
Drones are growing in popularity and varying in their use – this growth and evolution is progressing at a greater pace than the regulations needed to ensure safety and security.

Learn More

GRAND CHALLENGES RESEARCH

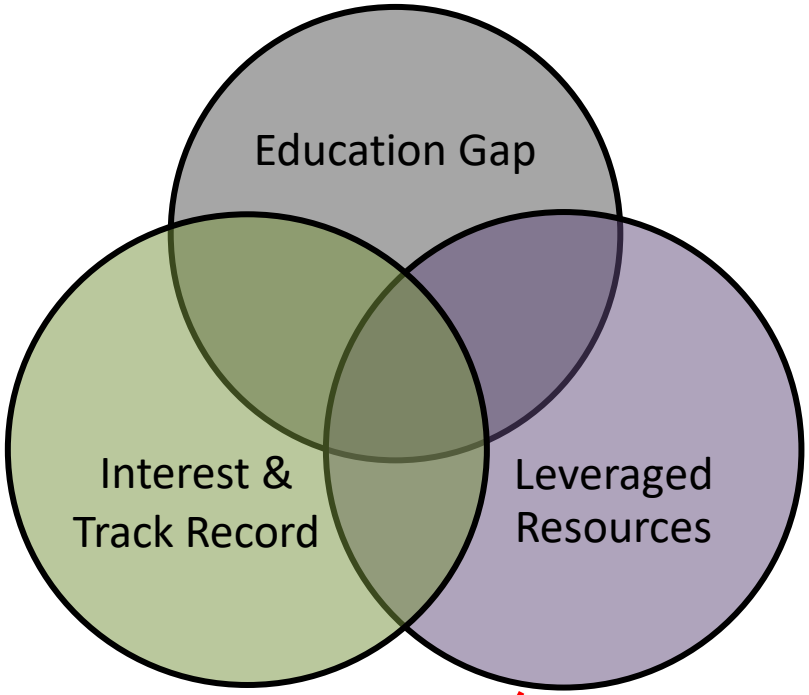
The Andrew W. Mellon Foundation supports a unique approach to global grand challenges research, scholarly publishing and communication at Purdue.

Visit Site



Best-practice undergraduate research as Discovery Park provides:

- **Cohort experience that includes professional development**
- **Recruitment**
- **Assessment**
- **Research poster and undergraduate research journal**



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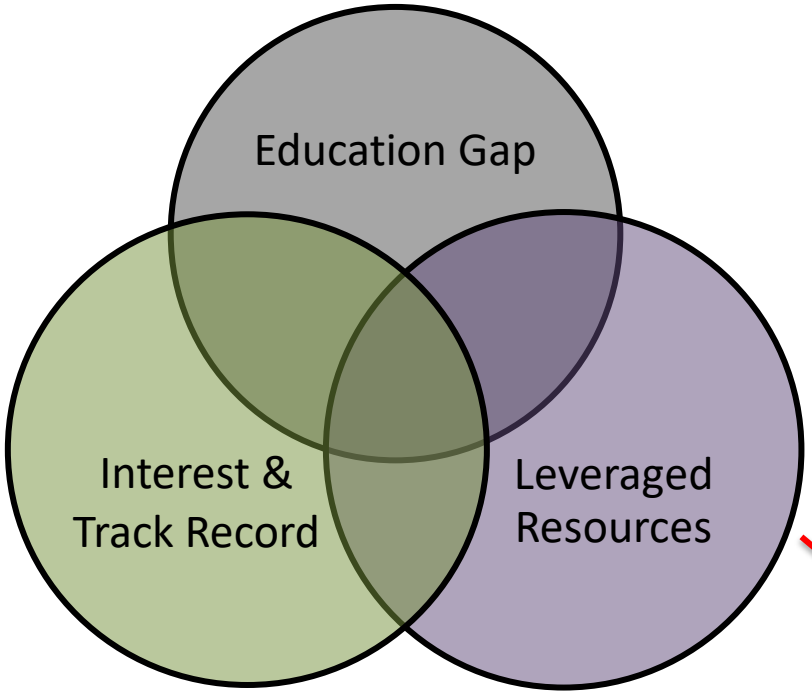
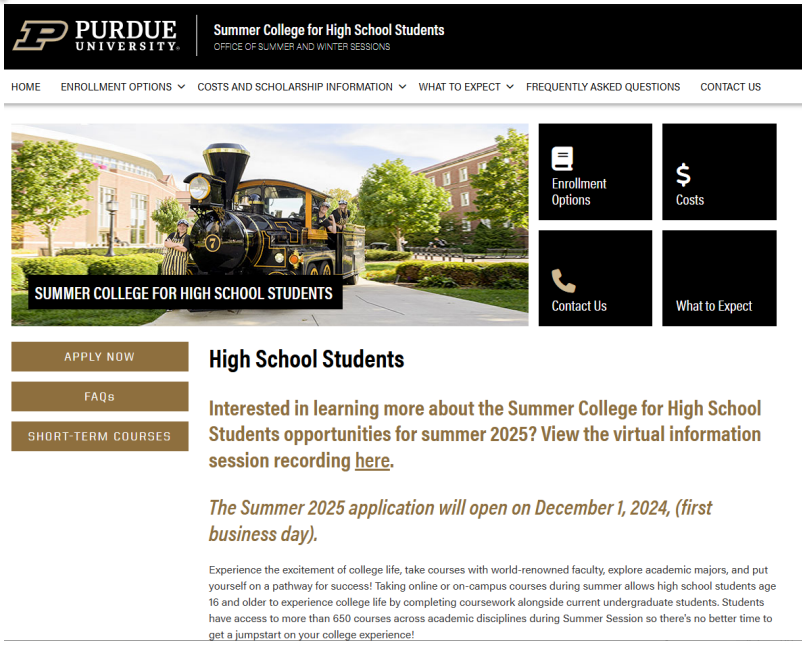
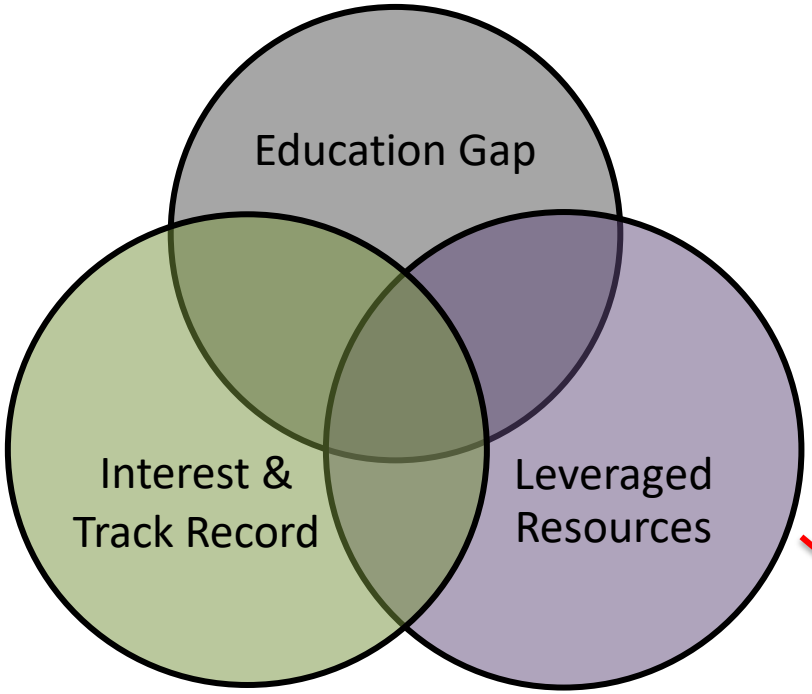
Evidence for apprentice-style research experience with separate research groups that meet together as a cohort focused on learning about research.

National Academies of Sciences, Engineering, and Medicine. (2017). Undergraduate Research Experiences for STEM Students: Successes, Challenges, and Opportunities. Washington, DC: The National Academies Press.



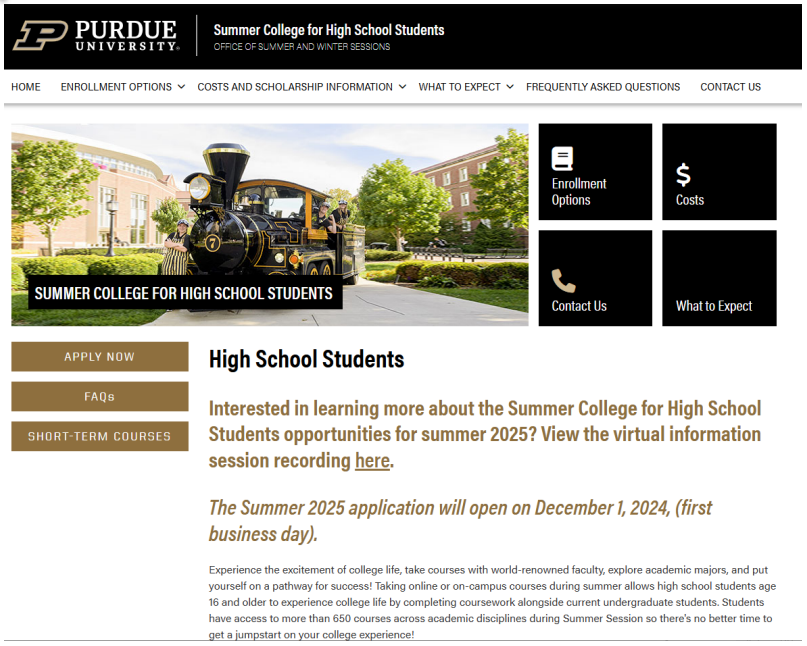
Case study-based learning incorporated into course with Purdue Summer College for High School Students





Case study-based learning incorporated into course with Purdue Summer College for High School Students

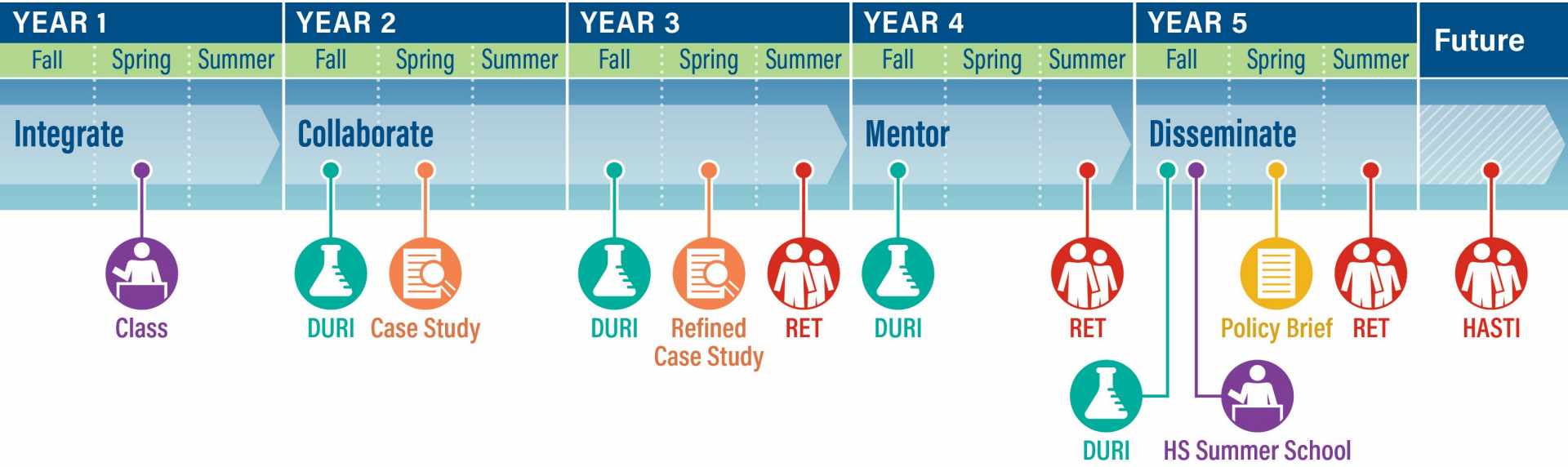
It is suggested that to motivate learners to engage in STEM, apart from focusing on the scientific content and processes, its contributions to solving societal problems must also be emphasized (Belanger et al., 2017).



Think Beyond Business as Usual

- Co-developed/cross-listed/online course
- Innovative undergraduate instruction
- K-12 teacher and student workshops
- Industry collaboration
- Service learning
- Entrepreneurship (include I-Corps!)
- Purdue Summer Program
- Partnerships with informal science learning organizations
- Citizen science and public STEM literacy

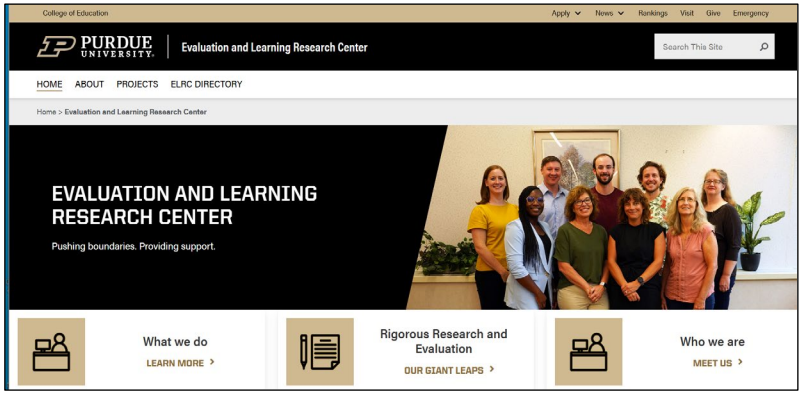
Phased Approach to Build and Support



Remember to Include…

- Plan to broadly recruit participants
- Plan to evaluate impact/success of educational initiatives

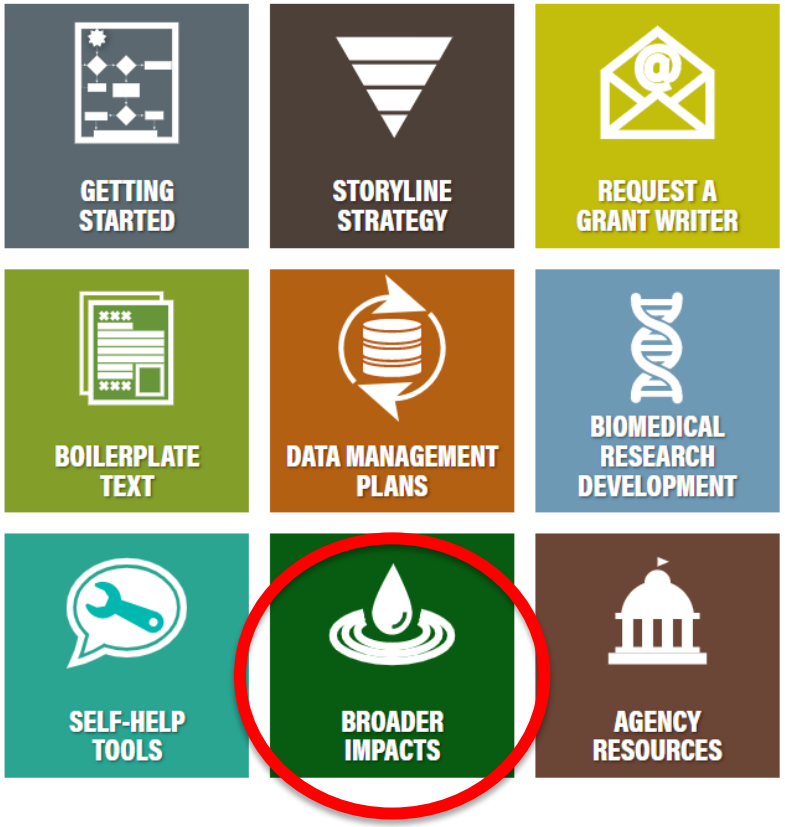
W.K. Kellogg Foundation
Logic Model Development Guide



Education and Outreach Resources

Ed Berger
Director of Innovation Hub
bergere@purdue.edu

Bill Bayley
Director of Science K-12 Outreach
wbayley@purdue.edu



Office of Research Grant Writing Website

Grant Writing Website

- What are Broader Impacts?
- Steps to Develop an Education and Workforce Development Plan
- Example Broader Impact Statements (login required)
- Other Broader Impact Resources
- Request a Broader Impact Consultation

What are Broader Impacts?

Broader impacts are the potential to benefit society and contribute to the achievement of specific, desirec 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

(Coming Soon!)

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

Example Activities

- What are Broader Impacts?
- Steps to Develop an Education and Workforce Development Plan
- Example Broader Impact Statements (login required)
- Other Broader Impact Resources
- Request a Broader Impact Consultation

Improved STEM Education and Educator Development

Broader impacts can integrate one or multiple "cords" of research, education and outreach, and diversity activities, as mapped in examples below:

	✓	✓	Populate a nationally accessible learning hub that hosts courses and learning modules for interactive data analysis and modeling tools for formal classroom active learning, training workshops, and hands-on tutorials.
✓	✓		Use a new instrument in a new, graduate-level imaging course to teach next-generation life scientists advanced imaging techniques and image analysis software.
	✓	✓	Collaborate with STEM outreach coordinators to conduct a summer outreach camp with students recruited from three campuses of the STEM-focused charter Purdue Polytechnic High Schools whose student body is nearly 70% black.
	✓	✓	Budget to recruit diverse undergraduate researchers in partnership with the College of Engineering Summer Undergraduate Research Fellowship Experience that provides a best practice cohort experience while engaging URM undergraduates in project laboratory research.
	✓		Create images and videos using the SDC microscope for use by secondary biology teachers to demonstrate organelles cell structures that are typically poorly represented in biology courses. Indiana Department of Education posts images and videos online for high school accessibility.
	✓	✓	Partner with Purdue Science K-12 Outreach coordinator expertise to budget two high school teachers who will have a research experience and also create a suite of 2D visualizations, 3D animations, and virtual reality experiences for use by biology teachers and hosted on globally accessible nanoHUB. Teachers recruited from school corporations with high percentage URM students.
	✓		Leverage the Purdue Gifted Education Resource Institute to develop, deliver, and assess an introduction to epigenetics summer course that will target STEM educational enrichment for gifted youth and help address the educational relevance gap between basic biology concepts and application to real-life topics.
✓			Deliver a transferable and scalable educational model for how elementary science teacher preparation in higher education can address next-generation science and engineering standards.

Grant Writing Website

- What are Broader Impacts?
- Steps to Develop an Education and Workforce Development Plan
- Example Broader Impact Statements (login required)
- Other Broader Impact Resources
- Request a Broader Impact Consultation

What are Broader Impacts?

Broader impacts are the potential to benefit society and contribute to the achievement of specific, desirec 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

(Coming Soon!)

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

Education Plan Process

Steps to an Education and Workforce Development Plan

The Best Education and Workforce Development (EWD) Plans:

- Are tailored to the specific research
- Are sustainable and scalable
- Include the right expertise
- Leverage institutional resources
- Have rationale from the literature
- Advance diversity, equity, and inclusion when possible
- Add an appropriate budget
- Do not name partners without permission

Click each step for details.

Plan of Action

CAREER 2025 Proposal Preparation Timeline (Due July 23) * Red denotes should do this before writing any proposal text

By:	Mon 2/10	Mon 2/24	Mon 3/10	April					May			Mon 6/9	Mon 6/23	Mon 7/9	Mon 7/14	Mon 7/21
Analysis and Planning																
Read funded CAREER abstracts for directorate fit and identify PO																
Notify Pre-Award Center																
Storyline Development • What is the problem? • What has been done already to address this problem? • What is the gap that still remains? • How do you propose to address gap?																
Map out long-term pathway and vision																
Identify research and education goals																
Identify win themes/discriminators																
Program Officer Input																
Draft concept paper for PO																
Concept paper reviewed internally																
Revise concept paper																
Email one-pager to PO/ request appt																
Revise storyline based on PO feedback																
Proposed Outline																
Develop detailed outline																
Identify graphics needed																
Partnerships																
Recruit any collaborators, if needed																
Recruit advisory board members, if needed																
Identify assessment partner, if needed																
Collect letters of commitment																
Request dept head ltr (provide bullet pts)																
Proposal Writing and Editing																
Develop NSF bio on SciENcv to reflect research & educ																
Use outline to write sections																
Edit																
Give near final draft to internal reviewers																
Revise based on review																
Write data management plan																
Complete COI																
Write mentoring plan																
Write budget justification																
Write facilities document (use epubs)																
Write one-page summary																
Final check of references																
Final budget/draft narrative to PreAward																
Submit all final supplementary documents																
Submit project narrative																

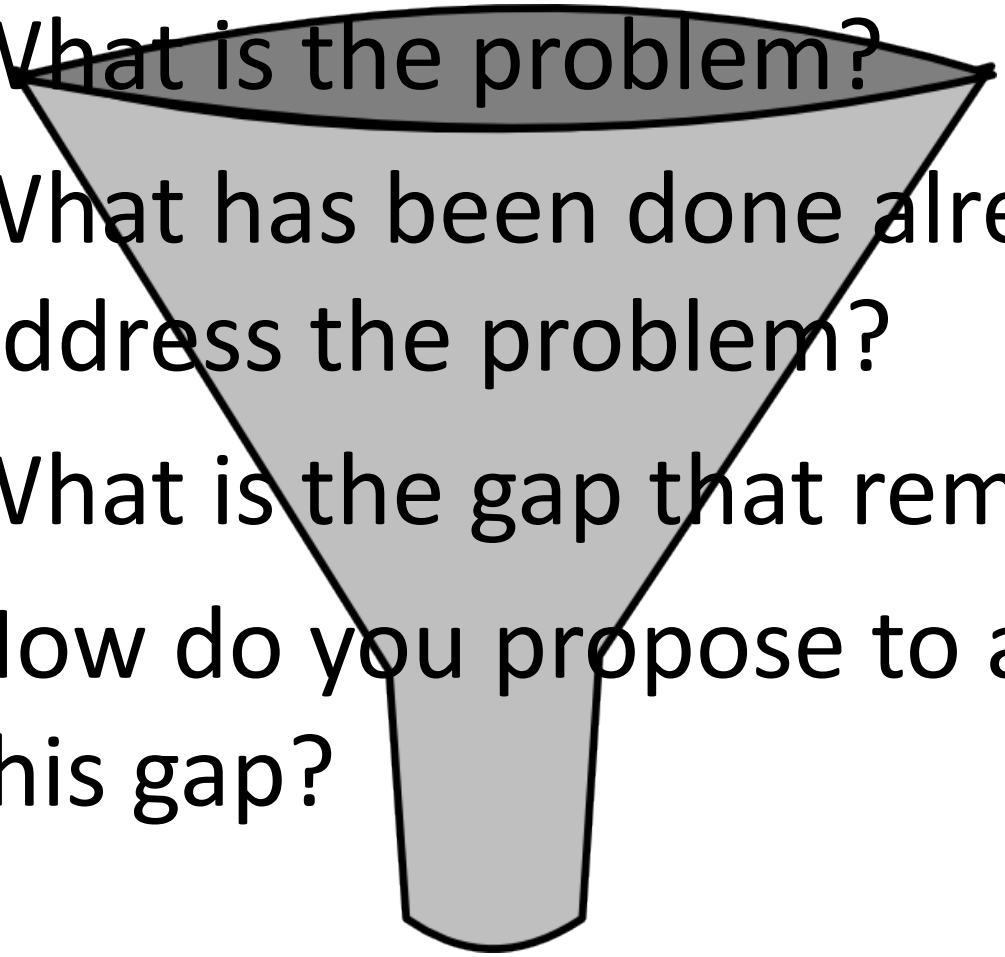
Tell a Compelling Story

Four logic questions

- 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?

Tell a Compelling Story

Logic flow goes from broad to narrower



- What is the problem?
- What has been done already to address the problem?
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Tell a Compelling Story

Where? Very first part of your introduction.

Despite the crucial link between engineering and innovation, research on engineering innovation education is limited. The challenge, however, is not the volume of studies on this topic but the integration and application of research. Prior studies conducted by cognitive scientists, design researchers, and business scholars highlight some of the individual characteristics important for creativity, characteristics of innovators and entrepreneurs, and the critical role of organizations in supporting innovation. However, very little is known about how engineering students approach innovation and ways to measure these processes and their outcomes. Hence, this study will examine engineering students' cognitions, motivations, and predispositions using interviews and think-aloud protocols. Their processes will then be analyzed to identify possible curricular, gender, and cultural differences among students.

Senay Purzer, Engineering Education

Tell a Compelling Story

Sets up the logical flow and significance for your proposal. Hooks reviewer.

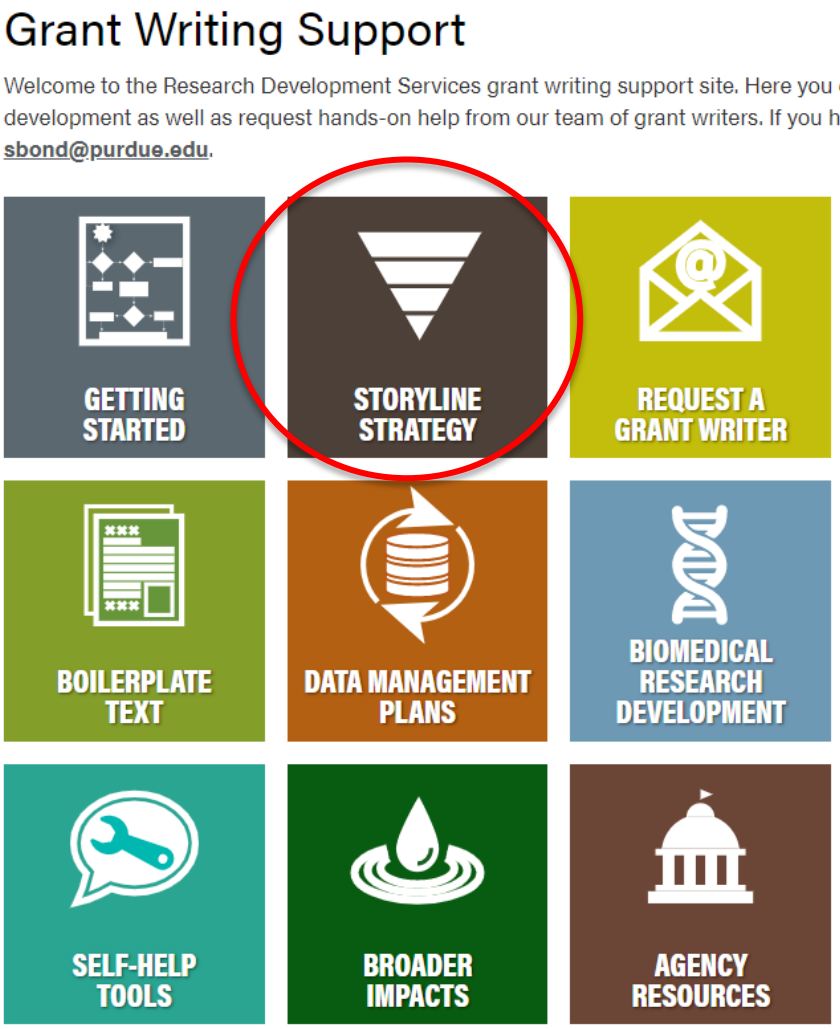
In 2013, 61% of raw energy (namely, coal, natural gas, and oil) was wasted as heat because of the low efficiency of power conversion. A thermophotovoltaic (TPV) system desirable for its low maintenance and quiet, portable operation can uniquely capture this waste heat as electricity by using thermal photons (discrete units or quanta of light) whose energies match the bandgap of the photovoltaic (PV) cell. However, TPV systems emit the vast majority of thermal photons at low energies, thus greatly reducing efficiencies. To overcome this barrier, we propose to develop a highly innovative approach to TPV, which we call thermo-photonics (TPX), by redirecting thermal photons into useful energies matching the PV cell. TPX can significantly increase the efficiency of TPV converters up to 50%. What is more, this device may efficiently utilize standard silicon PV technology, thus ensuring a relatively easy transfer to commercial development when the concept is proven.

Peter Bermel, Electrical and Computer Engineering,

Tell a Compelling Story

Storyline examples on website

https://www.purdue.edu/research/funding-and-grant-writing/grant-writing-support.php



Storyline is Basis for PO Discussion

Create a one-page brief

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.

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.

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EA/EOU 4/19

Storyline is Basis for PO Discussion

Create a one-page brief

One-page concept paper includes:

- concise storyline
- career vision/integrative goals
- brief qualifications…why you?
- overview of methodology/approach including education integration
- impact and why transformative

Contacting Your Program Officer

Do not make a 'cold call'

- Identify your program officer
- Contact PO(s) to request phone or in person conversation
- Include:
    - one-page concept paper
    - NSF-compliant biographical sketch

Contacting Your Program Officer

Do not make a 'cold call'

- Identify your program officer
- Contact PO(s) to request phone or in person conversation
- Include:
    - one-page concept paper
    - NSF-compliant biographical sketch
- **IN YOUR MEETING, LISTEN MORE THAN TALK**

Questions to Ask Program Officer

Contact by middle of May at the latest. Get moving on that storyline!

Ask questions such as:

1. Does my research goal fit well with your program?
2. Is this the right scope? Do I need more preliminary data?
3. What is the typical award size?
4. What type of review? Ad Hoc or Panel?
5. What is preference for RET/REUs?

Know Reviewing Mechanism

Ad hoc +/- Panel	Mostly Panel
GEO	ENG
BIO	CISE
SBE	HER
MPS: DHE, DMR	MPS: AST, DMS

Always Outline before Writing

Possible Outline for CAREER Project Description 2025

- Use "I" instead of "we" or "our" because this is about YOUR five-year career path. (However, one-page summary is required to be third person.)
- 15 pages for project narrative
- No urls allowed except in the references. No et als in references.
- Avoid passive voice whenever possible
- Include quality graphics. Do not just label but use the caption to walk the reviewers through the visual and/or provide the take away point.

1. Significance and Rationale (~1 page)

- Provide a compelling storyline that excites your reviewers. Use logic flow of:
  - What is the problem?
  - What has been done already to address this problem?
  - What is the gap that still remains?
  - How do you propose to address this gap?
- State your vision for how this will launch you into novel contributions in your career
  - Do not propose incremental advances
- Include both research and education goals
- Include summary sentence on impact of your project success

2. Broader Impacts (at least ½ page)

- **Suggest you put this section early on instead of the end**. Reviewers read more carefully at outset, and this BI text builds a case for the significance of your proposed work. You want them to read it as a lens for the rest of your proposal.
- State how your project will benefit society through both research and educational efforts. Can include translational potential.
- Refer to Broader Impacts resources on the grant writing website at: https://www.purdue.edu/research/oevprp/funding-and-grant-writing/grant-writing-support/broader-impacts.php for BI ideas

3. Approach

- Provide a short paragraph overview of your research plan approach as a section roadmap

3.1 Background

- **not** a literature review. Cite key references strategically particularly in light of "what has been done already to address this problem?"

3.2 Preliminary Data

- Three options for where to describe preliminary data: embedded within background section, a separate subsection such as this 3.2 (most common), or per objective.

3. 3 Research Objectives

- Include 2-4 sentences providing roadmap for objectives and how they integrate.
  - If you have any collaborators, clearly explain their roles
  - If you will need special equipment or instruments, include text on how you will acquire these resources or gain access to existing ones, e.g. national labs

[Objective /Phase Title for each obj/phase]

- Technical gap or research questions addressed
- Methods and procedures
- Potential problems and alternative solutions (e.g. risk mitigation)
- Expected outcomes
  - State significance

[Objective /Phase Title for each obj/phase]

- Technical gap or research questions addressed
- Methods and procedures
- Potential problems and alternative solutions (e.g. risk mitigation)
- Expected outcomes
  - State significance

Evaluation Plan

- If appropriate for your research, consider a section that the describes the evaluation metrics/benchmarks/criteria for success and evaluation methodology

4. Integration of Education and Research [~ 2 pages long]

- State the education problem/gap you are addressing and how this motivates your plan
- Include an education goal (see section 1)
- Provide an overview of your suite of educational activities and make it clear how it will integrate with research component
  - Note: make sure you have budgeted for your activities
  - Include student/participant recruitment mechanisms for broad participation

[Education Activity Title per Activity]

- Be creative. If you have existing or basic educational initiatives, show how you are expanding in new ways
- Include a description of your preliminary work in the educational arena. Have you already revised or created a new course? Have you led a workshop for undergraduates or high school students? Include text regarding your experience and motivation.
- Cite key educational documents as rationale for why these activities are a best practice.
  - Leverage institutional resources and expertise. Do not reinvent the wheel.

Education Plan Evaluation

- Include a clear assessment plan/evaluation mechanism either per activity or in a distinct subsection.

Always Outline before Writing

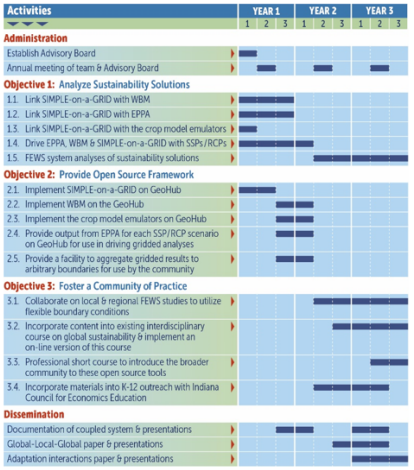
5. Prior NSF Support

- If you have received NSF funding (as PI, co-PI, senior personnel) in the past five years, you must report on one award most relevant to this CAREER proposal.
- use prescribed format given in the NSF Grant Proposal Guide, especially in regard to separate subheadings of *intellectual merit* and *broader impacts* and referencing resulting products/publications from this previous award. Here is an example:

NEES Operations (0927178; $81,761,788; 10/2009-9/2014). PI: J. Ramirez. Purdue University will lead, manage, operate, and maintain George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) with 14 earthquake engineering and tsunami experimental facilities locally operated by universities across the U.S. and NEEShub cyber platform for collaboration, NEEShub. ***Intellectual merit***: NEES Community and Communication Center's four-year tenure as headquarters for NEES Operations has facilitated an unprecedented cultural change in how research is performed in earthquake engineering in a new outside-the-university collaboration model using improved data sharing capabilities and tool co-location at NEEShub. Serves as both as an intellectual and practical model for all disaster-related fields that involve distributed sites. ***Broader impacts***: NEEShub provides broader access to experimental data, extensive simulation resources, and research-grade inquiry tools and streamlined data sharing capabilities. NEEShub now has 5700 registered users, thousands of data downloads from the Project Warehouse per quarter, and more than 55,000 contributors from over 182 nations. Example publications, products, tools from this effort: NEEShub platform for cyber collaboration; Buckle and Ramirez, 2010, Ramirez, 2010; and Browning et al, 2013.

6. Project Management

- Include a timeline of activities (research and education)
- If appropriate, consider using an advisory board
  - Provide feedback on your progress and offer risk mitigation input
  - Must have letters of commitment from any named board members
- Consider using a Gantt chart e.g. this style:



7. Dissemination

- For both research and education results

8. Career Development and Success Factors (optional)

- Could include a five-year overview of your career development and deliverables
- Briefly state where you see your teaching, research, and service in 5, 10, and 20 years
- Make a summary statement about how well-positioned you are to build on a record of success as a researcher and educator, align with institutional strategic plans, and leverage significant institutional resources
- Build a case for why you are an outstanding researcher/educator who will use this CAREER as a launching pad to potentially transformative work
- Describe how institutional capacity (infrastructure etc) is here at Purdue to help you succeed
- Describe how award will help you to collaborate better
- Describe ultimate impact on your career path and contributions to the field

Make Good Use of Conceptual Graphics

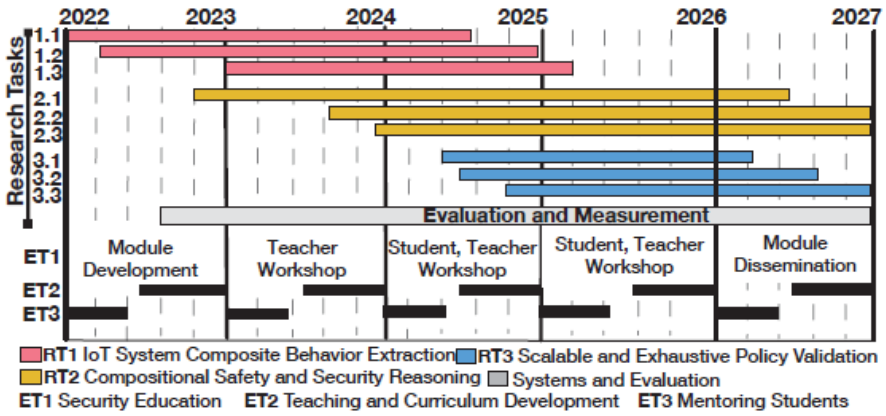
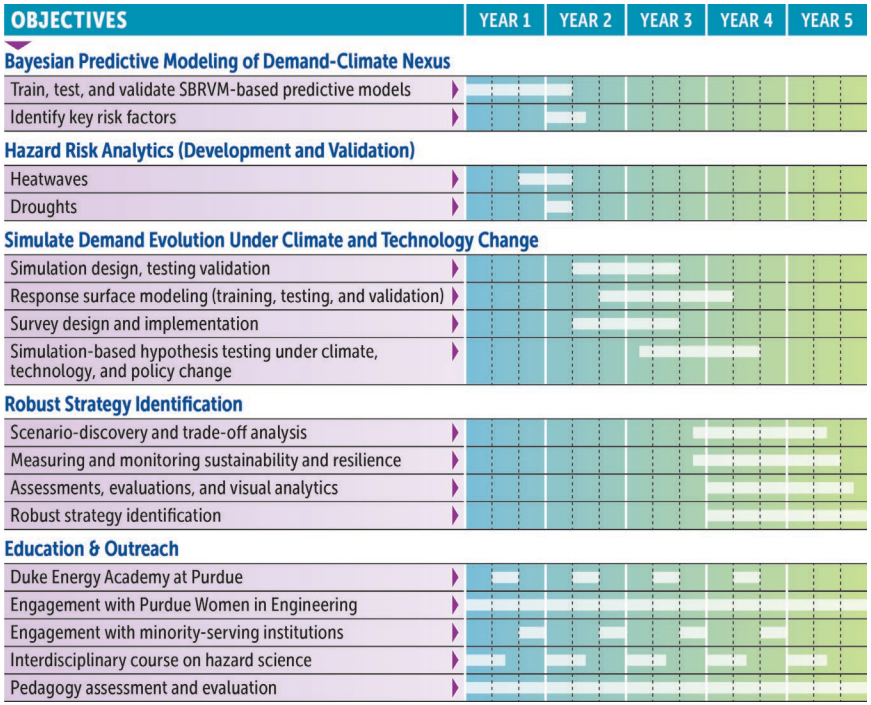


Fig. 6: Proposed Project Timeline

Berkay Celik, Purdue CAREER, CS



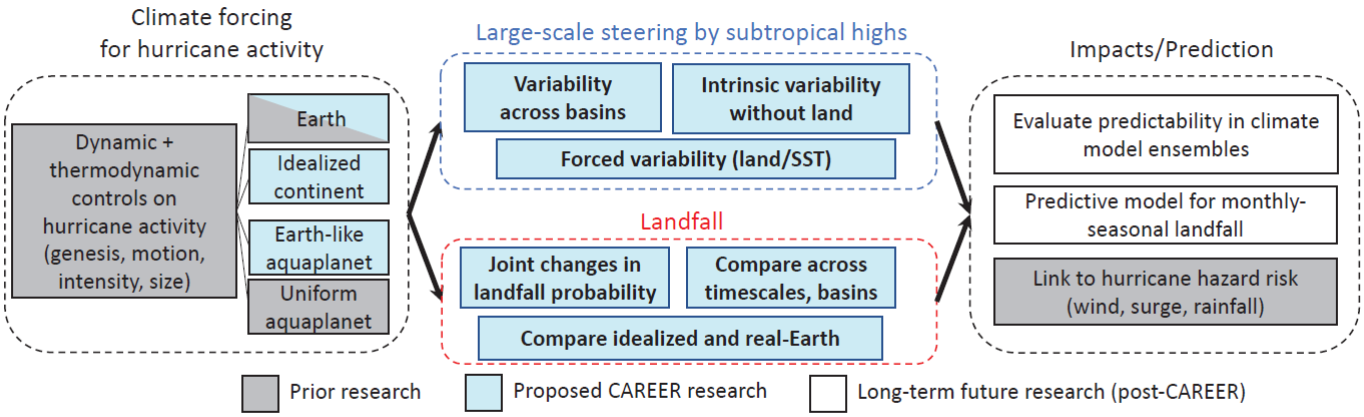


Figure 1: Schematic of the how this proposal fits into my long-term research goals.

Dan Chavas, Purdue EAPS CAREER

Roshi Nateghi, Civil Engineering

Resubmission Strategy

- Take the criticism well
- Look for patterns in the comments
- If you do not agree with the technical comments, get input from research mentors
- Work with grant writers to identify and fix issues with the storyline, readability, organization and broader impacts
- Discuss planned revisions with program officer

Top 10 CAREER Mistakes

10. Difficult to read with small fonts, illegible figures, too many acronyms
9. Unsubstantiated use of “innovative,” “novel,” “transformative”
8. Poor distinction between preliminary results and proposed work
7. Incremental research with narrow focus

NSF Top Ten Mistakes

6. Long sentences and unclear writing
5. Too similar to PhD work
4. Business-as-usual education plan
3. Little impact in broader impacts
2. Treating as a regular proposal instead of long-term trajectory

NSF Top Ten Mistakes

1. Research plan lacking cohesion

- Collection of loosely related ideas
- No gap identified to provide rationalization

Tell a story with your narrative

Questions?

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