Effective Proposal Writing

For Emerging STEM Professionals

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Welcome!

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- Ranked No. 1 for both Best Value and Best Academics in Oklahoma (Niche, 2024)
- Boone Pickens School of Geology
  - $250,000 in annual graduate scholarships
  - $100,000 in annual undergraduate scholarships
- 7 endowed chair positions
- Three undergraduate degree options
  - Geology, Geophysics, Environmental Geoscience
- Graduate degrees as MS. PSM, and PhD
- 7 student organizations
- Many national scholars

Introductions - You!

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Let’s learn more about you.

Poll:

- Your current academic/career stage
- Your experience with proposing a research project/plan to get some kind of funding or award.
  - Never have
  - Working on my first one
  - Have a few times
  - Have several times

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Scientific or “Academic” Funding Proposals

Purpose, Scope, and Goals

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Brainstorm

Why do scientists, engineers, researchers write funding proposals?

Chat Waterfall

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Why we write proposals

Securing funding for a project is often part of being a scientist/engineer.

- Want to make an impact
- Have a dream project
- Leverage skillset and ideas with funding opportunities
- Collaborate with others and build research teams
- Create a coherent and concise plan for the intended research
- Plan for resources needed, potential challenges, and timeline
- Strategize how to have a competitive edge
- Identify the Who, What, Where, When, Why, and How

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Why we need training

Need to learn how to “sell” a project idea

- “When something can be read without effort, great effort has gone into its writing.” Enrique JP
- Start planning early; ask questions
- Seek advice broadly—peers, mentors, colleagues
- Have a clearly defined hypothesis
- Present ideas clearly; pay attention to review criteria
- Pay attention to the details (spelling, punctuation, grammar, clarity of data/ images, error bars); proofread
- Make sure all required forms and documents are included
- Have someone else read your proposal before submission
- If you don't get funded, don't give up, regroup, and resubmit

YOU ALREADY HAVE KEY SKILLS FOR SUCCESS

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- You are capable of this
- You already have some of the needed skills to be a successful proposal writer
- Play out your strengths
- If you have completed a related project, leverage the findings
- Team up with others if the sponsor allows
- Use your knowledge to predict the expected outcomes
- What are the gaps in knowledge that you are going to fill with your proposal
- Compose and present your ideas clearly
- Be sure to include alternate plans if the selected approach fails

Building New Skills

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- Proposal writing will help you build new key skills
- Accept “win-lose” and the peer review process
- Professional and academic skills
- “Write it like you’re going to win!” approach
- Communication skills
- Research skills
- Critical thinking
- Project management
- Creativity and innovation
- Attention to details
- Persuasion and negotiation
- Networking and collaboration

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Who are you writing *to*

Understanding your audience is an essential component of the process.

- Understand who you are writing to/ for
- Consider who might be reviewing your application
- Use accessible language (avoiding jargon)
- Likely, reviewers are not experts in your specific discipline
- Outline your proposal to follow the sponsor's guidelines
- Devise the budget according to the project's goals
- A picture can tell a thousand words ...
- Diagrams help convey exchanging ideas
- Stick with the scientific writing style

- References:
  - https://unesdoc.unesco.org/ark:/48223/pf0000384826
  - https://library.seg.org/doi/10.1190/tle40010010.1

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What are the main goals

Proposals have a specific purpose and objective. It is more like a (written) job interview than a journal article

- The “alien” test:
  - Is your proposal SO CONVINCING and WELL JUSTIFIED that the proposal reviewers would be disappointed if you were to be abducted by aliens… because then the project wouldn’t happen.
- Use persuasive writing; future tense
- Talk with people whom they have funded
- Read some successful proposals
- Understand the review criteria
- Be as succinct as possible in conveying the funding need

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Effective Communication

Organization and Persuasion

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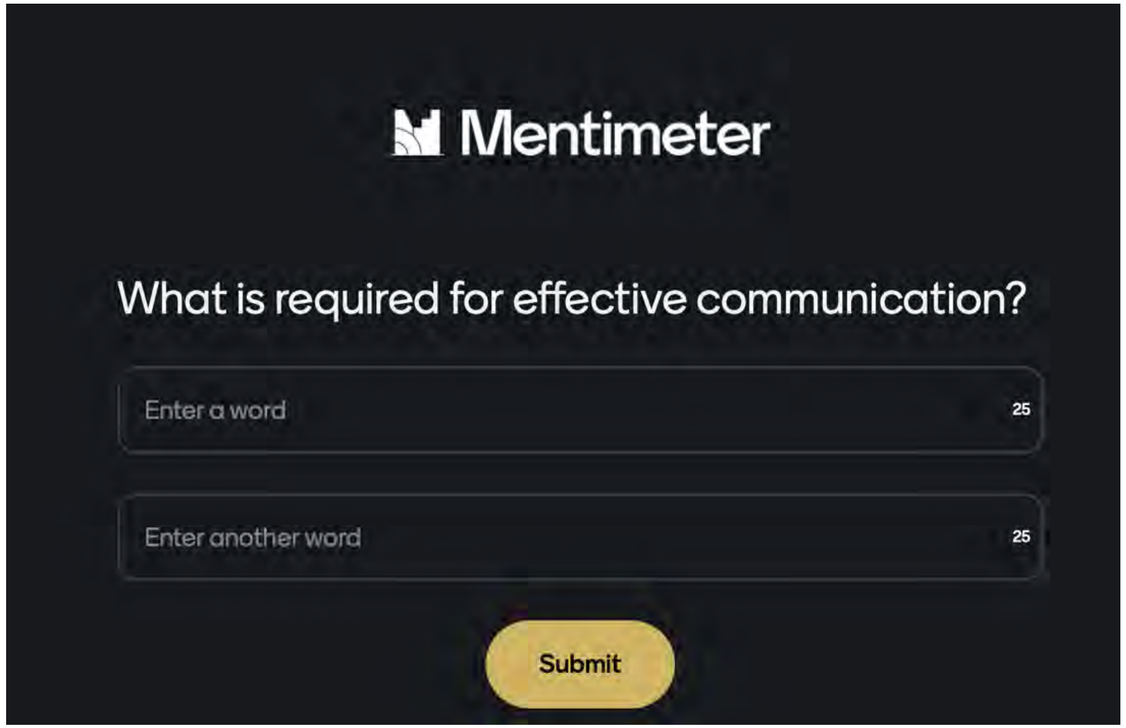
Brainstorm

What is required for effective communication?



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A clear message

Less is more

- Readers are busy people, grant readers especially
- 10% Introduction, 10% Conclusion (if that much), the rest of the piece is content

- GLOBAL: Thesis statement - the last sentence of your first paragraph, a crystallization of your project - “With X methodology, we hope to accomplish Y, which can impact Z.”
- LOCAL: Let the first and last sentences of your paragraph do the most work – this is what this paragraph ‘is’ so your reader knows what kind of genre/purpose this paragraph has from the first sentence. The last sentence can be the end cap of your idea.

Often I find it most effective to save writing the introduction for last

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Does it flow?

Sentences, paragraphs, and sections should flow smoothly.

- Each paragraph is an exploration of one idea, and each paragraph should bridge to the *next* idea
- Outlines are flexible guides

A - Complete sentence for paragraph thesis
  - Detail/evidence
  - Detail/evidence

B - Complete sentence for paragraph thesis
  - Detail/evidence
  - Detail/evidence

- Motivated transitions
- Signposting
- Write to discover -> Revise to present what you know

Science alone is not enough

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Your science will get lost if your story is not effective.

- Provide an effective story to help reviewers connect with the significance of your project

EXAMPLE:

A. Introduction

B. Background (put your project in conversation with existing science)

C. Identify the “gap” where your research lies

D. Methodology

E. Results/Societal impact/Conclusion

Imagine you’re guiding your reader through a timeline at a museum, the development of life on earth – because A, therefore B, finally C – compel your reader through the life of your potential project; from where we are now to where we could be

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Get their attention

Statements should be precise, concise, and impactful.

- Be specific and detailed
- Use specific terms; no “this” or “it” for the majority of the paragraph - don’t begin sentences with “this” or “it”
- The noun is the noun
- Complex ideas can be broken up with periods – giving things out in bite-size chunks and they become a full idea over the course of a paragraph
- Keep the subject at the start of the sentence

Be “ACTIVE”

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• In scientific writing, it’s more traditional to use “to be” constructions; be mindful of your intended audience

- Your narrative should have *drive* - make your reader compelled
- Verb choice can provide energy, color, emotion -- and a little can go a long way
  - She walks across the room
  - She runs across the room
  - She dashes across the room
  - She swaggers across the room

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Key Proposal Components

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Brainstorm

When preparing a funding proposal or application, where should you start?

Chat Waterfall

#1 Tip from Reviewers

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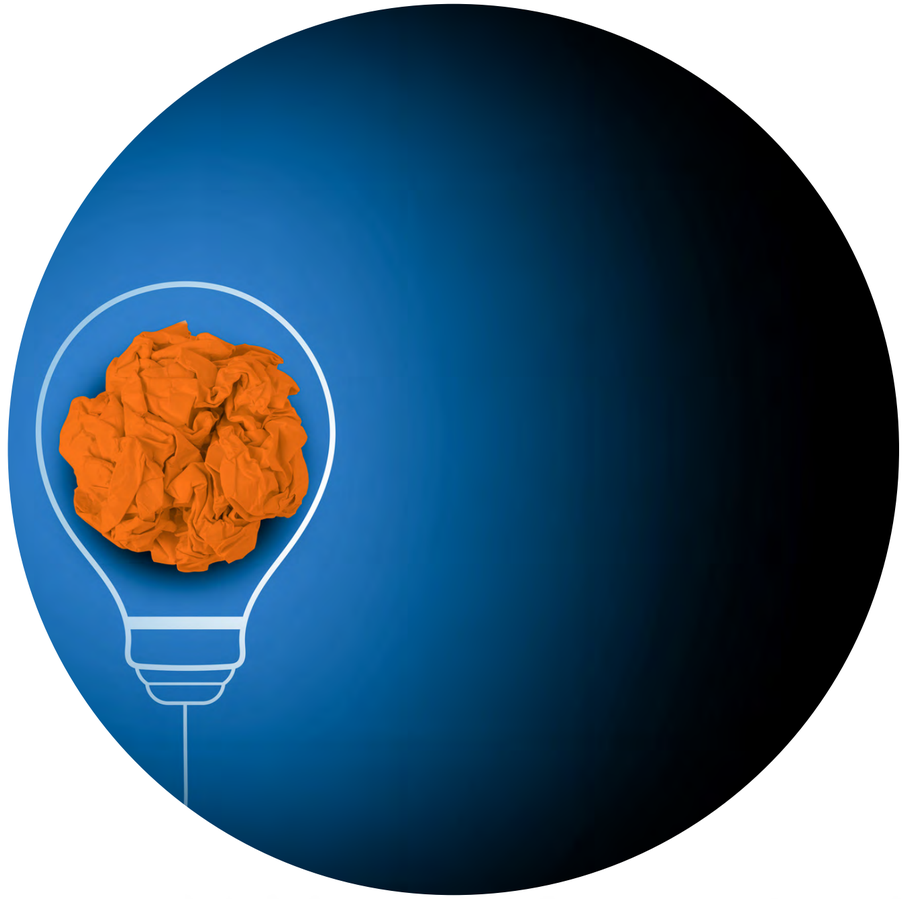
Read and follow instructions… all of them



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Key Proposal Components

***But always read the requirements for specific applications.**

- Executive Summary
- Background or Problem
- Objectives and/or Hypothesis
- Methodology and Plans
- Budget and Justification
- Societal/Broader Impacts

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Executive Summary

A concise but specific overview of your proposal.

- Engaging and compelling
- Capture (and keep) the reader's interest
  - "**sell**" the whole project in a few paragraphs
- Focus on:
  - Problem or "gap" in knowledge
  - Goals and (briefly) methodology
  - Significance or importance
  - How are you (and your team) qualified to do this work

- May find it easier to write it **last**

Other names:
Abstract
Summary
Project Description

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Background or Problem

Put your project into wider scientific context.

- Work builds upon existing knowledge
- Proposal must root project in existing knowledge
- Thorough literature review establishes foundation upon which to argue that your research is needed
  - Gap in our understanding that you can fill
  - New or on-going problem that has not been addressed, or addressed well
  - Particular research question that needs to be asked
- What puzzle are you trying to solve and why does it still need solving?
- Narrative writing and story telling are critical here

https://asiaedit.com/blog/3-fundamental-principles-of-writing-an-effective-introduction-to-your-journal-article

Objectives and/or Hypothesis

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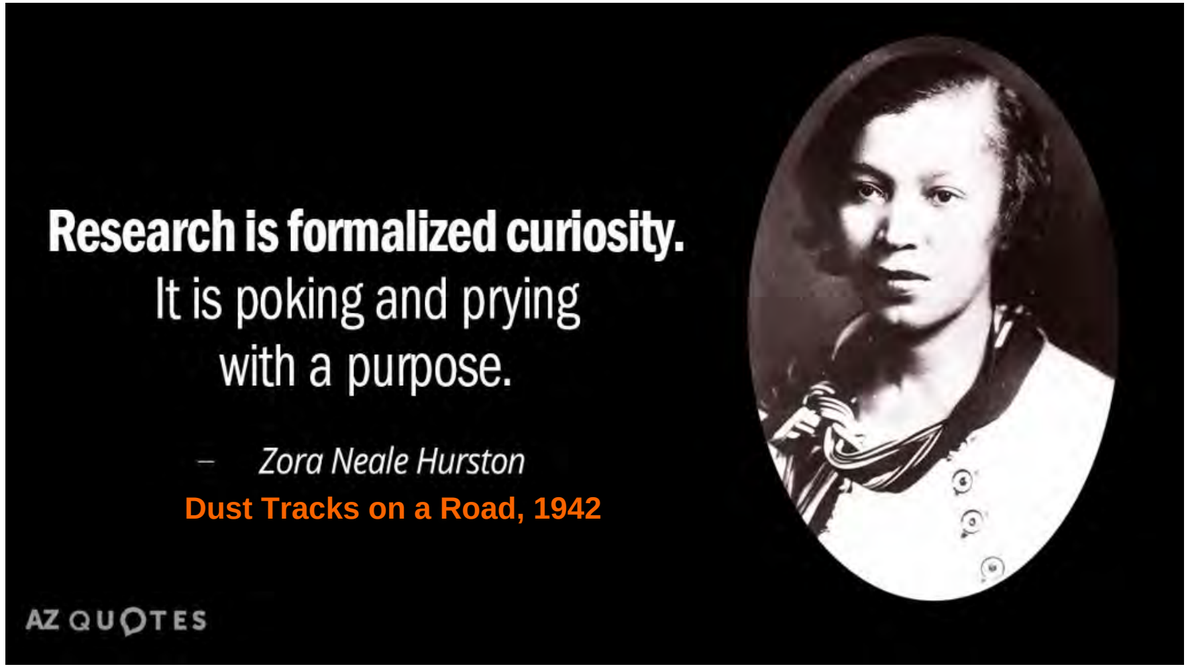
Be clear and creative.

- Show your **creative** approach to addressing the questions or problems
- Don’t be afraid to take risks (interesting)
- Limit or avoid...
  - “yes” or “no” style questions
  - questions with obvious answers
  - vague objectives or questions
- Clear and specific
- Feasible and achievable
- Build upon one another, but don’t depend entirely upon one another



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Methodology and Plans

The heart of your proposal.

- What will you *actually* do?
- *Why* will you use that approach to address your problem or answer your question?
- Detail critical elements of your plans
  - Clear
  - Thorough
  - Mindful of your audience's familiarity with your discipline
- Scientifically appropriate for the project goals or questions
- If trying something new, be explicit about why and why it's a better way
- How will you know if your methodology **"worked"**?
- What are contingency plans to proceed if early outcomes/results are unexpected?

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Budget

WHAT you need (Research projects usually cost money)

Your budget reflects the *numerical* story of your proposal.

- Three criteria for costs: 1) allowable, 2) allocable, and 3) reasonable
- Use headings/subheadings to delineate cost categories; provide subtotals at the end of each section; most importantly, *be clear.*

Common Categories: Personnel & Fringe, Travel, Consultant/Contractors/Vendors, Equipment, Materials & Supplies, Other, Indirect Costs

Budget

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TABLE I. OVERALL PROJECT BUDGET

Project Title:	**Sustainability Research Project**	
Principal Investigators:	Name, GRA	
	Name, GRA	
	Name, GRA	
Starting Date:	September 1, 2024 (contract will cite official date)	
Duration:	12 Months	
BUDGET SUMMARY	**Description**	**Year One Sponsor**
1. Salaries	Detailed at Table II	$0
2. Employee Benefits* & FICA	Detailed at Table II	$0
3. Materials & Supplies	Expendable Office Supplies (CAS Exception)	$0
4. Materials & Supplies	Computer & Data Processing Supplies (CAS Exception)	$0
5. Materials & Supplies	Laboratory Supplies	$500
6. Computers	Data processing equipment (CAS Exception)	$2,000
7. Instrumentation & Equipment	Non-inventory equipment items for labs	$0
8. Travel - Domestic	Attend meetings, conferences	$0
9. Travel - International	Attend meetings, conferences	$1,500
10. Communications	Fed-Ex, UPS, Priority Mail	$0
11. Publications	Duplication, copies, reproductions, etc.	$0
12. Services	Contractual Services &/or CBI	$1,000
13. Human Subjects Incentives		$0
14. Subcontracts (Initial $25,000)		$0
15. *Additional line item as needed*		$0
16. *Additional line item as needed*		$0
17. *Additional line item as needed*		$0
MODIFIED TOTAL DIRECT COSTS (MTDC)		**$5,000**
F&A Costs	49.6% of MTDC	$2,480
F&A waived	-49.6%	($2,480)
Equipment	Software, Individual items greater than $5,000	$0
Equipment	Lab Equipment, Individual items greater than $5,000	$0
Tuition (GRA Support)	19.06% of GRA Salary	$0
Subcontracts (Amount > $25,000)		$0
TOTAL PROJECT COSTS		**$5,000**

*OSU's fringe benefit rates are negotiated annually with the Office of Naval Research (ONR) and the actual negotiated rate,
**OSU negotiates the F&A rate with the Office of Naval Research (ONR) and the actual negotiated rate, at the time of award,

TABLE II. SALARIES, WAGES AND EMPLOYEE BENEFITS

			Number Months	Percent Time	Year One Sponsor
Name/Position					
Name, GRA					
Sponsor - 12 months @ 50%		$0	12	50%	$0
Year 1 benefits calculated at the rate of	9.81%				$0
Name, GRA					
Sponsor - 12 months @ 50%		$0	12	50%	$0
Year 1 benefits calculated at the rate of	9.81%				$0
Name, GRA					
Sponsor - 12 months @ 50%		$0	12	50%	$0
Year 1 benefits calculated at the rate of	9.81%				$0
	Subtotal, Graduate Students				**$0**
Graduate Student Salary - for use in calculation of Tuition Support					**$0**
Total Salaries and Wages					**$0**
Total Employee Benefits					**$0**
Total Salaries, Wages and Employee Benefits					**$0**

Budget Justification

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You will have to explain **why (justify) you need** the money you are requesting to conduct your project.

- Write AFTER you have finalized your budget, to avoid error/discrepancies
- Be detailed - show your calculations, basis for estimate, etc.
- Be accurate - no discrepancies between your budget and your narrative.
- Be thorough - every line item in your budget should have a corresponding description.

SDC AAPG - “include details of any additional funding obtained or sought”

Budget Justification

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Budget Justification

An itemized budget for each year of the proposed project is presented on the Proposed Budget Form. The principal investigator on this project is Insert of the Insert Department at Oklahoma State University.

SENIOR PERSONNEL –
The PI for this project is Insert. Explain the project involvement being supported.

OTHER PERSONNEL –
Graduate Students will be involved in the project. Explain the project involvement being supported.

FRINGE BENEFITS –
Fringe benefits are for health care and other benefits for the employees, faculty and students. Fringe benefit rates are negotiated annually with the Office of Naval Research and will be adjusted accordingly.

EQUIPMENT –
Enter applicable items.

TRAVEL –
Enter applicable travel. Travel may be reimbursed at federal rates, which may exceed state rates.

OTHER DIRECT COSTS –

Materials and Supplies. Explain costs.

Communication. Explain Costs.

Publications. Explain Costs.

Instrument Use Fees. Explain Costs.

Tuition Remission - One graduate student will work on this project. The tuition remission for the graduate research student is requested and is calculated at a rate of 18.2% of GRA salary. This rate is reviewed annually and will be adjusted accordingly.

List other costs as needed.

INDIRECT COSTS (F & A)
The allowable Facility & Administrative Cost rate for on-campus research is 49.6-percent of Modified Total Direct Costs (MTDC) until further amended. This is the predetermined rate

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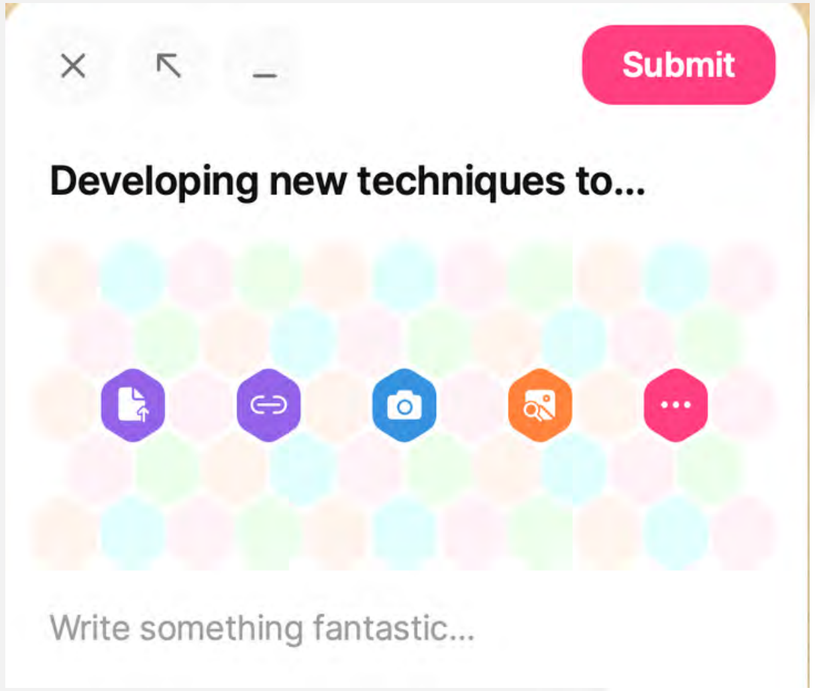
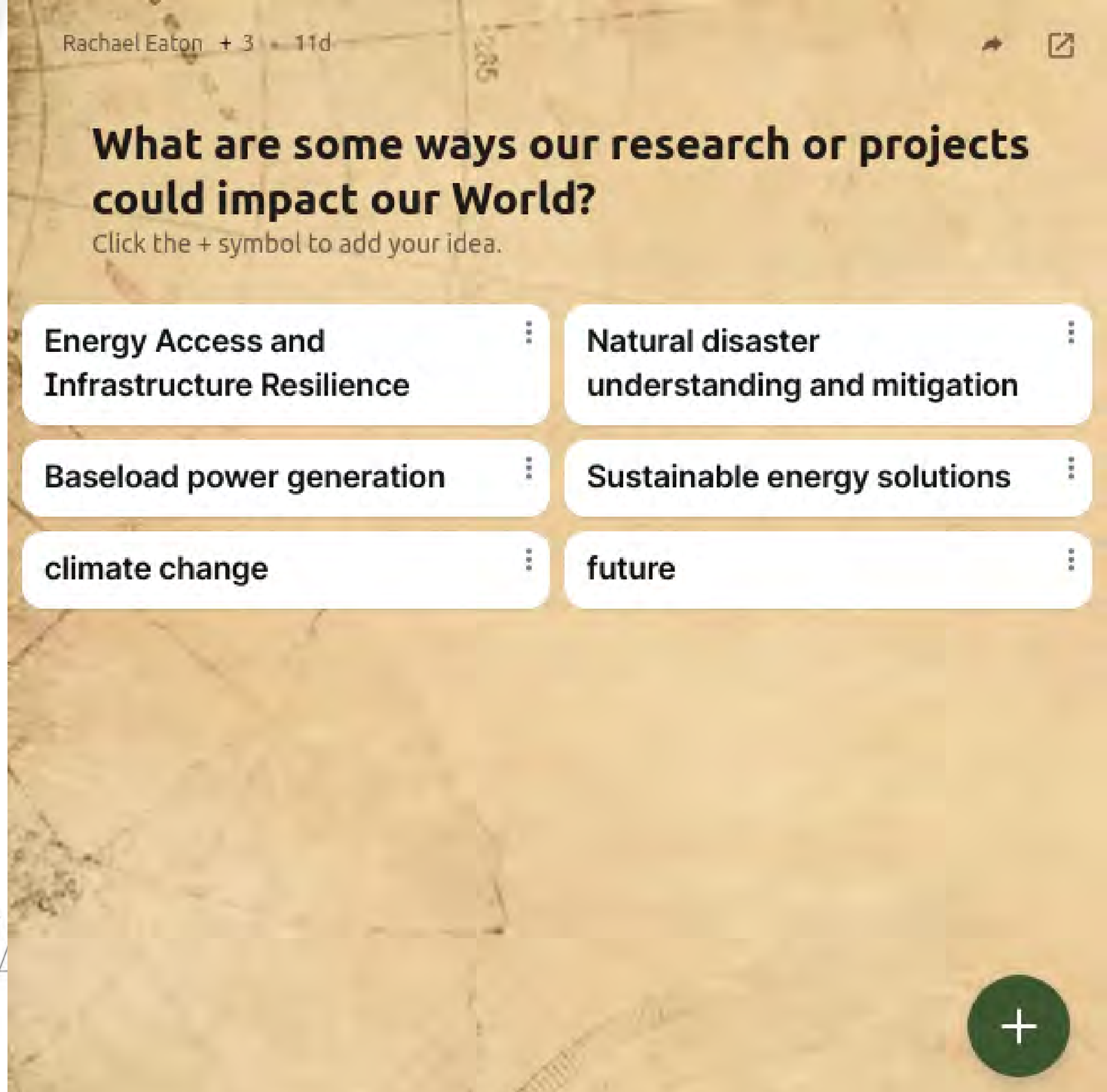
Societal Impacts of your work

Brainstorm


Submit
Developing new techniques to...
Write something fantastic...


Rachael Eaton + 3 · 11d
What are some ways our research or projects could impact our World?
Click the + symbol to add your idea.
Energy Access and Infrastructure Resilience
Natural disaster understanding and mitigation
Baseload power generation
Sustainable energy solutions
climate change
future

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Our work must be ‘relevant’

Why do scientists have to consider the societal impact of their work?

- Science and research do not occur “in a vacuum”
- Science inherently has social and cultural context

Must be able to explain why your research is worth of time, money, and other resources

Where does $ come from

Be aware of your funding sources.

- Research funding/support comes from a variety of sources:
  - government agencies
  - private industry
  - professional organizations
  - private foundations
- Researchers must justify their work (especially if someone else is paying for it)
- Responsible steward of “other people’s money”

- Many funding agencies incorporate this societal component into proposal evaluation.

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Connect to a bigger picture

Your research is part of our larger society and World.

- Creativity and critical thinking important
- “Big picture” relevance of our work is not always obvious
- Emerging professionals must be prepared to address this essential component of research

- Make your goals for the “impact” of your work clear
- Any community engagement or outreach to the public must link to the science
- Be specific with your “impact” content -- just like with your science content
- How will you know that your impact or outreach **is effective**
- How will you pay for any public engagement or outreach (**budget for it**)

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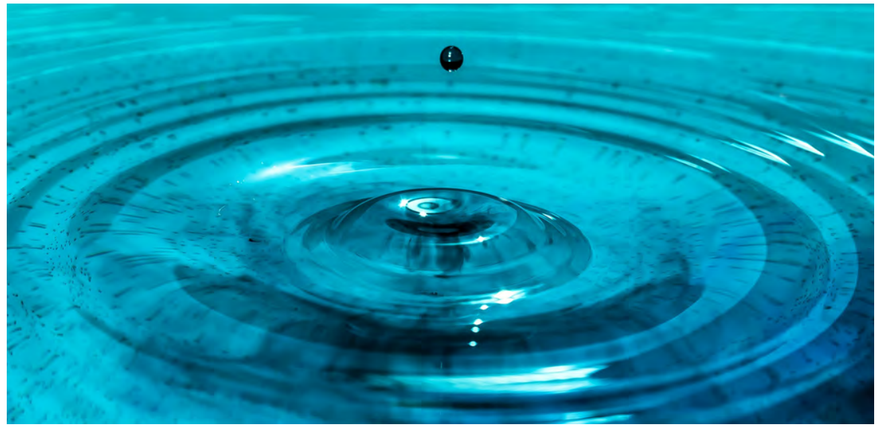
“Broader Impacts”

Agencies might give you specific indication of what they look for.

Example: National Science Foundation (NSF) in the U.S.

“Broader Impacts” or societal relevance of research could take many forms:

- Full participation of underrepresented groups in STEM
- Improved STEM education or educator development
- Increased scientific literacy or public engagement
- Improved well-being for people in society
- Developing diverse STEM workforce
- Increase partnerships between academia, industry and others
- Increased economic competitiveness of the United States
- Enhanced infrastructure for research and education



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Incorporating SDGs

Align your work with UN Sustainable Development Goals.

- Goals for the development of our World
- "*peace and prosperity for people and the planet, now and into the future*."

- Increasing emphasis on connecting research to UN SDGs
- Familiarize yourself with the SDGs
- Be thoughtful about how your research or project connects to SDGs

https://sdgs.un.org/goals

https://www.earthdata.nasa.gov/learn/backgrounders/sdg

https://unesdoc.unesco.org/ark:/48223/pf0000384826

The reviewers’ perspective

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What are the reviewers ultimately asking themselves?

- What the proposers want to do
- Why they want to do it
- How they plan to do it
- How they will know if they succeed
- What they will do if they don't "succeed"
- What benefits result if the project is successful

- Technical aspects of proposal AND the potential for project to make broader contributions

Today's Main Messages

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Purpose

- Impact
- Dream project
- Collaboration
- Leverage skills
- Strategy

Communication

- Be concise
- Be specific
- Be compelling
- Tell a story

Components

- Follow instructions
- Be clear and convincing
- Use creativity to solve interesting problems

Societal Impacts

- Find connections
- Think outside your discipline
- Be a steward

Thank you! Questions?

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