OSRD Grant Writing Workshop for Postdoctoral Researchers

Jake Maas, Director, Office of Strategic Research Development
Rachel Ankirskiy, Research Development Professional, OSRD

UNIVERSITY OF GEORGIA
1785

Today's Agenda

12:00-12:50 Presentation
12:50-1:00 Q&A
1:00-2:00 Writing Groups
- 1:00-1:15 Read and discuss 1st SA page/Summary (15 minutes)
- 1:15-1:30 Read and discuss 2nd SA page/Summary (15 minutes)
- 1:30-1:45 Read and discuss 3rd SA page/Summary (15 minutes)
- 1:45-2:00 Read and discuss 4th SA page/Summary (15 minutes)

Ten Steps to Success

1. Find the right opportunity
2. Research the program

3. Make a detailed plan
4. Take advantage of grant expertise
5. Engage readers

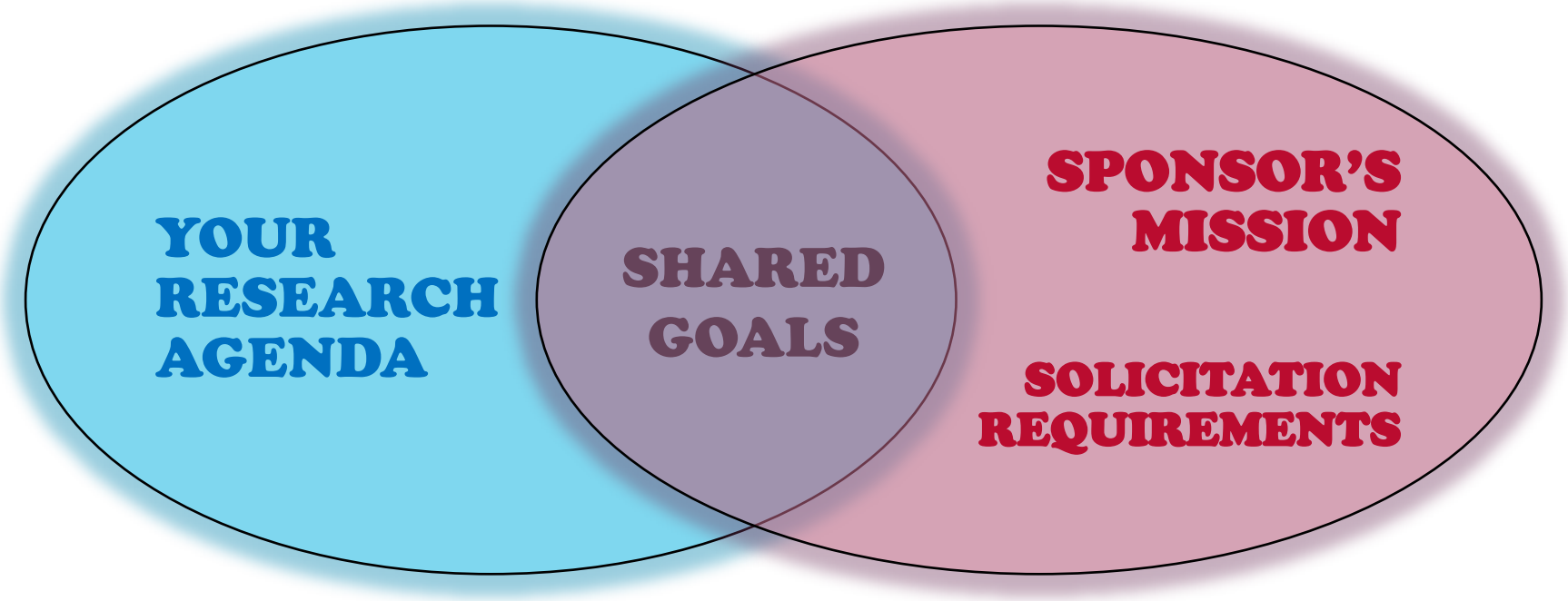
6. Write to **your audience**
7. Get feedback from readers
8. Revise
9. Submit
10. Resubmit

Discovery

Preparation

Execution

How do you determine fit?



1. Find the Right Opportunity

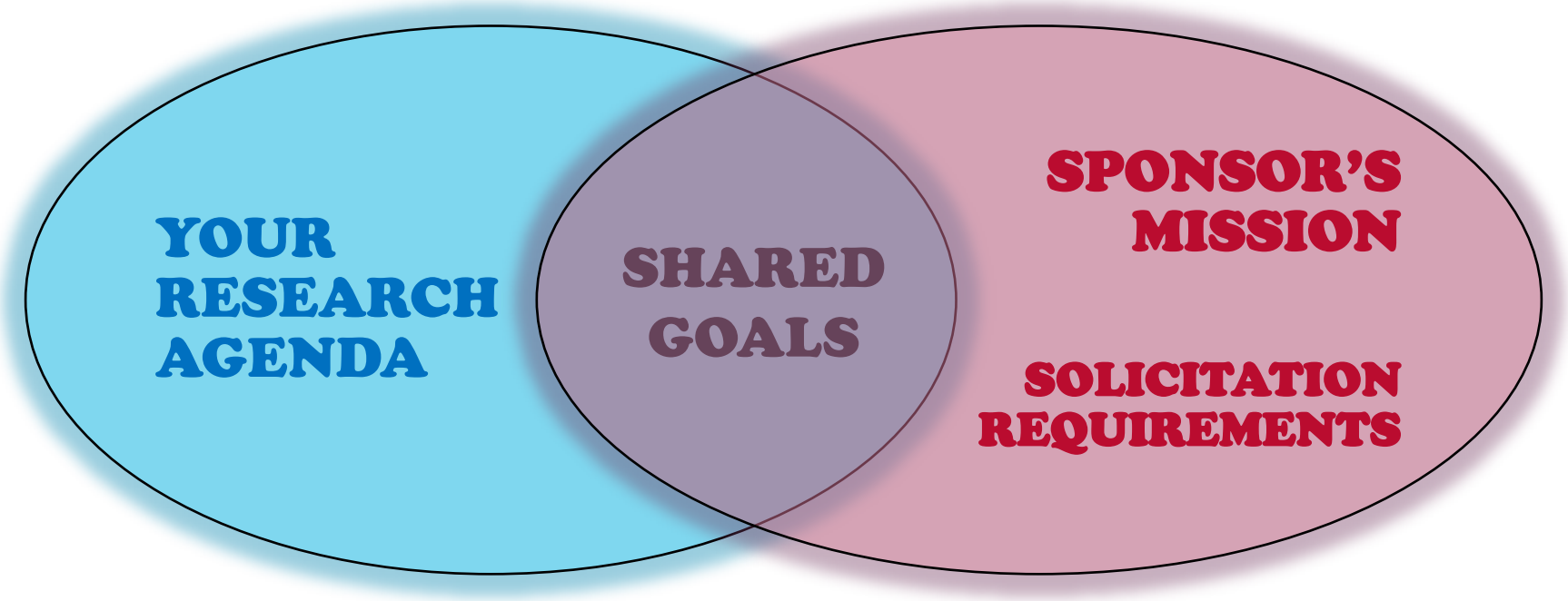
- Colleagues
- PDA Listserv
- PIVOT
- Grants.gov
- Foundation Relations
- Office of Research Newsletters
- Willson Center for Arts and Humanities

2. Research the Program

- Close-read the **solicitation**
- Explore all hyperlinks. Example: https://www.nsf.gov/pubs/2023/nsf23610/nsf23610.htm
- Read about the sponsor and their **mission**
- Find info on what has been awarded
- Get advice from **colleagues**
- Develop an abstract, one-pager, or elevator pitch
- Contact the **sponsor**

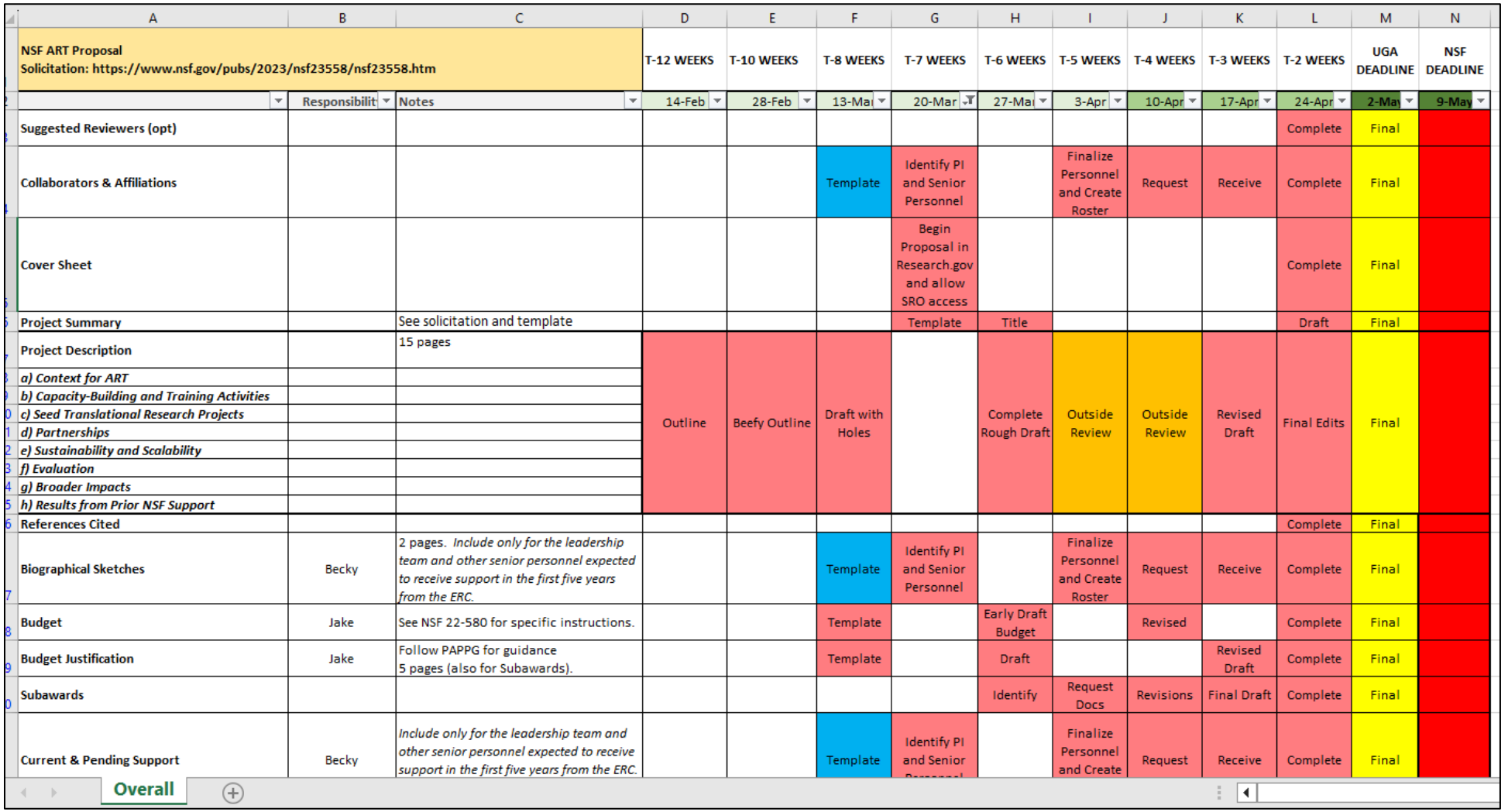
Multiple sources of information allow you to triangulate the "overlap"

How good is the fit?



3. Make a Detailed Plan

- Build a Timeline/ Checklist
- Revisit Solicitation
- Refer to Sponsor's general Guide
- Include ALL required components
- Include non-tangible steps
- Stagger deadlines
- Think about dependencies



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	NSF ART Proposal Solicitation: https://www.nsf.gov/pubs/2023/nsf23558/nsf23558.htm			T-12 WEEKS	T-10 WEEKS	T-8 WEEKS	T-7 WEEKS	T-6 WEEKS	T-5 WEEKS	T-4 WEEKS	T-3 WEEKS	T-2 WEEKS	UGA DEADLINE	NSF DEADLINE
2		Responsibilit	Notes	14-Feb	28-Feb	13-Ma	20-Mar	27-Ma	3-Apr	10-Apr	17-Apr	24-Apr	2-May	9-May
3	Suggested Reviewers (opt)											Complete	Final	
4	Collaborators & Affiliations					Template	Identify PI and Senior Personnel		Finalize Personnel and Create Roster	Request	Receive	Complete	Final	
5	Cover Sheet						Begin Proposal in Research.gov and allow SRO access					Complete	Final	
6	Project Summary		See solicitation and template				Template	Title				Draft	Final	
7	Project Description		15 pages	Outline	Beefy Outline	Draft with Holes		Complete Rough Draft	Outside Review	Outside Review	Revised Draft	Final Edits	Final	
8	*a) Context for ART*													
9	*b) Capacity-Building and Training Activities*													
10	*c) Seed Translational Research Projects*													
11	*d) Partnerships*													
12	*e) Sustainability and Scalability*													
13	*f) Evaluation*													
14	*g) Broader Impacts*													
15	*h) Results from Prior NSF Support*													
16	References Cited											Complete	Final	
17	Biographical Sketches	Becky	2 pages. *Include only for the leadership team and other senior personnel expected to receive support in the first five years from the ERC.*			Template	Identify PI and Senior Personnel		Finalize Personnel and Create Roster	Request	Receive	Complete	Final	
18	Budget	Jake	See NSF 22-580 for specific instructions.			Template		Early Draft Budget		Revised		Complete	Final	
19	Budget Justification	Jake	Follow PAPPG for guidance 5 pages (also for Subawards).			Template		Draft			Revised Draft	Complete	Final	
20	Subawards							Identify	Request Docs	Revisions	Final Draft	Complete	Final	
	Current & Pending Support	Becky	*Include only for the leadership team and other senior personnel expected to receive support in the first five years from the ERC.*			Template	Identify PI and Senior		Finalize Personnel and Create	Request	Receive	Complete	Final	

Overall

4. Take Advantage of Grant Expertise

- Colleagues (senior)
- Colleagues (peers)
- College/school grant staff
- Sponsored Projects Administration/DLSA
- Program officers/agency personnel

5. Recruit Readers

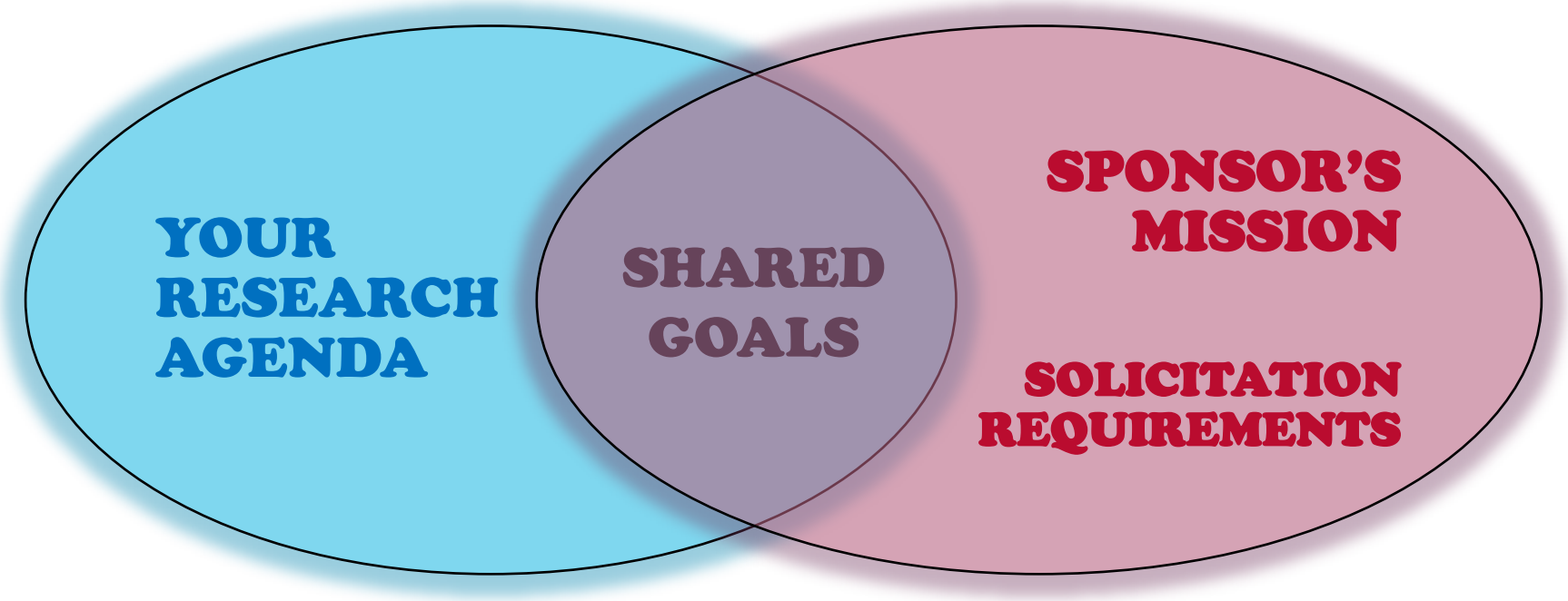
- Subject matter experts
- Colleagues outside of your field/subfield
- Lay readers

6. Write to your Audience

- *Who are your reviewers? Gather as much info as possible.*
- Are they a homogenous or heterogeneous group?
- What is each type of reviewer looking for?
- Stick to your timeline!

T-12 WEEKS	T-10 WEEKS	T-8 WEEKS	T-7 WEEKS	T-6 WEEKS	T-5 WEEKS	T-4 WEEKS	T-3 WEEKS	T-2 WEEKS	UGA DEADLINE	NSF DEADLINE
14-Feb	28-Feb	13-Ma	20-Mar	27-Ma	3-Apr	10-Apr	17-Apr	24-Apr	2-Ma	9-May
Outline	Beefy Outline	Draft with Holes		Complete Rough Draft	Outside Review	Outside Review	Revised Draft	Final Edits	Final	

Write to the overlap!



7. Send Draft to Readers

- Give each reader specific instructions according to their expertise:
  - Ask **subject matter experts** about the nitty-gritty: methods, approach, project design, situation within your field
  - Ask **colleagues outside your field** about logic, clarity, jargon
  - Ask **lay readers** about comprehensibility, significance, impact

You don't want people to tell you what you already know!

Time to Work on those Ancillary Docs!

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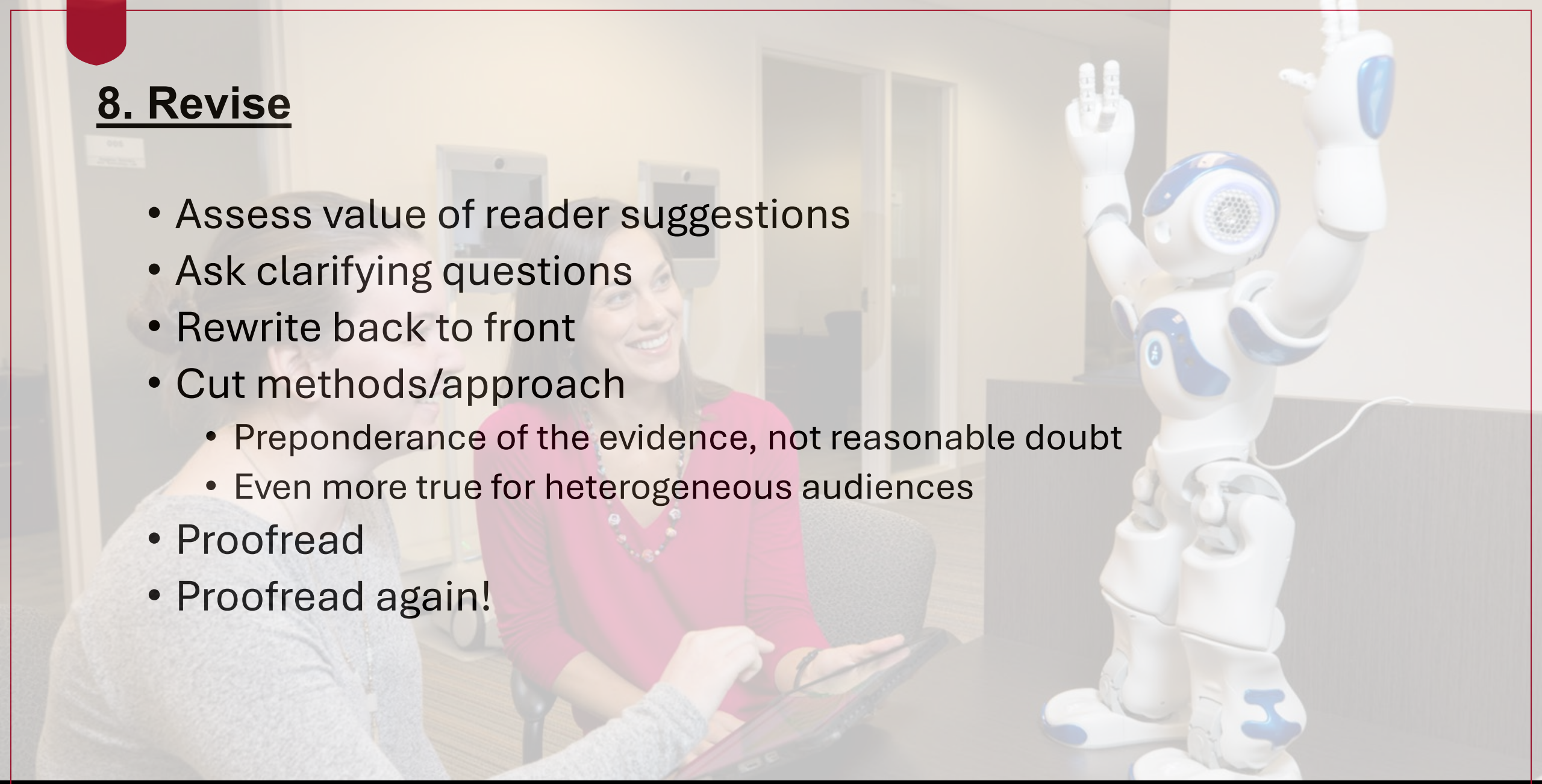
Subawards					Identify	Request Docs	Revisions	Final Draft	Complete	Final	
Current & Pending Support	Becky	*Include only for the leadership team and other senior personnel expected to receive support in the first five years from the ERC.*	Template	Identify PI and Senior Personnel		Finalize Personnel and Create Roster	Request	Receive	Complete	Final	
Facilities, Equip, Other	Jake	See NSF 22-580 for specific instructions.					Rough Draft	Complete Draft	Final Draft	Final	
Data Management Plan	Ian							Draft	Complete	Final	
Postdoctoral Mentoring Plan	Shelley							Draft	Complete	Final	
Statement from IHE re: research capacity	Jake			Template			Draft		Complete		
Letters of Collaboration				Template		Identify	Finalize	Solicit	Receive	Final	
Consolidated List of Personnel			Template			Draft				Final	
All Research.gov Components										Final PI/OPE Review	
Submission to DLSA			Proposal in Portal								
Submission by DLSA to NSF											

8. Revise

- Assess value of reader suggestions
- Ask clarifying questions
- Rewrite back to front
- Cut methods/approach
  - Preponderance of the evidence, not reasonable doubt
  - Even more true for heterogeneous audiences
- Proofread
- Proofread again!



9. Submit

- Authorized Organizational Representatives – Sponsored Programs/Projects
  - Keep lines of communication open
  - Agree on a timeline for delivery
- Electronic Systems
  - Grants.gov
  - Research.gov
  - Bespoke systems

Cathy's Admonitions

- Things can go wrong – do not wait to submit until the day it is due!!
  - Power outages
  - Internet outages
  - Fire
  - Flood
  - Pandemics
  - Computer crash
  - Snow/Ice storms at agency or your university
  - Hurricanes

Hope for success -- but embrace rejection

10. Resubmit!

RESUBMISSION CHART

Location	Critique	Response	Actions	Done?	Page #
	Intellectual Merit				
PS	The panel did express some concern as to whether the instrument would be used to its full capacity.	This seems to be related to the PO's point about wanting to see more Co-PIs, and more biosketches of major users. We will add Co-PIs and biosketches of major users.	One Co-PI and two Senior Personnel are added.	Done	P#3-4 P#5
R2	It is still not clear about additional scalability. There is considerable discussion in the sequence-verse that the NovaSeq 6000 almost never achieves the yields advertised.	Magdy respectfully disagrees – no need to address.			
	Broader Impacts				
R1	Some method of evaluating outcomes of workshops and student tours (other than number of participants) would improve Broader Impacts.	A pre-/post survey would probably address this point sufficiently. Needs to be economical as there is no budget for this.	See above		P# 15
	Solicitation-Specific Criteria				
PS	Management Plan: The panel has some uncertainty about the actual scheduling mechanism for use of the sequencer and the adequacy of the cost recovery level.	Make sure that the Management Plan provides the full context: that this is a high-capacity core facility with processes in place that obviate scheduling.	Addressed. Users do not schedule to use the instrument. The GGBC staff members are the only people to use the instrument.	Done	P# 14

Learning Objectives

1. Understand the purpose and nature of each of the (nearly) universal components of a research grant project summary/specific aims page

2. Learn how to use your summary/aims page as a roadmap to the project description/research strategy

3. Practice analyzing and improving your colleagues' summary/aims and your own

General Writing Considerations

- **You are arguing that the sponsor should give you money**
  - Every sentence should serve a purpose
  - This is not the place to ruminate or philosophize
  - Words to avoid: *interesting, important, unique.* Show, don't tell!
  - Signpost!
- **Think like a reviewer**
  - Know your audience
  - Anticipate counter-arguments
  - Understand the reviewers' apples & oranges problem
  - Identify and emphasize your differentiators

Hourglass Structure

What is this paragraph or section about? How does it flow logically from the previous paragraph?

What does the reader need to know to understand the details?

The details

How is this a logical step in a sequence of activities?

How is this related to the project's goals, outcomes, impact?

ANATOMY OF A RESEARCH PROPOSAL

Expands upon https://www.niaid.nih.gov/grants-contracts/sample-applications

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Components of a Specific Aims Page

COMPONENT	PURPOSE
Hook	Capture reviewers' interest.
Background	Lead readers from what they know to what they don't know.
Rationale	How will the activities you propose lead to the results you seek?
Gap in Knowledge	What hole will your research fill?
Critical Need	What is needed to fill this gap? What happens if this need isn't met?
Long-Term Goal	Explain how the objectives fit into your larger research agenda.
Objectives	Define what you will accomplish.
Hypothesis/Aims	The testable proposition you plan to investigate
Aims	***How will you test your hypothesis?***
Research Question(s)	The question(s) this project aims to answer
Aims	***How will you answer your research question(s)?***
Innovation	How will this project move your field forward?
Expected Outcomes/Deliverables	The sponsor is giving you money. What are you giving them?
Capacity/Qualifications	Demonstrate that you have the knowledge and resources to succeed.
Impact	How will this research change the world?

NIH Specific Aims Page vs. NSF Project Summary

1st Paragraph
- Hook
- Background
- Gap in Knowledge
- Critical Need

2nd Paragraph
- Long-Term Goal
- Objectives
- Rationale
- Hypothesis

AIMS (with hypotheses, optionally)

3rd Paragraph
- [Innovation]
- Capacity/Qualifications
- Expected Outcomes/Deliverables
- Impact

Overview
- Hook
- Background
- Gap in Knowledge
- Critical Need
- Long-Term Goal
- Objectives

Intellectual Merit
- Research Questions, Hypotheses, or Aims
- Rationale
- Innovation
- [Capacity/Qualifications]
- Expected Outcomes/Deliverables
- Impact (scientific)

Broader Impacts
- BI Proposed Activities
- BI Expected Outcomes/Deliverables
- BI Anticipated Societal Impact

HYPOTHESIS AND SPECIFIC AIMS:

The transcription factor FOXP3 is critical to the regulation of numerous debilitating human immune-mediated diseases, the prevalence of which together affect over 8.5 million people (1 in 31 U.S. residents). In Inflammatory Bowel Disease (IBD) chronic intestinal inflammation indicates aberrant *in vivo* FOXP3+ T regulatory (Treg) cell function (1). Similarly, proinflammatory signals *in vitro* impair Treg function (2). Our lab was the first to characterize the essential role for the histone methyltransferase (HMT) EZH2 in the epigenetic regulation of FOXP3 (3). Recent published work extended our observations indicating a key role for EZH2 in FOXP3 repressor function (4); however the regulation and biological impact of the FOXP3-EZH2 pathway to IBD is unknown. This knowledge is important given the apparent loss of function of Treg cells in inflammation.

Our *long-term goal* is to dissect epigenetic mechanisms regulating Treg cellular differentiation and function, particularly within the setting of GI inflammatory diseases; as these discoveries will facilitate design of human cell therapy trials for IBD. Consequently, the *objective* of this grant is to characterize the role for the epigenetic regulator EZH2 in Treg suppressive function. These investigations are strongly supported by preliminary data demonstrating that: 1) EZH2 is required for Treg suppressive function; 2) IL6 signaling leads to phosphorylation and inhibition of EZH2; 3) lymphocytes isolated from the intestine of IBD patients demonstrate activation of IL6-induced gene networks and loss of EZH2 HMT function; and 4) conditional knockout of EZH2 in FOXP3+ T cells leads to *in vivo* immune dysfunction. Based upon these compelling data we propose the **CENTRAL HYPOTHESIS that EZH2 plays a critical role in the homeostasis of Treg cells, and the disruption of EZH2 function by inflammatory signaling pathways contributes to IBD.** Our rationale is that identification of the mechanism(s) to restore Treg suppressive function in the setting of intestinal inflammation will offer new therapeutic opportunities within the field of IBD. Our specific aims will test the following hypotheses:

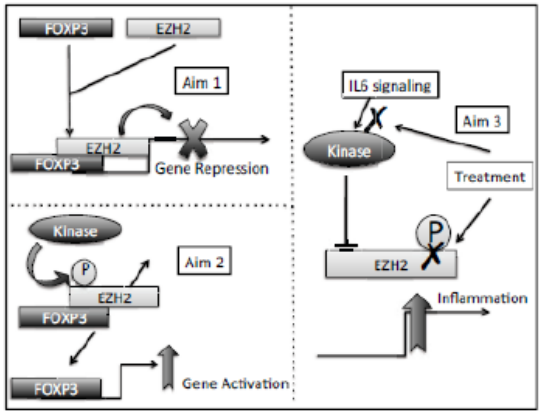

Figure 1: Conceptual framework. Through the mechanistic experiments designed in the following aims we will identify the role for FOXP3 in the recruitment of EZH2 to core target genes required for Treg function (Aim 1). We will define the signaling network responsible for phosphorylation of EZH2 and disrupted HMT function (Aim 2). Finally, we will perform pre-clinical studies of innovative therapy designed to generate Treg cells resistant to disruptive modifications in the setting of inflammation (Aim 3).

Aim 1: Repression of immunoregulatory gene networks by FOXP3 requires the formation of a complex between this transcription factor and EZH2.

Aim 2: Inflammatory stimuli, such as IL6 lead to EZH2 phosphorylation and thereby disrupt the enzymatic activity of this epigenomic regulator.

Aim 3: Inhibition of the IL6 to EZH2 signaling pathway permits sustained Treg suppressive function in the setting of intestinal inflammation.

Upon conclusion, we will understand the role for EZH2 in Treg loss of function in the setting of active inflammation. This discovery will stimulate new areas for experimental therapeutics in human chronic inflammatory diseases. Our environment in the Epigenetic and Chromatin Dynamics Laboratory combined with the Department of Immunology at the Mayo Clinic makes us uniquely qualified to pursue this objective given the extensive collective experience of histone methyltransferase biology, proinflammatory signaling networks, and *FOXP3* gene regulation.

1st Paragraph
- Hook
- Background
- Gap in Knowledge
- Critical Need

2nd Paragraph
- Long-Term Goal
- Objectives
- **Rationale**
- Hypothesis

AIMS (with hypotheses, optionally)

3rd Paragraph
- [Innovation]
- Capacity/Qualifications
- Expected Outcomes/Deliverables
- **Impact**

Hook

Capture reviewers' interest

- ONE sentence to get reviewers excited about the importance of the research topic
- Indicate a problem in the field that will lead to a productive line of research
- Get the reviewers intrigued!
- Focus on something that most reviewers will *not* know

The transcription factor FOXP3 is critical to the regulation of numerous debilitating human immune-mediated diseases, the prevalence of which together affect over 8.5 million people (1 in 31 U.S. residents)

Hook It Up

- Flooding is the most frequent and costly natural disaster in America, with more than $850 billion in damages and more than 5,000 deaths since 2016, representing two-thirds of the costs from all natural disasters. *(societal significance/impact-based hook)*
- Nematode worms are abundant and ubiquitous in marine sediment habitats worldwide, performing key functions such as nutrient cycling and sediment stability. *(background hook)*
- Symbiosis with microbes has been integral to the evolution of life on earth. *(scientific significance hook)*

Background (What is Known)

Inform and educate

- Lead non-experts from what they know to what they don't know
- Start with oldest known facts relevant to what currently represents the frontier of your field
- End with the specific knowledge they will need to understand your research
- Provide exactly the right amount of information

In Inflammatory Bowel Disease (IBD) chronic intestinal inflammation indicates aberrant *in vivo* FOXP3+ T regulatory (Treg) cell function (1). Similarly, proinflammatory signals *in vitro* impair Treg function (2).

Gap in Knowledge

What hole will your research fill?

- *The "gap" you identify dictates the logic of the rest of the proposal*
- The gap in knowledge should **link back** to Background/What is Known
- Also known as a "problem statement"

Our lab was the first to characterize the essential role for the histone methyltransferase (HMT) EZH2 in the epigenetic regulation of FOXP3 (3). Recent published work extended our observations indicating a key role for EZH2 in FOXP3 repressor function (4); however the regulation and biological impact of the FOXP3-EZH2 pathway to IBD is unknown.

Critical Need

Frame the Gap as a problem needing a solution

- Write a *statement of need*:
  - What knowledge is needed to fill in the **Gap**?
- Address the consequences of *failing to meet this need.*
  - *If need relates to gap in knowledge, failure = blocking advancement of field*
  - *Argue for timeliness if appropriate (as in "flooding" hook)*

however the regulation and biological impact of the FOXP3-EZH2 pathway to IBD is unknown. This knowledge is important given the apparent loss of function of Treg cells in inflammation.

Proposal Objectives

Define what you will accomplish

- This should meet the Critical Need described earlier and link back to your *statement of need.*
- It should be positioned as the next step toward your Long-Term Goal.
- Emphasize the *product* you plan to produce, not the *process* that will lead to it. (I.e., this is not the place for methodological detail.)

Consequently, the *objective* of this grant is to characterize the role for the epigenetic regulator EZH2 in Treg suppressive function.

Long-Term Goal

Place your proposal in a wider context

- How do your Proposal Objectives fit into your larger research agenda?
- Convey excitement
- Make the reviewers feel important

Our *long-term goal* is to dissect epigenetic mechanisms regulating Treg cellular differentiation and function, particularly within the setting of GI inflammatory diseases; as these discoveries will facilitate design of human cell therapy trials for IBD.

Rationale

Explain yourself!

- What is the logic by which the activities you propose will lead to the results you seek?
- Why did you choose these approaches and not others?
- This needs to be succinct and plausible, but not comprehensive – you will have room to elaborate in the Research Strategy.

Our rationale is that identification of the mechanism(s) to restore Treg suppressive function in the setting of intestinal inflammation will offer new therapeutic opportunities within the field of IBD.

Hypothesis & Aims

Hypothesis: the testable proposition you plan to investigate.

Aims: how you will test it

- Aims should be global and open-ended
- Convey “why,” not “what”
- Avoid a descriptive approach (again, this is not the place for methodological detail)
- Must encompass alternatives in case working hypothesis doesn’t pan out
- Aims must not wholly depend on each other

we propose the **CENTRAL HYPOTHESIS that EZH2 plays a critical role in the homeostasis of Treg cells, and the disruption of EZH2 function by inflammatory signaling pathways contributes to IBD**.

Research Questions & Aims

(inquiry-driven research)

Your Research Questions are the questions your project seeks to answer.

Your aims/goals describe your plan for answering them.

- Each RQ should focus on a single problem or issue.
- RQs should be specific enough to answer thoroughly, but…
- …Complex enough to develop the answer over the course of the project period.

Capacity/Qualifications

Demonstrate that you can perform the project

- Scope of project fits timeline and budget
- Personnel experience
- Institutional track record
- Physical & intellectual resources

Our environment in the Epigenetic and Chromatin Dynamics Laboratory combined with the Department of Immunology at the Mayo Clinic makes us uniquely qualified to pursue this objective given the extensive collective experience of histone methyltransferase biology, proinflammatory signaling networks, and *FOXP3* gene regulation.

Expected Outcomes/Deliverables

What is the sponsor's potential ROI?

- State the contribution to science
- Describe any tangible deliverables:
  - Technology commercialization, patents, licensing
  - Techniques, novel methods
  - Material for policymakers
- Help sponsors justify the expenditure of funds

Upon conclusion, we will understand the role for EZH2 in Treg loss of function in the setting of active inflammation.

Innovation

What is NEW in the proposal?

- Weighed differently by different sponsors and grant opportunities
- How is your project novel?
- How will your project help drive your field forward?
- Leaps forward vs. incremental progress

Impact

How will your proposal change the world?

- What new scientific frontiers will your project open?
- Think big! This is your chance to write a little science fiction.
- What are the project's potential economic/societal benefits?
- What communities – especially underserved / under-resourced communities – will your project help?

This discovery will stimulate new areas for experimental therapeutics in human chronic inflammatory diseases.

as these discoveries will facilitate design of human cell therapy trials for IBD.

https://research.uga.edu/strategic-research-development/

https://www.youtube.com/@OSRD1975

Questions?

Instructions for Writing Groups

- Introduce yourselves. Be considerate and constructive in conversation
- Is each of the necessary* components of the “anatomy” present, clear, and adequate? Focus particularly on: Gap in Knowledge, Rationale, Impact
- If a component is missing, is it necessary? What additional information do you, as a reader, need in order to understand the purpose the research?
- How would you expect each component to be developed in detail in the research strategy/project description?