

WEBINAR  
April 17, 2023  
(Will be Recorded)

NSF 23-068

Dear Colleague Letter:  
DMR-NIBIB Collaboration: Exploring  
Fundamental Drivers of Next Generation  
Biomaterials for Biomedical Research

<https://www.nsf.gov/pubs/2023/nsf23068/nsf23068.jsp>



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# DMR-NIBIB DCL Webinar Outline

- ❖ *General Welcome*
- ❖ *Webinar Logistics*
- ❖ *Charge*
  - *Germano Iannacchione (NSF/DMR)*
  - *David Rampulla (NIH/NIBIB)*
- ❖ *Context Setting*
  - *Abraham Joy (NSF), [ajoy@nsf.gov](mailto:ajoy@nsf.gov)*
  - *Luisa Russell (NIBIB), [luisa.russell@nih.gov](mailto:luisa.russell@nih.gov)*
- ❖ *DCL Review*
  - *Shadi Mamaghani, [smamagha@nsf.gov](mailto:smamagha@nsf.gov)*
- ❖ *Q&A Panel Discussion*
  - *Shadi Mamaghani, [smamagha@nsf.gov](mailto:smamagha@nsf.gov)*





## DMR-NIBIB DCL Webinar Logistics

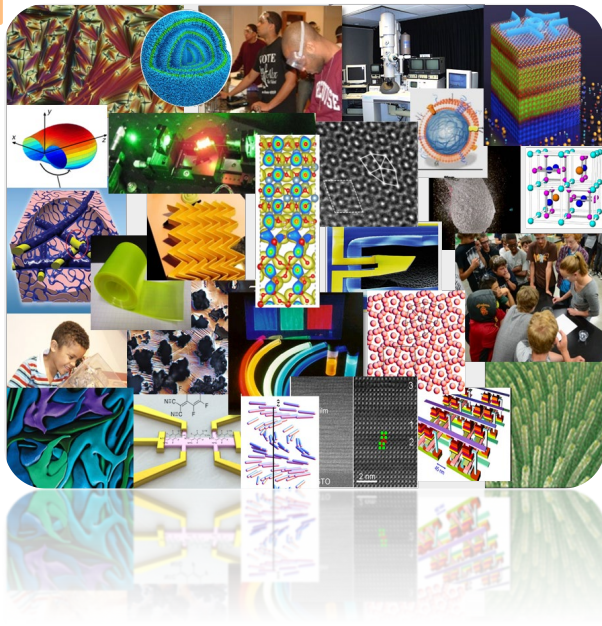
- ❖ *Webinar will be **recorded** and posted.*
- ❖ *Attendee mic/camera are muted.*
- ❖ *Use the **Q&A button** at the bottom of your Zoom to post your questions.*
- ❖ *You can adjust your view of the speakers and slides using the Zoom view button in the upper right.*
- ❖ *The compiled registration information will be shared with all the attendees.*



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# DMR-NIBIB DCL: Exploring Fundamental Drivers of Next Generation Biomaterials

*Germano Iannacchione, Ph.D.*

*Division Director, Division of Materials Research (DMR),  
Directorate of Mathematical & Physical Sciences (MPS), NSF*

*David Rampulla, Ph.D.*

*Division Director, Division of Discovery Science and Technology  
(Bioengineering)  
National Institute of Biomedical Imaging and Bioengineering  
(NIBIB), NIH*



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## Context Setting: Goals

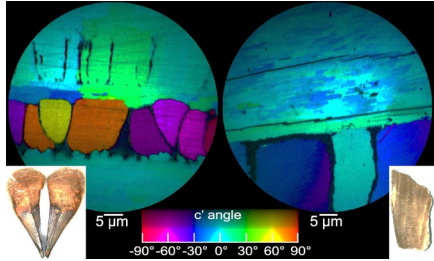
The goal of the webinar is to convey to the community:

- ❑ The major gap between exciting advances of biomaterials and the tailoring of such advances towards biomedical problems
- ❑ Responsive, dynamic or active materials may play an impactful role in biomedical science
- ❑ The opportunity through this DCL to propose topic ideas for a workshop to address the above aspects

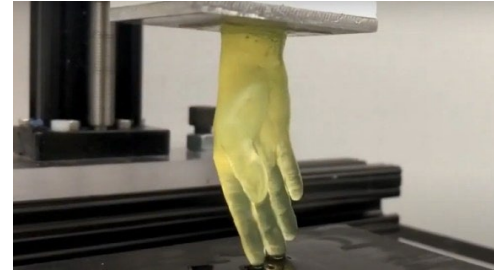




# What is the intent of this DCL?

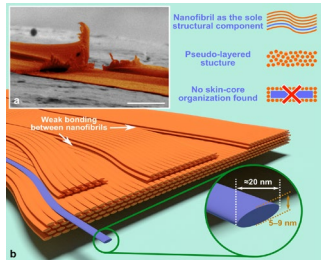


Fossil Proteins, P. Gilbert  
DMR 1603192

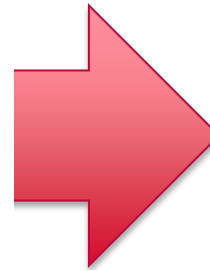


## NSF

### Biomaterials Development

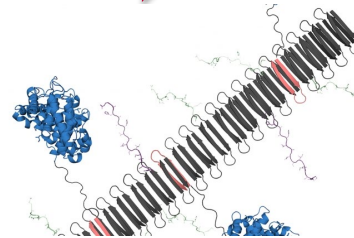


Spider silk  
characterization  
H. Schniepp,  
DMR 1352542



## NIBIB

### Biomaterials Application



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# DMR-NIBIB DCL: Exploring Fundamental Drivers of Next Generation Biomaterials

## BMAT Program Portfolio

*Abraham Joy*  
*Program Director, NSF DMR BMAT*  
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*Nitsa Rosenzweig,*  
*Program Director, NSF DMR BMAT*  
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# NSF BMAT Program Portfolio

The BMAT program focuses on research and related education projects investigating the fundamental questions on materials FROM and FOR biology related to:

- Biological materials
- Biomimetic, bioinspired, and bio-enabled materials
- Synthetic materials intended for applications in contact with biological systems
- Processes through which nature produces biological materials





# The BMAT Program is Naturally Convergent and Dynamically Evolving

Synthetic Biology and Active-Matter are examples of the evolution of research themes supported by BMAT

- New approaches to biomaterials that did not exist
  - Making our world perpetual

The BMAT program is uniquely positioned to bring together fundamental questions from soft matter to active matter to the emergence of Life.

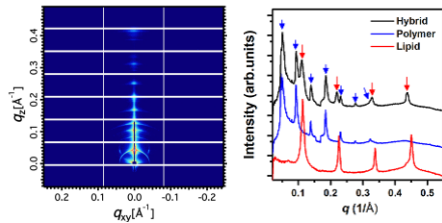
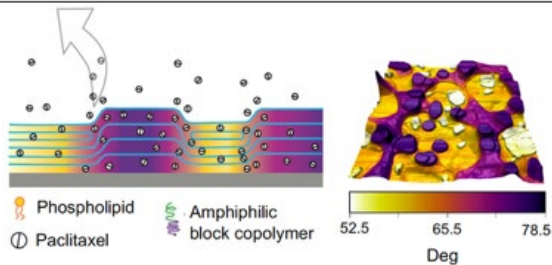


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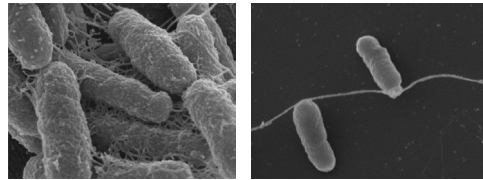


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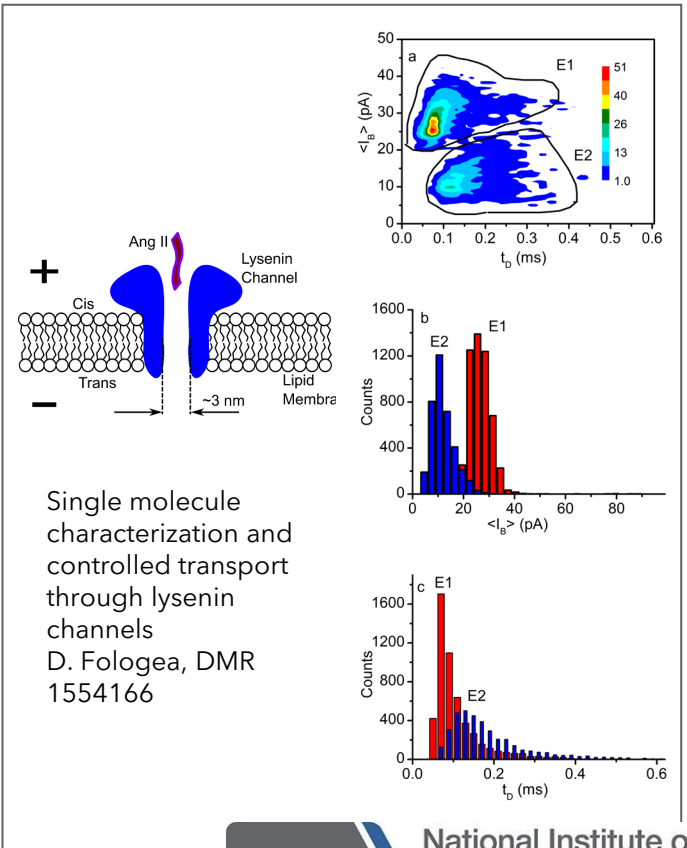
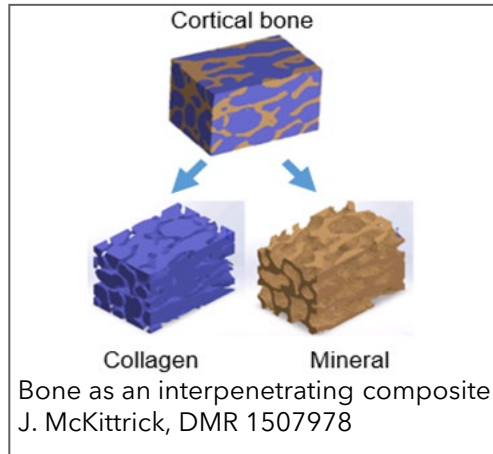
# NSF BMAT Program Portfolio



Nanostructured soft substrates for responsive bioactive coatings  
C. Leal, DMR 1554435



High-resolution microscopic images showing the cellular interaction within high- (left) and low-conductivity (right) bacterial cables  
X. Jiang, DMR 1652095



Single molecule characterization and controlled transport through lysenin channels  
D. Fologea, DMR 1554166



# DMR-NIBIB DCL: Exploring Fundamental Drivers of Next Generation Biomaterials

## NIBIB Program Portfolio

*Luisa Russell*  
*Program Director NIH NIBIB*  
[\*luisa.russell@nih.gov\*](mailto:luisa.russell@nih.gov)



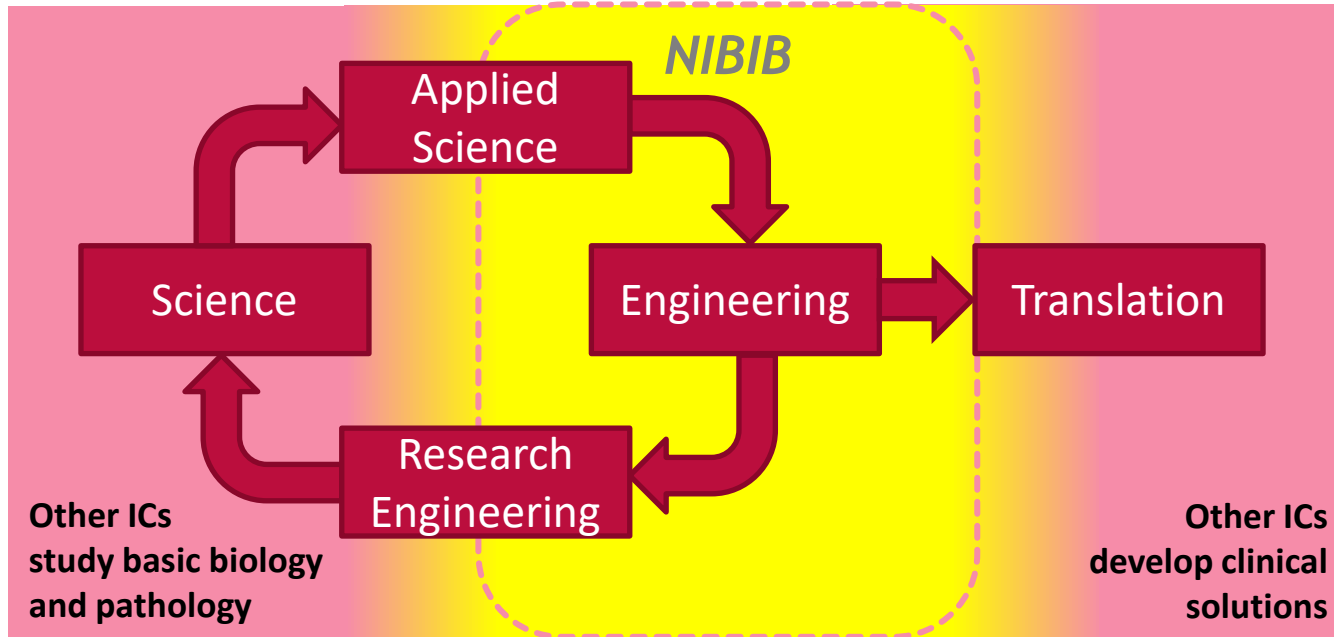
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# NIBIB Bioengineering is a Bridge to other ICs



Mission fit for NIBIB: technology development (iteration from ~1.0 to 2.0), broad applicability (not specific to a single disease or disorder) and human health relevance <https://www.nibib.nih.gov/>



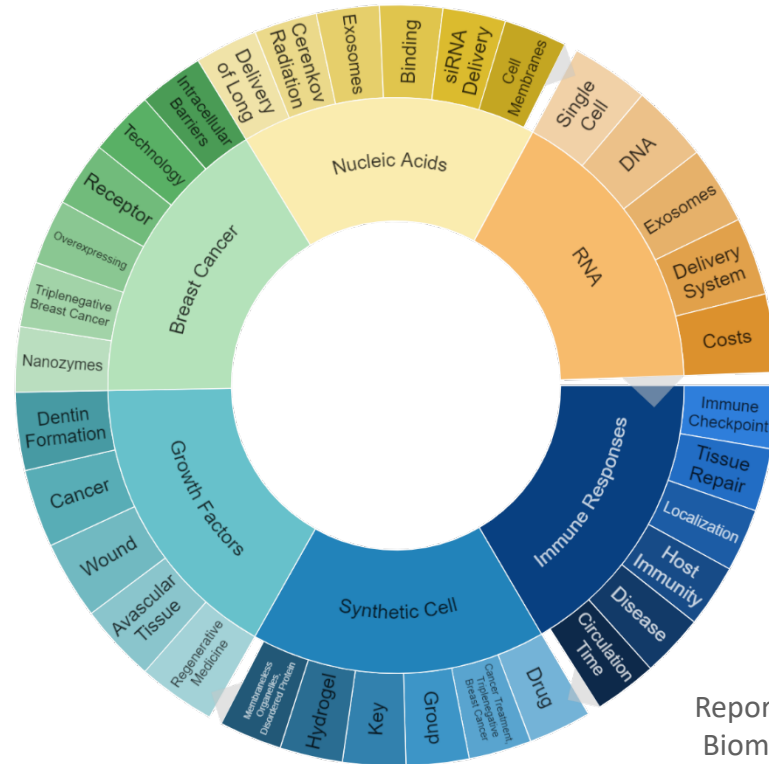
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# Biomaterials Interfaces Program

- ***NIBIB has no specific focus area*** in its biomaterials program
- End goal is to increase human health, regardless of scale of innovation (nano, micro, macro)
- Current projects are on engineering novel biomaterials, models, techniques and devices (biological/non-biological component)



Reporter circle chart of Biomaterials portfolio



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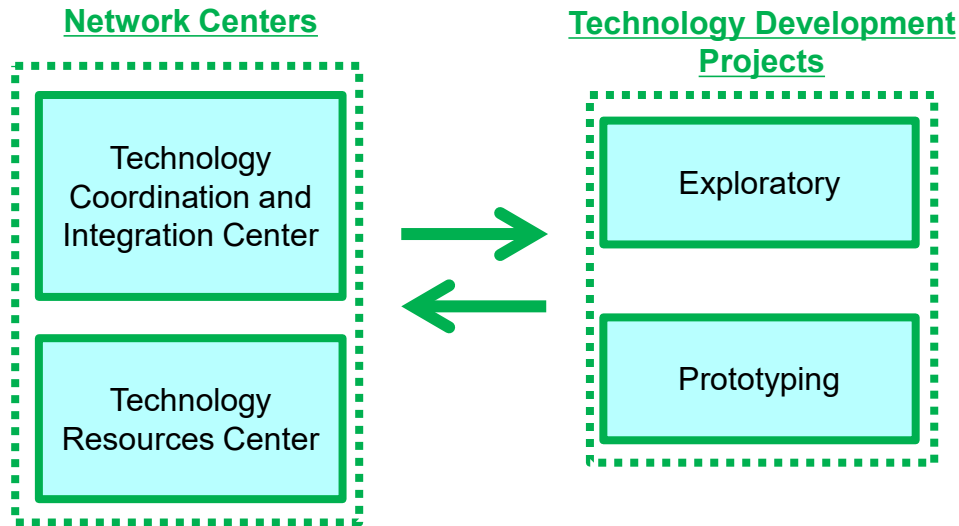


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# Biomaterials Network

*The Biomaterials Network reflects and supports the state of projects within the DDST biomaterials portfolio...*

- *... designed to get more success out of the research we fund.*

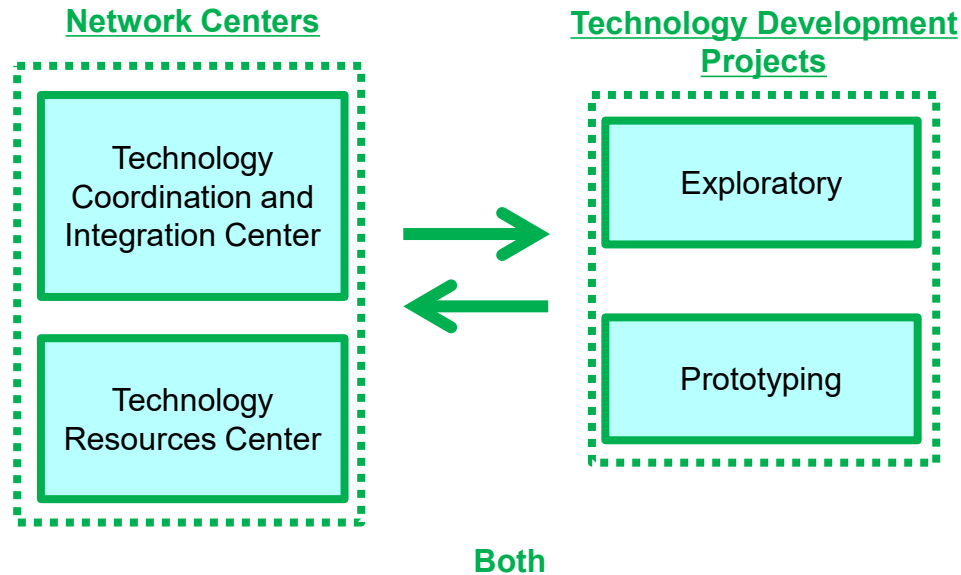


# Biomaterials Network

*The Biomaterials Network reflects and supports the state of projects within the DDST biomaterials portfolio...*

➤ *... designed to get more success out of the research we fund.*

- Provide **consultancy, modeling, education, and design** resources
- Identify and build **partnerships**
- **Assess projects** for needs and utilization of resources
- Administer **opportunity funds** for standards/validation studies/etc.



- Use **technical/clinical/commercialization consultants** as needed
- Use **modeling and simulation resource**
- Undergo **needs assessment** by centers
- **Apply for opportunity funds** to support partnerships

- Organize and attend **Annual PI Meeting** and workshops
- Interact with **NIBIB Program Staff**



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New NOFO: RFA-EB-23-002



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## **Next up:**

Dear Colleague Letter: DMR-NIBIB  
Collaboration: Exploring Fundamental  
Drivers of Next Generation Biomaterials for  
Biomedical Research



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# Workshop on Responsive and Active Biomaterials

- The Workshop should involve enough in-person or virtual participants to demonstrate community need and buy-in, while retaining the breakout and in-depth interactions characteristic of a conference.
- In addition to academic researchers, conference participants may include relevant scientists, engineers, and practitioners from industry, federal agencies, and international organizations.
- NSF welcomes proposals that include efforts to broaden participation or persons from under-represented groups in STEM in defining these research drivers of next generation biomaterials. Conference participants should include individuals with disciplinary expertise as well as an interdisciplinary worldview.
- Key members of each team (e.g., PI, Co-PIs) should plan to attend the in-person or virtual workshop.



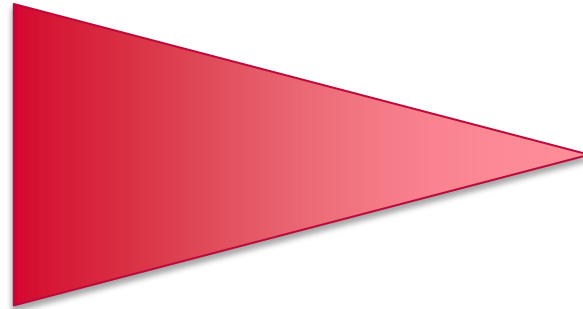


# Responsive and Active Biomaterials: What are they?

- **Responsive, and dynamic materials or materials composites**: Out-of-equilibrium material systems that blend the space between chemistry, physics, mathematics, biology, and device engineering to sense their environments and respond appropriately with independent control over temporal and spatial factors

NSF

Active Materials



NIBIB

Active Materials



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**Next up:**  
DMR-NIBIB DCL – How to Apply



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# DMR-NIBIB DCL

- **Announcement:** DMR-NIBIB invites topic ideas for a workshop.
- **Purpose:** To encourage research in emergent topics such as responsive and active biomaterials and addressing the issues that will enable the use of such biomaterials in biomedical needs.
- **Budget:** \$50,000 (under exceptional circumstances up to \$100k may be provided)
- **Application Due Dates:**
  - Concept Outline: **May 5, 2023**
  - Conference Proposal (by invitation): **June 8, 2023**





# Concept Outline

- The concept outline must describe the planned science drivers, a working title, and a statement describing how the elements described in the DCL are addressed (3-page max.)  
<https://www.nsf.gov/pubs/2023/nsf23068/nsf23068.jsp>
- The Concept outline should include a list of the co-PIs and organizers of key portions of the conference, as well as for the dissemination of a written report.
- The Concept outline will be shared between the NSF and NIBIB program directors involved in this collaboration, who will determine suitability for the proposed workshop.
- If selected, PIs will be directed to submit the conference proposal. The email inviting the the submission must be included in the conference proposal as a 'Single-copy document'.
- The title of the proposal should begin with 'DMR-NIBIB Planning Workshop' and should be submitted to the BMAT program (program element code: 7623)).
- Target date for proposal submission is **June 8, 2023, 5 pm EST.**



# Q & A Session

READY?