



# **NSF Growing Convergence Research**

**Informational Webinar**

**November 2024**

# GROWING CONVERGENCE RESEARCH (GCR) WEBINAR AGENDA

- **Part I: GROWING CONVERGENCE RESEARCH program**, NSF presenters
  - Dragana Brzakovic, [dbrzakov@nsf.gov](mailto:dbrzakov@nsf.gov)
  - Rebecca Morss, [reellis@nsf.gov](mailto:reellis@nsf.gov)
- **Part II: CONVERGENCE CULTURE**, TDI team
  - Chet McLeskey, [chetmcleskey@toolboxdialogue.com](mailto:chetmcleskey@toolboxdialogue.com)
  - Michael O'Rourke, [orourk51@msu.edu](mailto:orourk51@msu.edu)
- **Part III: OPERATIONALIZING CONVERGENCE**, panel of GCR awardees
  - Kay Bidle, [kbidle@marine.rutgers.edu](mailto:kbidle@marine.rutgers.edu)
  - Elizabeth Holley, [eholley@mines.edu](mailto:eholley@mines.edu)
  - Matthew Libera, [mlibera@stevens.edu](mailto:mlibera@stevens.edu)
- **Part IV: Q&A**



# WEBINAR INFORMATION

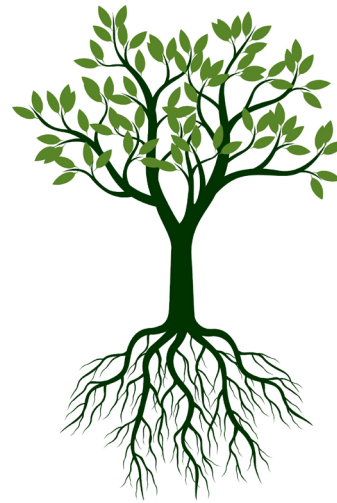
- **Goals for webinar**
  - Highlight key elements of NSF GCR program
  - Provide insight into convergence culture and operationalizing convergence – recognizing that every project is different
  - Address questions from attendees
- **Please ask questions using the Q&A in Zoom**, at any time during the webinar
  - Indicate whether your question is for **NSF**, **TDI**, or the **GCR panel**
  - We will begin answering questions later in the webinar (but may not have time to answer all questions today)
- **Webinar slides and recording** will be posted on the NSF GCR web site in 1–2 weeks.



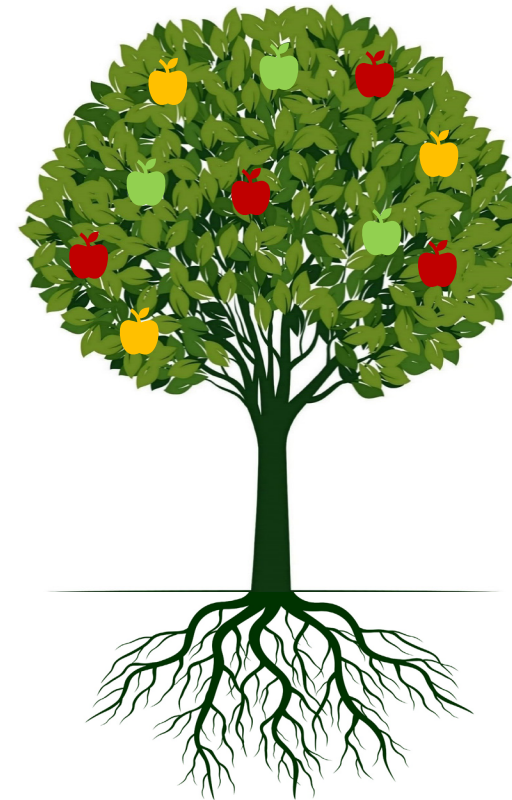
# Cultivation of Convergence Research at NSF



**GROWING  
CONVERGENCE  
RESEARCH  
PROGRAM**



**OTHER NSF  
PROGRAMS AND  
INITIATIVES**



**CONVERGENCE  
ACCELERATORS**

Growing Convergence Research

# Characteristics of Convergence Research Supported by GCR

- *Research driven by a specific and compelling problem.* Convergence research is generally inspired by the need to address a specific challenge or opportunity, whether it arises from deep scientific questions or pressing societal needs.
- *Deep integration across disciplines.* As experts from different disciplines pursue common research challenges, their knowledge, theories, methods, data, research communities and languages become increasingly intermingled or integrated. **New frameworks, paradigms or even disciplines** can form sustained interactions across multiple communities.

# Growing Convergence Research Program Goals

The NSF GCR program aspires to build **new research capacity by growing the earliest foundations of convergent approaches** for addressing a specific and compelling problem resulting in **paradigm shifting approaches** within disciplines, establishment of **new disciplines** and scientific communities, or development of **transformative technologies** that have the potential for broad scientific or societal impact.



# Growing Convergence Research Unique Program Features

- Five-year research plan, organized as two phases (2 + 3 years)
- Initial funding for first two years, up to \$1.2 million
- Mandatory workshop for each GCR team at start of award
- Reverse site visit near the end of Year 2
- Phase II funding requires exceptional progress in Phase I

# Proposal Structure ↔ Solicitation-Specific Review Criteria

- Long-term vision
  - *Is the vision motivating this proposal sufficiently compelling and ambitious to justify investment in growing new convergence research? Is there potential for this project to transform foundational scientific understanding and open new research vistas?*
- Appropriateness for this solicitation
  - *Is the proposed research appropriate for this solicitation? Do the proposed ideas integrate deeply across disciplines and differ markedly from research supported by other NSF programs, solicitations, or funding mechanisms?*
- Research plan
  - *Are the goals outlined for the two phases of the research plan sufficiently novel to develop new paradigms and approaches and move the science toward addressing the problem that engendered the proposal?*
  - *Are the proposed research activities innovative, promising, and appropriate for growing convergence research? Are these activities well-suited to building convergence and addressing scientific and/or technical challenges that are currently limiting progress?*



# Proposal Structure ↔ Solicitation-Specific Review Criteria

- Convergence Management Plan (supplementary documents) = Project Management + Convergence Management
  - *Is the proposed management plan appropriate to foster an effective convergent team and advance the intended convergence and research outcomes?*
  - *Is the assembled team of project participants and partners appropriate and essential for the planned project? Are the partner organizations and participants meaningfully integrated?*

## Reviewers also evaluate each proposal using the 2 NSF Review Criteria

- *Intellectual Merit*
- *Broader Impacts*

# Growing Convergence Research: Points of Emphasis

- Convergence = Research driven by a specific and compelling problem + Deep integration across disciplines
- Appropriateness for GCR solicitation
  - “Convergence research is supported in many ways by the Programs of NSF.”
  - “Make a convincing case that the research to be conducted cannot be supported by other NSF programs and solicitations, innovates at interdisciplinary intersections beyond existing approaches, and has potential to transform foundational scientific understanding.”
  - “Team should be comprised of researchers from different disciplines that do not typically work together in the proposed research areas and are crucial to catalyze the proposed scientific discovery and innovation.”

# Growing Convergence Research: Points of Emphasis

- GCR Research Plan
  - “Proposals ... are expected to explore novel avenues not previously investigated that are at the forefront of advancing science.”
  - “Proposers must clearly identify which elements of different disciplines will be contributing to the convergence project and how the team plans to deeply integrate those elements.”
  - Additional information in solicitation
- GCR Research Plan has 2 phases: Years 1-2 and Years 3-5
  - In year 2, progress is evaluated according to the merit review and solicitation specific criteria

# Growing Convergence Research & Toolbox Dialogue Initiative Center

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Information and Outreach Session  
November 14, 2024

Chet McLeskey, PhD  
Associate Director  
Toolbox Dialogue Initiative Center



# GCR and the centrality of collaboration

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- Collaboration ↔ Integration
- Program-level support for collaborative process
- Capacity building mechanisms
  - TDI workshops and consultation
  - Lecture series
  - Panel discussions
- Learning from/with each other
  - Within teams
  - Team ↔ team
  - Program ↔ teams
  - Program, teams, greater scientific community

# Who is TDI?

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- Research and outreach project based at Michigan State University
- Build collaborative capacity with partners around the world and investigate the practice of collaborative, crossdisciplinary research
- Working with GCR from the beginning
  - Workshops
  - Research



# Collaboration and deep integration

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- Convergence culture
  - Environment that supports and promotes convergence
  - Facilitates deep integration
    - Knowledge (epistemic)
    - Methodological
    - Social
- Needs a different kind of collaboration
  - Intentionality
  - Adaptability
  - Openness
  - Intensity



Knowledge integration



Methodological integration



Social integration

# Convergence culture: collaborative themes

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- Intentionality
  - No time to let things happen 'organically'
  - Requires *deliberate planning* and effort at every stage to allow unique collaboration structures and techniques between academic disciplines
  - Need to *actively* put team members in positions to learn from each other
- Adaptability
  - GCR projects push boundaries—expect false starts, hiccups, growing pains
  - Need to foster flexibility, trust, and commitment
  - Requires strong leadership and engagement from the entire team



# Convergence culture: collaborative themes

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- Openness
  - Willingness to learn and use each other's disciplinary language, methods, conceptual resources
  - Build an environment that supports asking naive questions
  - Support mutual respect, vulnerability, and questioning focused on *understanding*
- Intensity
  - Accept and embrace the level of intensity needed to do this work
  - Resource intensive:
    - Time
    - Effort
    - Commitment

# Operationalizing these themes

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- Expectation setting
  - Success conditions may vary over time
  - Projects will evolve, go through stages, experience false starts
  - Sustained effort over time
- Build a convergence management plan that embraces these themes
  - Chart a path toward convergence that can adapt to needs
  - Keep track of successes and failures
- Start building trust, respect, and shared norms early
  - Regular and frequent engagement
  - Cultivating relationships
  - Retreats and immersive experiences
  - Rotating voice

## Comments from PIs

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*“Working toward this idea of convergence, and so I think this would happen naturally in any context, but I think [what] that meant was **real attention to create a culture that would allow people to ask questions** and no question was a silly one [...] I think maybe it was through the **Co-PI demonstrating this in the beginning and building kind of a team culture** where it was okay to ask those types of questions.”*



## Comments from PIs

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***“It’s about the individuals as well as the fields. They’re not just fields, they are individual people with all that that brings. They are packages of many things, not just not just their field, not just their discipline.”***



# Panel time!

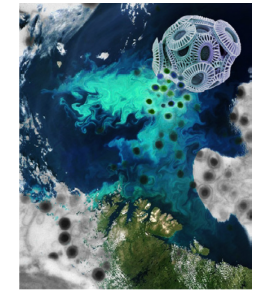
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- 3 Panelists from different Phase II funded teams across 3 cohorts
- Moderated discussion of key topics
- Questions from the audience at the end
- Enter questions in the Q&A function as they occur to you

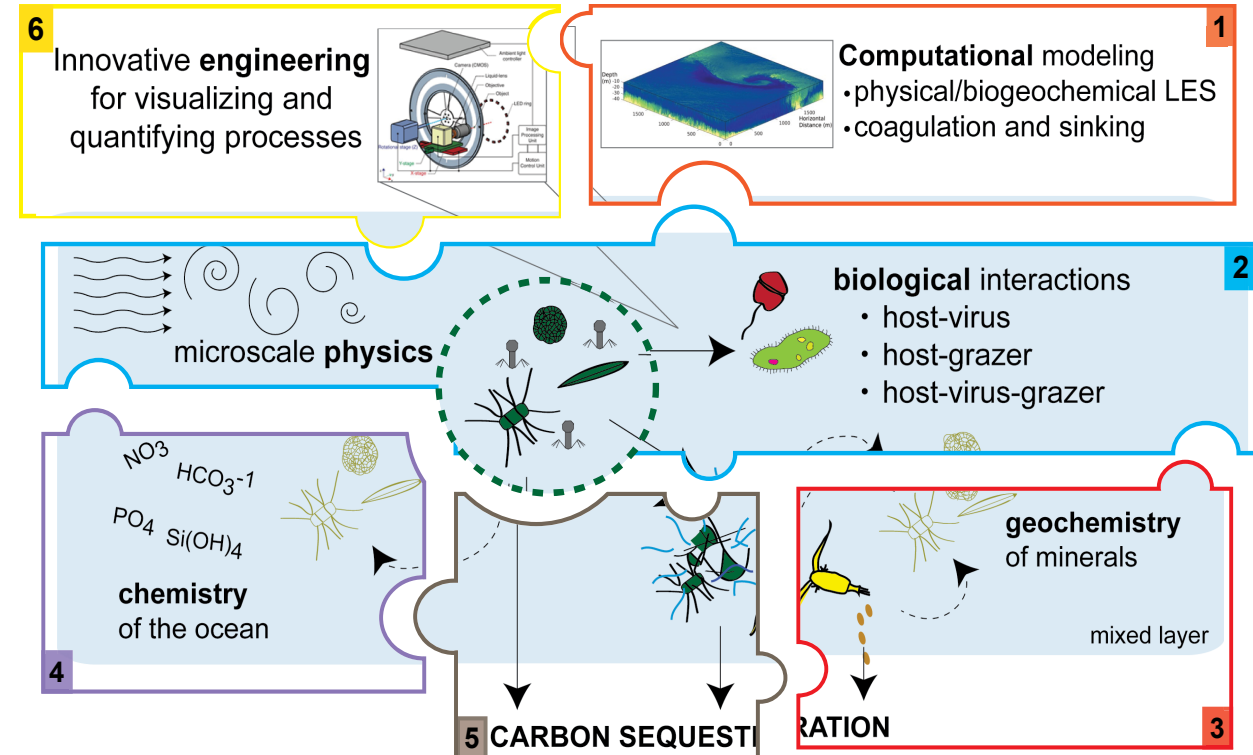
Kay Bidle, Rutgers University

*'The convergent impact of marine viruses, minerals, and microscale physics on phytoplankton carbon sequestration'*

funded in 2020



- Aim: Elucidate, quantify and develop predictive understanding and rules on how viruses drive Earth's carbon cycle
- Approach: Integrative, convergent 'puzzle pieces': innovative conceptual understanding, analyses, and tool development
- Application: Get to know...idea incubation...foster a common foundation of understanding...collective hypothesis generation...experiential co-incubation...creating trust and a comfortable space...develop convergence modules



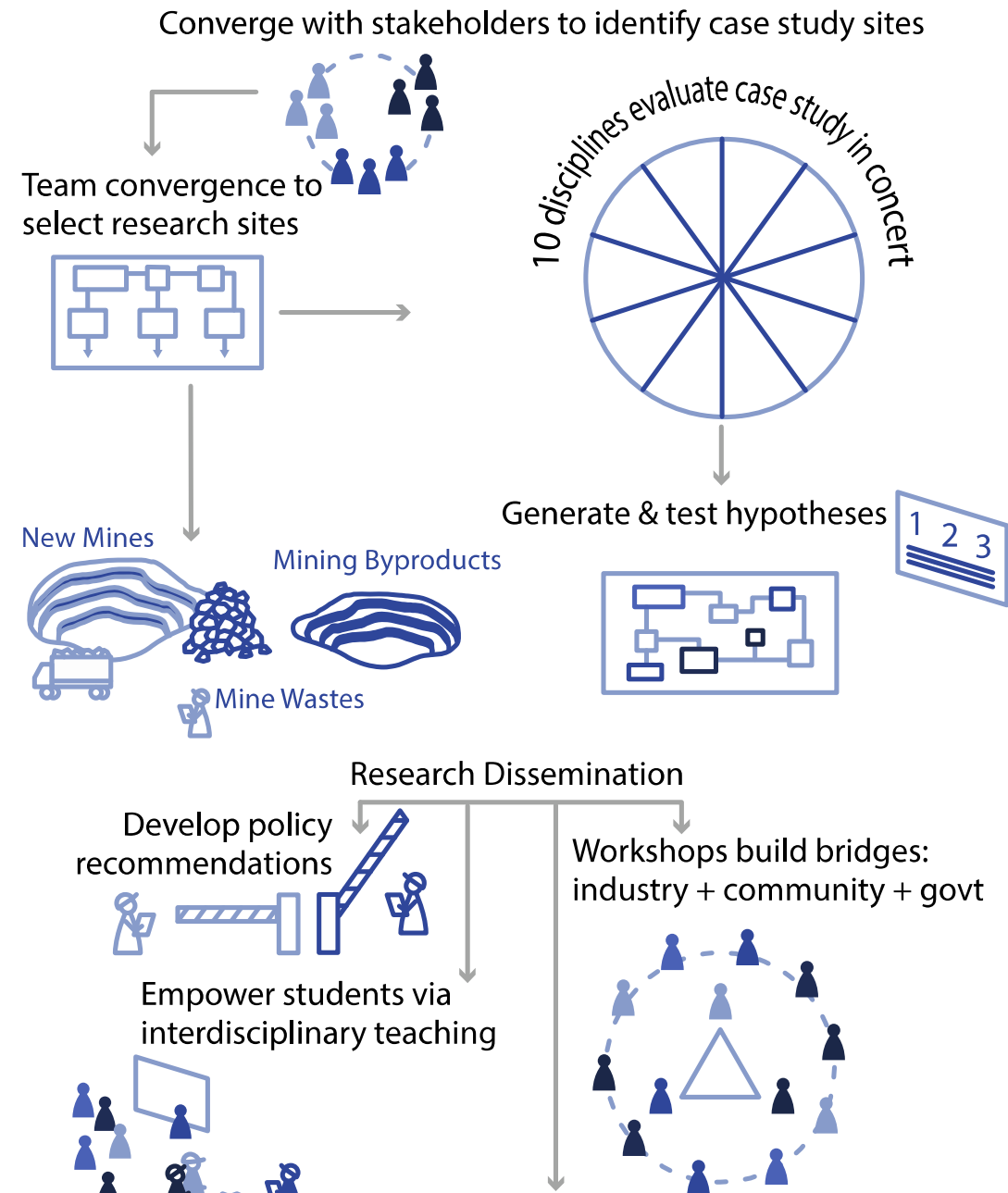
Stanford BIOENGINEERING



# Responsible Critical Elements: Transforming Earth Resource Development for the Carbon Neutral Future, GCR 2021 Cohort

- How can the US produce critical minerals responsibly?
- Convergence around new paradigms for responsible resource development... among scholars, industry practitioners, community leaders, and policymakers
- Transformative approaches enabling resource efficiency, sustainable development, and environmental justice

<https://mining.mines.edu/gcr/>

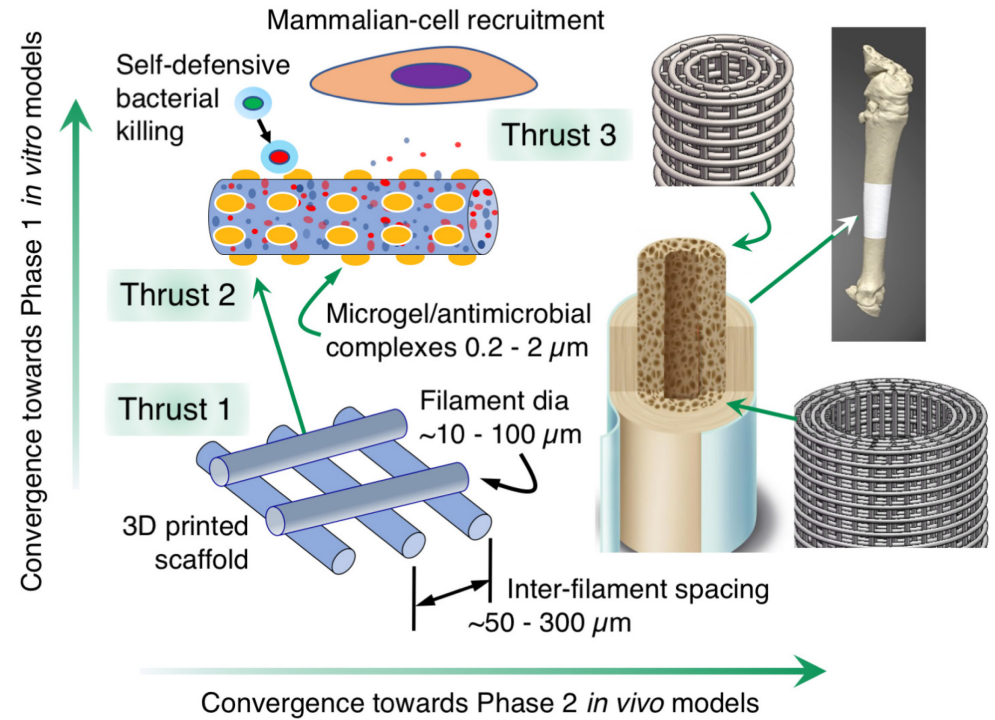
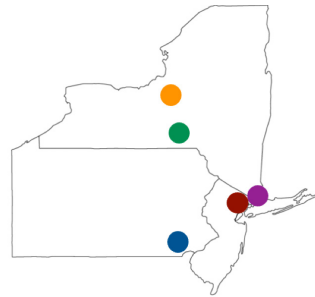


# Matt Libera

## Infection-Resisting Resorbable Scaffolds for Engineering Human Tissue

### GCR 2022 Cohort

- **The problem:** Develop biomaterials that promote healing while reducing infection
- **Cultivating disciplinary convergence:**
  - Stevens : Biomaterials
  - Binghamton: Microbiology and biofilms
  - Syracuse: Computational chemistry
  - CCNY: Translational medicine
  - UPenn Vet: in vivo infection models
- **A convergence success:** Cultivating a new community with workforce development – an inter-institutional course on device-associated infection.





# Thank you for joining!

- Webinar slides and recording will be posted on the NSF GCR web site in 1-2 weeks
- A previous GCR informational webinar was held in March 2024
  - Slides and recording are available on the NSF GCR web site
- A GCR Town Hall (with opportunity to submit questions) is planned for January 2025
- GCR program contact information: [gcr@nsf.gov](mailto:gcr@nsf.gov)