

SCMCS Webinar

Synthesis Center for Molecular and
Cellular Sciences

[NSF 22-608](#)

NATIONAL SCIENCE FOUNDATION



INTRODUCTIONS & WELCOME

Welcome:

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INTRODUCTIONS & WELCOME

SCMCS Program Contacts:

- **Charlie Cunningham**, Molecular and Cellular Biosciences
- **Manju Hingorani**, Molecular and Cellular Biosciences
- **Ishita Mukerji**, Molecular and Cellular Biosciences
- **Arcady Mushegian**, Molecular and Cellular Biosciences
- **Sridhar Raghavachari**, Biological Infrastructure



QUESTIONS

- **Submit your **SCMCS-related** questions using the Q&A module.**
- Program contacts are here to address your questions.
- If your question is not answered, email programmatic questions to SCMCS@nsf.gov.
- Webinar materials (slides, script, and audio recording) will be posted on the program/webinar web page.



SYNOPSIS OF PROGRAM

The purpose of SCMCS is to support a national resource of excellence that will advance our ability to explain and predict complex molecular and cellular phenomena through **innovative synthesis and integration of available biological data** and scientific knowledge from multiple disciplines.

The Center is not expected to generate new primary data nor replicate existing data repositories or cyberinfrastructure resources.

Funding: \$20M for one Center over 5 years
(through a Cooperative Agreement)
Possibility of a single 5-year renewal



WHAT IS A SYNTHESIS CENTER?

Synthesis centers are a form of scientific organization that catalyzes and supports research that integrates diverse theories, methods and data across spatial or temporal scales to increase the generality, parsimony, applicability, or empirical soundness of scientific explanations. ([Hackett et al. 2021](#))



WHAT IS A SYNTHESIS CENTER?

An interdisciplinary endeavor to:

- **Organize and synthesize** existing data and information to open original avenues of inquiry and strive for groundbreaking discoveries in molecular and cellular biology.
- **Provide the necessary support**, including infrastructure, culture and leadership, to promote data-intensive information synthesis on a community-wide scale.
- **Create an open, collaborative environment** for cross-fertilization and generation of novel ideas and approaches (scientific and organizational) to address complex challenges.
- **Train a diverse cohort of scholars** for a lasting impact.



WHAT IS A SYNTHESIS CENTER?

Prior NSF-supported synthesis centers:

- National Center for Ecological Analysis and Synthesis ([NCEAS](#))
- National Evolutionary Synthesis Center ([NESCent](#))
- National Institute for Mathematical and Biological Synthesis ([NIMBioS](#))
- National Socio-Environmental Synthesis Center ([SESYNC](#))
- Environmental Data Science Innovation and Inclusion Lab ([ESIIL](#))





NATIONAL CENTER FOR ECOLOGICAL ANALYSIS AND SYNTHESIS



Our Science

Through synthesis and data science, we accelerate discoveries that can inform solutions to today's environmental challenges.

Outcomes (1995-2017):

5,000 visitors
200+ Working groups
150+ Postdocs, sabbaticals

Participant surveys (2008):

- 74% more collaborative
- 77% more willing to share data

- Established in 1995 (University of California, Santa Barbara).
- **Goal:** To seek fundamental, bigger picture insights into the natural world by combining disparate ecological data, from individual organisms to global ecosystems (**synthesis**), through unprecedented large-scale collaborative efforts (**team science**).
- First NSF synthesis center to harness existing ecological data by providing informatics support, promoting collaborative science and building capacity.





ENVIRONMENTAL DATA SCIENCE INNOVATION AND INCLUSION LAB

Established in 2022 (University of Colorado, Boulder)



ESIL will empower a diverse community to tackle big-data questions in continental-scale ecology, the resilience of Earth systems, applications of AI to Earth ecosystems and environmental justice and equity.

In partnership with [CyVerse](#) at [University of Arizona](#)

- Team science
- Analytics and cyberinfrastructure
- Data science education and training
- Inclusive participation



WHY A SYNTHESIS CENTER FOR MOLECULAR AND CELLULAR SCIENCES?

The vast amount of distributed molecular and cellular data calls for collaborative synthesis and integration in order to:

- stimulate novel questions
- answer long-standing puzzles
- develop innovative research and analytical strategies
- test novel organizational models with open science principles
- tap diverse new talent
- train a future workforce

and amplify the impact of data in advancing science for the benefit of society.



SCMCS: MISSION

- The Center will serve as a nexus of connections to enhance the utility of data across scales, modalities and disciplines.
- The Center is expected to support development of theoretical foundations and technological platforms for data synthesis.
- The Center should promote innovative approaches to interdisciplinary education and workforce training, to build capacity in data-intensive science.
- Diversity, equity, inclusion, and accessibility will be core values of the Center, with specific activities expected as part of the proposal.



SCMCS: SPECIFIC OBJECTIVES

- Address compelling scientific questions in molecular and cellular biosciences that would benefit from synthesis.
- Enable synthesis research – integrate theories, methods and existing data for mechanistic and predictive understanding.
- Develop or provide resources for data management and integration.
- Advance open science, data access, sharing, and reuse.
- Foster cross-disciplinary collaboration and team science



SCMCS: SPECIFIC OBJECTIVES contd.

- Promote community standards and best practices in data generation and synthesis.
- Train next generation of scientists in data-intensive, cross-disciplinary and collaborative science.
- Broaden participation across demographic, geographic, and disciplinary lines and types of institutions.



SCMCS: PROGRAM TIMELINE

Milestone	Program-wide timeline
Webinar	Today
Preliminary proposals due	January 13, 2023
Results of preliminary proposal review	March 2023
Full proposals (by invitation only)	July 07, 2023
Anticipated date of site visits	November 2023
Anticipated start date of awards	February 15, 2024



ELIGIBILITY

- Institutions that may apply:
 - Institutions of Higher Education (IHEs)
 - Non-profit, non-academic organizations
 - Other organization types, such as Federal agencies and federally funded research and development centers (FFRDC) can only participate as subawardees; FFRDC and federal agency scientists cannot serve as lead PI
- Limit on number of proposals per organization: **No limit**
- Limit on number of proposals per PI or co-PI: **1**
- Proposals involving multiple organizations: **Single proposal submission with subawards**
(note: collaborative proposals are not allowed)



PRELIMINARY PROPOSAL: Due 01/13/2023

➤ Required

10-page Project Description should include:

- Intellectual vision, scientific focus, and objectives
- Rationale for a center-scale effort
- Plans for infrastructure, resources, and scientific practices
- Plans for education, training and broadening participation
- Organizational network and key personnel
- Outline of assessment of activities and outcomes

➤ Other required documents: Biosketches (PI, co-PI, senior personnel); Collaborators and Other Affiliations (PI, co-PI, senior personnel); Senior Personnel list.

➤ **Prohibited:** Budget; Facilities; Postdoctoral Mentoring plan; Data Management plan; Current & Pending Support.



PRELIMINARY PROPOSAL: Due 01/13/2023

- Preliminary Proposal – Process:
 - Reviewed internally by NSF
 - Advisory (i.e., non-binding) “Encourage”/“Discourage” decision
 - ~ 4 - 6 week turnaround

- Preliminary Proposal – Benefits to the Applicant:
 - Affords more time for high quality proposal development
 - Early feedback about responsiveness to the solicitation
 - Allows teams to adjust proposals and plans based on feedback
 - Reduces effort of preparing proposals unlikely to succeed in a competition with one award

More about NSF policy on preliminary proposals in the [PAPPG](#).



FULL PROPOSAL: Due 07/07/2023

- Must follow parent preliminary proposal (submitted by same lead organization)
- 25-page Project Description must include:
 - Scientific vision, rationale, and specific objectives
 - Center design
 - Organization, management, and governance
 - Broader Impacts
 - Cyberinfrastructure plans
 - Intellectual contribution and credit assignment plans
 - Institutional capabilities
 - Strategic plan and assessment strategy
 - External advisory committee – roles and responsibilities
 - Results of Prior Support for all PIs and co-PIs (listed on cover page)



FULL PROPOSAL: SCIENCE, BROADER IMPACTS

Scientific vision, Rationale and Objectives:

- Lay out the vision and rationale for the Center, including compelling questions and themes ripe for synthesis.
- Describe theoretical frameworks, data-intensive approaches and infrastructure needed to realize the Center's vision and objectives.

Broader Impacts:

- Describe the education and training plans of the Center and how they will be integrated with the Center's research focus.
- Identify strategies to include diverse researchers and trainees in the Center's activities.



FULL PROPOSAL: CENTER DESIGN

Center Design section will describe:

- Key activities aimed at engaging a broad scientific community
- Team science approaches enabled by the Center
- Criteria for recruitment and participation mechanisms for personnel and collaborating institutions
- Plans to engage and integrate researchers and other personnel from diverse backgrounds and institutions in Center activities

NSF encourages creative approaches to Center design. PIs are not constrained to existing models of synthesis centers.



FULL PROPOSAL: MANAGEMENT

Management and Governance section will describe:

- Key leadership positions, their roles and responsibilities; plans to ensure diversity
- Reporting lines, means of communication among members
- Mechanisms for identifying and selecting projects and participants; allocation of funds and resources
- Processes used to prioritize Center activities
- Plans for implementation, operation and divestment tied to deliverables/activities during the award period



FULL PROPOSAL: CYBERINFRASTRUCTURE

Cyberinfrastructure section will detail plans for:

- Addressing software, data and computing needs
- Integrating existing CI and repositories
- FAIR (Findable, Accessible, Interoperable, and Reusable) practices for data and metadata
- Collaborative scientific workflows and data pipelines
- Strategy for data attribution, curation, sharing and authentication
- Maintenance of CI resources beyond the award lifetime

The Center is not expected to replicate nor develop **extensive** new cyberinfrastructure resources. Use of existing resources is encouraged.



FULL PROPOSAL: CONTRIBUTIONS AND CREDIT

Intellectual Contribution and Credit assignment section will detail plans for:

- Management of rights and credits of participants for data, tools methods, code, manuscript authorship and intellectual contribution
 - Fair and equitable assignment of credit – considerations for early career researchers and staff such as data managers, programmers, team facilitators.

Plans must address expectations across different disciplines.



FULL PROPOSAL: Due 07/07/2023

- Follow all [PAPPG](#) guidance for items not specified in the solicitation
- Other required and optional supplementary docs and single-copy docs:
 - List of senior personnel
 - [Suggested reviewers \(COI could be problematic\)](#)
 - Updates from preliminary proposal (1 page):
 - Changes to PI/co-PI
 - Changes to sub-awardees/contracts
 - Significant changes in research scope (250 words)



REVIEW CRITERIA

In addition to Intellectual Merit and Broader Impacts, SCMCS proposals will be assessed on:

- Compelling plans for synthesis activities with potential to open new lines of inquiry and create new knowledge to advance science
- Effectiveness of the Center design
- Engagement of a diverse and inclusive scientific community
- Open science workflows and practices that democratize accessibility and utility of data
- Effectiveness of the cyberinfrastructure plan to meet the Center's vision and activities
- PI and leadership team capabilities; host institution resources and commitment
- Quality of assessment activities in informing Center operations



REVIEW CRITERIA contd.

In addition to the Intellectual Merit and Broader Impacts, SCMCS proposals will be assessed on:

- Quality and effectiveness of training activities that are cross-disciplinary, data-intensive and promote collaborative efforts toward synthesis
- Commitment to increasing diversity, equity, inclusion, and accessibility
- Effectiveness of plans for dissemination of outcomes



Q&A SESSION

Questions from the webinar attendees



COMMON INQUIRIES

- Is there a preference for particular scientific areas or themes?

No.

Applicants are encouraged to develop a compelling case for any area(s) of molecular and cellular biosciences where synthesis research would have a transformational impact on state-of-the-art knowledge and capabilities.



COMMON INQUIRIES

➤ What does it mean for the Center Director to be “full time”?

The Director must devote substantive time and effort toward the scientific and educational mission of the Center, but they can continue their normal academic activities to a reasonable extent, such as managing their laboratory, some teaching, etc.

The Director should not have other major responsibilities that would impede their work on the Center.

A leadership team should be considered to share decision-making, administrative, and budget-related responsibilities.



COMMON INQUIRIES

- Can foreign institutions and/or foreign collaborators be involved in a center proposal?

International collaborators may be included.

Proposals including a foreign institution will need to describe why the institution's capabilities are needed, and/or why the specific expertise of a foreign collaborator is required to accomplish the goals of the proposed center.

If international activities or collaboration are envisioned, the plans should be described in line with PAPPG guidance (PAPPG: [I.E.6](#) and [II.D.8](#))



Thank you for attending the SCMCS Webinar

We look forward to receiving
proposals from you!

[NSF 22-608](#)

Webinar materials will be posted on the program
and webinar web page.

