TITLE: R3PEATS: **R**igor, **R**eplicability, & **R**eproducibility to **P**romote **E**xcellence, **A**ccuracy, & **T**ranslation in **S**cience

INTRODUCTION:

This revised concept was presented at the January and May 2026 Council of Councils meetings. Council members were enthusiastic about a program to promote scientific rigor, replicability, reproducibility, and culture change. In May, Council members were supportive of the added focus on rigorous research practices, shift toward more institutional incentives and culture change, and increased number of researchers participating in the program. However, Council members expressed concern that Center-based organization and coordination could centralize activities, potentially limiting participation and creating a single locus of review and outcome evaluation. This structure implied that a small number of individuals would choose which studies to replicate and whether they were successful.

The revised concept described below decentralizes the proposed Initiatives and adds new components to address Council feedback. Specifically, we address issues related to:

1. *Centralizing decision-making within Centers*: The three previously proposed "Centers" have been reorganized into distributed investigator-initiated projects, and the Coordination and Review (CoRe) Initiative and R3PEATS Steering Committee have been removed.
2. *Replication studies re-adjudicating established science or disincentivizing innovative research*: Replication Centers have been replaced with Initiatives to support novel investigator-initiated studies that incorporate replication into the initial design rather than performing replications of prior studies.
3. *Limited participation of institutions and researchers in R3PEATS*: Large Centers have been replaced with more awards supporting both community-wide and individualized projects to promote lasting culture change. This expands participation and engagement across institutions, researchers, and stakeholder groups to increase cross-fertilization within and beyond R3PEATS.
4. *Insufficient methods to shift incentives and culture*: R3PEATS has been reenvisioned under a metascience (science of science) umbrella to gather evidence, foster collaborations, evaluate interventions, provide resources, and enhance communications and outreach, thereby increasing its impact.
5. *Need for more novel approaches*: New components related to community- and capacity-building have been added to incorporate specific Council member recommendations.

BACKGROUND:

R3PEATS addresses the critical need for increased rigor, replicability, and reproducibility (R3) in biomedical research, which is key to generating reliable knowledge, improving health outcomes, and extending healthy lifespan. Although definitions of R3 vary across fields, the shared goal is to enhance the validity and robustness of biomedical research and its integration into our collective scientific knowledge.

What do we mean by rigorous research practices?

Practices include (but are not limited to) ensuring or including the following for a study:

- A strong theoretical foundation
- Pre-study protocol validation and standardization
- Preregistration of methods/analyses and plans for data exclusions/outliers
- Sample size estimation
- Blinding/masking
- Randomization
- Detailed workflows/protocols and standard operating procedures (SOPs)
- Responsible data management and sharing
- Transparent reporting of methods, experimental deviations, limitations, and null results

Efforts to improve R3 have a long and robust history but often have been limited by cultural pressures and incentive structures. Irreproducibility has been frequently linked to inconsistent use of rigorous research practices (see Box); however, other factors such as biological variability, confounders, experimental design, and chance also contribute and may point toward important undiscovered biological insights. These challenges are compounded by scientific norms that reward novelty, publication volume, and bibliometrics. Despite NIH's commitment to rigor and reproducibility through policies that highlight the

importance of research rigor, responsible data management and sharing, and researcher education, additional cross-sector cooperation is needed to optimize research robustness and reliability.

Lasting change in how researchers integrate rigorous research practices requires active participation across the scientific ecosystem and better alignment of incentives, resources, and goals. R3PEATS aims to foster such culture change by studying the biological and structural factors that affect replicability and reproducibility; simplifying and amplifying information sharing; supporting early champions of rigor and improving scientific practice; engaging, training, and incentivizing broader adoption of these practices; and building sustainable networks across scientific sectors to guide future research. R3PEATS builds on prior lessons learned to systematically examine factors that shape R3 and, ultimately, the reliability of scientific research by fostering **community-driven partnerships, innovative research, and professional development** to benefit biomedicine, the wider scientific community, and the general public.

PROGRAM GOALS:

To foster culture change across the scientific ecosystem, research, workforce, and broader community by:

1. Developing and testing cross-sector interventions to incentivize R3
2. Supporting research that integrates R3 in order to advance biomedical discovery and identify novel contributors to biological and methodological variability
3. Cultivating a network of scholars who implement and disseminate R3 practices locally and nationally

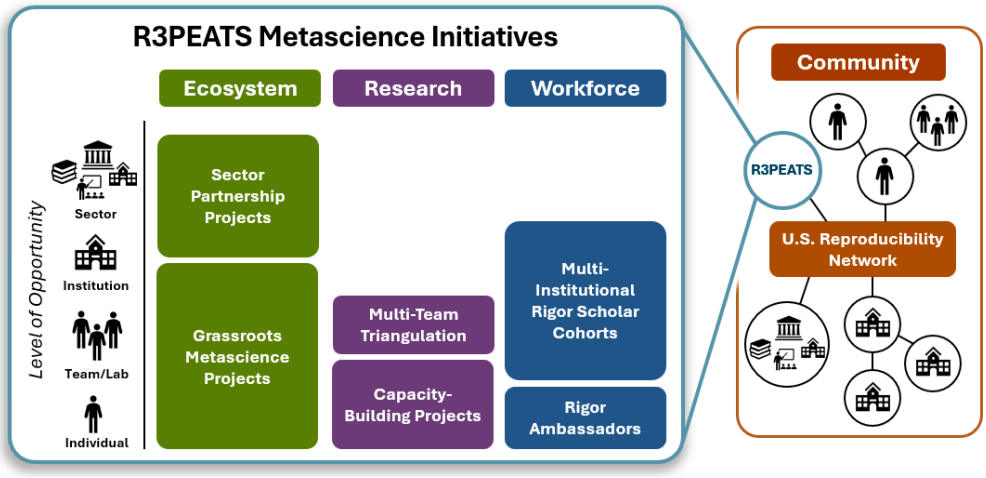


Figure 1: R3PEATS Program Structure. Metascience (science of science) is an overarching theme of the first three Initiatives, as R3PEATS aims to enhance rigor, replicability, and reproducibility (R3) by targeting culture change in the scientific ecosystem, research practice, and biomedical workforce. These Initiatives provide two levels of opportunities each for researcher participation: one with broader, community-building projects and one with more localized projects. The fourth Initiative will broaden these efforts to further engage the scientific community, stimulate cross-pollination, and boost collaboration via the establishment of a U.S. Reproducibility Network. This effort will provide a sustainable, community-driven foundation for a nationwide coalition testing interventions and sharing lessons learned beyond R3PEATS.

PROPOSED INITIATIVES:

R3PEATS comprises four Initiatives designed to gather evidence on practical ways to incentivize and support rigorous and replicable research, assess effectiveness, and optimize implementation strategies (Fig. 1). This metascientific approach will generate tangible and informative outcomes that will be openly shared.

1. Ecosystem: Projects will assess and improve the *support systems and culture* around scientists and laboratories to better incentivize R3 practices.

- **Sector Partnership Projects:**

  Objective: Foster partnerships across the scientific enterprise (e.g., publishers, science societies, industry, research institutions, private funders, researcher coalitions) to develop, implement, and evaluate community-wide systems, infrastructure, processes, and incentives that foster broad integration of R3.

  Examples: Develop and test new research dissemination methods, conference session formats, assessment criteria, journal or funder reporting requirements, or recognition prizes at the level of an organization, coalition, or field.

  Expectation: Generate evidence on effective community-wide culture change strategies while catalyzing

broad action. Projects will involve partnerships within and/or between scientific sectors. One partnership will lead R3PEATS-wide communication, dissemination, and collaboration through annual meetings, working groups, and an information hub (i.e., website) for projects, progress, events, and outputs (e.g., preregistrations/protocols, publications, best practices, landscape analyses, broader impacts).

Awards: Multi-year projects with distributed start dates over the first three years of R3PEATS.

- **Grassroots Metascience Projects:**

  Objective: Support investigators and small teams pursuing novel, focused metascience projects that promote R3 broadly (i.e., beyond their laboratory).

  Examples: Develop and evaluate new software for research planning, algorithms to identify predictors of robust findings, metrics to reward mentorship in rigorous research practices, landscape or meta-analyses of research practice interventions, consensus best practices guidelines, local infrastructure to promote R3 (e.g., new personnel, core facilities, quality management systems, research practice tracking), incentives (e.g., recognition, promotion and tenure criteria, graduation requirements), or workshops with innovative formats to promote collaboration and R3.

  Expectation: Produce and evaluate new tools for measuring and promoting rigorous research behaviors, generate evidence about local culture change interventions, develop models for recognizing commitment to rigorous science, and share lessons learned with the broader scientific community.

  Awards: Three-year projects with distributed start dates over the first three years of R3PEATS.

- *Anticipated Outcomes: Evidence of effective culture change approaches; community engagement and dissemination (scientific and public); new tools for measuring and improving R3-related behaviors*.

2. Research: Projects will directly support *biomedical and behavioral research* that answers investigator-initiated, NIH-relevant questions while promoting and testing factors that influence R3. These projects will enhance our understanding of biological and methodological variability and provide new models for funding and conducting research in this area.

- **Multi-Team Triangulation Projects:**

  Objective: Facilitate collaboration, rigorous experimental design, and built-in replication for projects exploring new scientific questions from multiple angles ("triangulation"). Two to five teams per project will jointly address the same scientific question(s) using complementary methods and outcome measures to generate a fuller biological understanding than a single study usually provides. This approach will accelerate future research by building a stronger scientific foundation and elucidating study caveats.

  Examples: Comprehensively answer the question(s), identify unique contexts for observed outcomes, and/or determine generalizability of a phenomenon (e.g., the effect of a drug on disease modification, neural mechanism of a behavior, or applicability of a health measure across species or human populations using behavior, molecular genetics, neurophysiology, and computational biology).

  Expectation: Use rigorous research practices and replication approaches while openly sharing data, results, lessons learned, and insights into biological and methodological variability gleaned during the project. This will provide a team science model to introduce R3 into research workflows and provide the scientific community with often unreported contextual insights to leverage in their future work.

  Awards: Three-year scientific projects with distributed start dates over the first three years of R3PEATS.

- **Laboratory Capacity-Building Projects:**

  Objective: Assist individual laboratories, investigators, or small teams in integrating validated infrastructure, methods, and workflows to enable sustainably rigorous science, especially where local resources are limited.

  Examples: Engage experts to establish sustainable resources (e.g., staff, software, equipment), new techniques (e.g., cell culture method, behavioral apparatus, computational approach), or innovative processes (e.g., data auditing, error reporting, randomization/blinding schemes) to increase local R3.

  Expectation: Initiate collaborations, establish new processes, evaluate implementation, identify and track

factors that affect research outcomes (e.g., biological variables, algorithm seeds, equipment settings, reagent sources), and publicly share these findings and any replications arising from method validation to inform and improve scientific practice more generally.

Awards: One-year projects with distributed start dates across all five years of R3PEATS.

- *Anticipated Outcomes: New knowledge about methodological and biological variability; publicly shared replication results and lessons learned; methodologically described data that can be mined by the scientific community; optimized scientific techniques and R3-related research workflows*.

3. Workforce: Projects will support and develop *people* by helping researchers build the skills, systems, and leadership needed to promote R3 in the laboratory and the broader scientific community.

- **Multi-Institutional Rigor Scholar Cohort Awards:**

  Objective: Establish consortia of two to five institutions each to collaboratively build and sustain programs that provide training, infrastructure, mentorship, and resources for at least 4 appointed scholars per award. Multi-institutional participation ensures that expertise, infrastructure, exposure to varied scientific and administrative environments, networking opportunities, and financial support are cooperatively provided so that programs comprehensively enable scholars to integrate R3 into their work.

  Examples: Fund early-career researchers (trainees through early faculty) learning to navigate institutional policies, develop SOPs, network with experts, and share lessons learned about R3 research practices with colleagues through mentorship, workshops, scientific collaborations, and R3PEATS meetings.

  Expectation: Provide individualized mentorship, expertise (e.g., statisticians, R3 experts, bioethicists), infrastructure (e.g., core facilities, software), incentives (e.g., graduation requirements, promotion criteria), training (e.g., workshops, courses), and supplemental research support for scholars to integrate new, rigorous best practices into their research projects and teach others about them. Scholars will be prepared to independently conduct rigorous research studies and train the next generation of scientists.

  Awards**:** Three-year institutional awards with distributed start dates over the first three years of R3PEATS.

- **Rigor Ambassador Awards:**

  Objective: Empower active researchers at any career stage to become local Ambassadors for R3 by individually partnering with stakeholders across the scientific enterprise.

  Examples: Year 1: Update journal peer review processes (e.g., implement results-blind peer review), develop industry-standard R3 SOPs for a biotech company, or organize R3 conference sessions for a science society's annual meeting. Year 2: Facilitate workshops to disseminate lessons learned and create institutional R3 interest groups.

  Expectation: Year 1: Individual Ambassadors are embedded within a partner organization (e.g., publisher, biotech company, science society) and co-design a project to be implemented by the Ambassador that integrates or promotes attention to R3 and evaluates the outcomes (functioning similarly to a research sabbatical). Partner and Ambassador matches can be facilitated as necessary, and matched pairs will continue mutual information exchange into the second year. Year 2: Ambassadors return to the home institution to engage direct scientific networks (e.g., graduate program, department, field), share project outcomes and lessons learned, and establish a community of practice in their area of interest (e.g., publishing practices, SOP development, symposia formats). Participation in the U.S. Reproducibility Network (Initiative 4) will be encouraged if applicable. Ambassadors will gain skills and insight into how other sectors operate within the scientific enterprise and become more effective leaders and R3 culture change agents.

  Awards: Two-year fellowships (100% salary support in Year 1, 50% salary support in Year 2) with distributed start dates over the first four years of R3PEATS.

- *Anticipated Outcomes: Effective mentorship and incentive strategies; assessment of scholar professional development strategies; adoption of rigorous best practices into daily work; engaged local communities of practice; programs for cultivating future rigor scholars*.

4. Community: Support for initial infrastructure will create a sustainable, self-organized *peer network* of academic institutions, researchers, and other stakeholders working to improve R3.

- **U.S. Reproducibility Network (USRN):**

  Objective: Establish a self-governed, self-sustaining coalition modeled after the U.K. Reproducibility Network (UKRN), which has spread internationally to many countries (although, notably, not yet the U.S.). The USRN will not be limited to R3PEATS award recipients, goals, or timelines, allowing it to serve as an open, community-driven forum for sharing lessons learned, minimizing individual risk, and implementing new practices. Participants cooperate while maintaining each entity's independent approaches.

  Example: Recruit participants to be Institutional Leads from senior leadership (e.g., University President, Vice President of Research), Local Network Leads representing researchers (e.g., faculty, staff, fellows), and/or representatives for a Stakeholder Engagement Group for other entities (e.g., publishers, funders, science societies). Network participants may establish a Supervisory Board to provide necessary structure and coordination, determine governance, and prioritize activities within the USRN. The USRN could pursue cross-organizational projects (e.g., employing and evaluating new systems, meta-analyzing R3PEATS outputs, combining internal data) or local efforts (e.g., workshops, training, policies, infrastructure).

  Expectation: Meet regularly, include all interested participants, and foster collaboration, knowledge-sharing, and troubleshooting. Similar to previous models (e.g., UKRN), the USRN would be well-served to facilitate grassroots as well as coordinated collaborations, resources, and projects and provide broad mutual support for R3 champions. R3PEATS project participants will be encouraged to join, making the USRN an additional forum for R3PEATS engagement, dissemination, and cross-pollination.

  Award: Five-year support to form the Network and stimulate recruitment and collaborative projects.

- *Anticipated Outcomes: Self-sufficient U.S. Reproducibility Network; collaborative activities initiated across the scientific community; cross-pollination within and beyond R3PEATS.*

COMMUNICATIONS, OUTREACH, AND ENGAGEMENT:

R3PEATS-wide dissemination will be integrated into at least one Sector Partnership that supports metascience research on effective large-scale communication and collaboration strategies, including accessible, understandable, and usable resources for both scientific and public audiences. Grassroots metascience projects will help define, evaluate, and disseminate metrics and approaches for effective engagement. The Research and Workforce Initiatives will broaden impact by exposing trainees, early-career investigators, and established researchers to rigorous scientific methods and effective communication practices, expanding the number of scientists trained in R3 and empowered to mentor others. The U.S. Reproducibility Network, which extends far beyond R3PEATS, will serve as a key outreach platform for engaging researchers, institutions, funders, journals, policymakers, and the public in developing, testing, disseminating, and adopting new approaches that promote robust and trustworthy scientific progress.

DELIVERABLES:

Expected deliverables from R3PEATS include the following:

1. New community-driven, evidence-based **dissemination approaches, assessment criteria, reporting requirements, and incentive structures**.
2. **Experimentally validated methods** to guide researchers in designing more rigorous studies that maximize knowledge about biological and technical systems.
3. New **frameworks and tools that promote scientific collaboration** and enable teams to integrate multidisciplinary expertise to achieve consistently rigorous, replicable, and reproducible scientific outcomes.
4. A **sustainable, community-based forum** for knowledge sharing and collaboration.

BUDGET: $174.15M total costs over 5 years.

TABLE 1 – BUDGET SUMMARY: Costs in Millions

Funding Opportunity	Lead IC	FY28 (Year 1)	FY29 (Year 2)	FY30 (Year 3)	FY31 (Year 4)	FY32 (Year 5)	Total
R3PEATS Network and Community	TBD	6.0	10.175	13.375	10.175	5.025	44.75
R3PEATS Grassroots Rigor Projects	TBD	5.6	9.2	12.8	9.2	5.6	42.4
R3PEATS Multi-Team Triangulation	TBD	5.0	10.0	15.0	10.0	5.0	45.0
R3PEATS Rigor Scholar Cohort Awards	TBD	4.25	8.5	12.75	8.5	4.25	38.25
RMS - NIH staff salary/travel; NIH-organized workshops	TBD	0.75	0.75	0.75	0.75	0.75	3.75
Grand Total		**21.560**	**38.625**	**54.675**	**38.625**	**20.625**	**174.15**

Note: Funding ramps between FY28 and FY30 as initiative operations and awards begin and mature, then declines in FY31 and FY32 as selected activities sunset or step down.

INITIATIVE MAPPING: R3PEATS Initiatives to Award Mechanisms

TABLE 2 – FUNDING OPPORTUNITY STRUCTURE

Funding Opportunity	Component (Initiative Number)	Number of Projects	Award Mechanism	Unifying Theme
R3PEATS Network and Community	Sector Partnerships (1)	5-7	OTA	Community-Building; Cross-Enterprise Participation
	Rigor Ambassadors (3)	60		
	U.S. Reproducibility Network (4)	1		
R3PEATS Grassroots Rigor Projects	Grassroots Metascience (1)	24	RP1	Grassroots/Local Participation
	Laboratory Capacity-Building (2)	40		
R3PEATS Multi-Team Triangulation	Multi-Team Triangulation (2)	15	RM1	Team Science; Implementing Rigor and Replication
R3PEATS Rigor Scholar Cohort Awards	Multi-Institutional Rigor Scholar Cohorts (3)	15 (~75 scholars)	K12	Professional Development

Note: R3PEATS was limited to four award mechanisms for implementation, which is presented above and highlights how the initiatives share common purpose and cross-fertilization. Initiative Number: 1. Ecosystem, 2. Research, 3. Workforce, and 4. Community.