National Institutes of Health
Office of Data Science Strategy

Research Software Excellence Initiative

Council of Councils

Concept Clearance

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Concept Clearance: Research Software Excellence Initiative

Initiative 1: Research Software Engineer (RSE) Award (R50 Clinical Trials Not Allowed)	Initiative 2: Development of Novel Research Software for Health Research (R21 Clinical Trial Not Allowed)
Objective: Fund **RSEs** to bring unique skills to building sustainable, open software and tools.	**Objective**: Fund development of **novel research software tools, methods, and algorithms**.
Mechanism: R50	**Mechanism**: R21
Duration of Award: ≤3 years	**Duration of Award**: 2 years
Funds/Awards: set aside of $3 million; fund ~8-10 awards per year contingent on availability of funds and receipt of meritorious applications.	**Funds/Awards**: Set aside of $3.0 million; fund ~8-10 awards per year contingent on availability of funds and receipt of meritorious applications.
Due Dates/Award Period: Two receipt dates per year - June and October	**Due Dates/Award Period:** Two receipt dates per year - June and October

Open Science & Open-Source Matters

Open Source as Scientific Backbone

Many scientific breakthroughs critical in biology and biomedicine enabled by **Open Source Software -** protein folding and virus tracking.

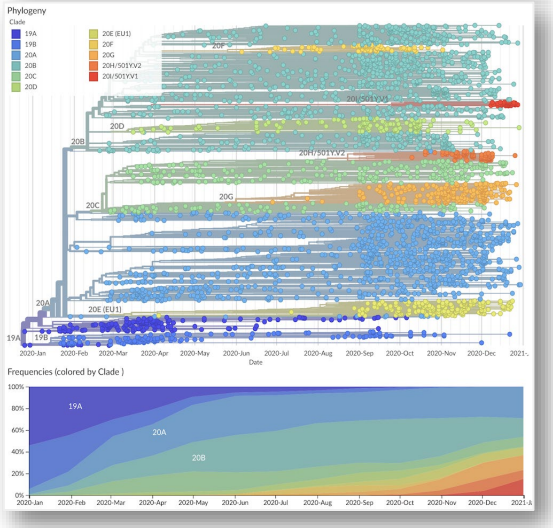
Critical Software Ecosystem

Tools like NumPy, SciPy, Jupyter, and PyTorch empower modern scientific workflows, from genomics to imaging and machine learning.

Sustainability Risks

Underfunding open-source infrastructure risks dependency failures, loss of maintainers, and slows innovation especially in fast-evolving AI fields.





Slide Courtesy: Open Source for Science Fund

The Need for Health Research Software

- Informatics tools are **essential** to all areas and aspects of health research today.
- Evolving needs and trends in health research and informatics requires **ongoing software innovation** to keep pace with and enable research priorities.
- Technology development and infrastructure projects require **dedicated funding**, review, and specialized expertise (RSE).
- Many software tools are relevant across health research areas, requiring a **cross-NIH approach** to enable reuse, optimize sustainment and better provide program coordination.

Updates to the NIH Strategic Plan for Data Science

2018 — 2025 — 2030

First NIH Strategy for Data Science

Goal 1
Support biomedical data infrastructure

Goal 2
Modernize data-resources ecosystem

Goal 3
Develop and disseminate advanced tools

Goal 4
Enhance workforce development

Goal 5
Enact appropriate policies to promote stewardship and sustainability

Updated NIH Strategy for Data Science

Goal 1
Improve Capabilities to Sustain the NIH Policy for Data Management and Sharing

Goal 2
Develop Programs to Enhance Human-Derived Data for Research

Goal 3
Provide New Opportunities in Software, Computation Methods, and AI

Goal 4
Support for a Federated Biomedical Research Data Infrastructure

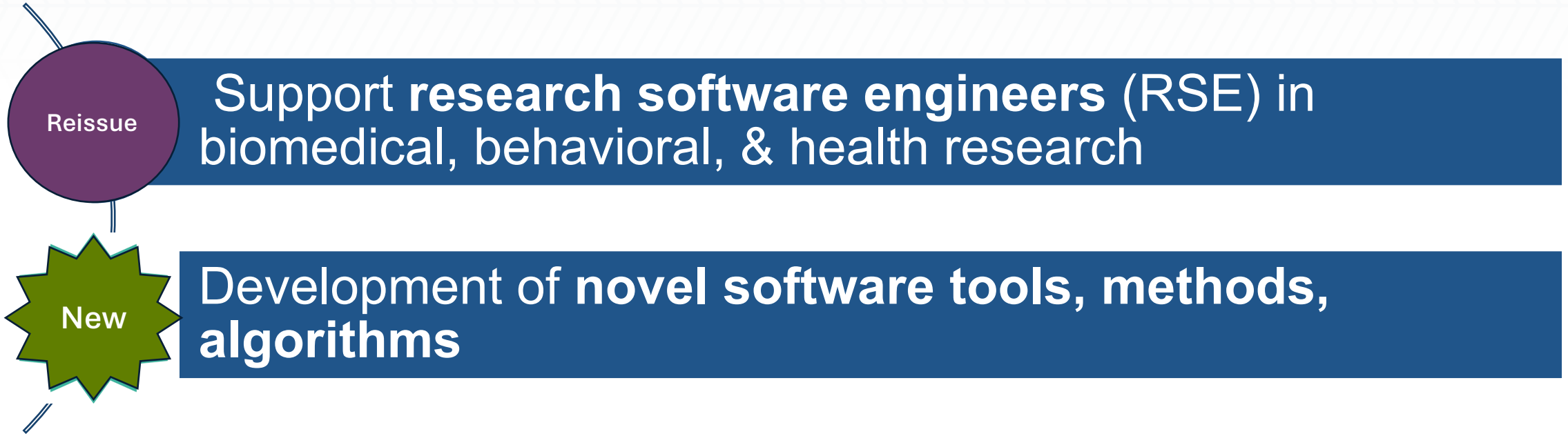
Goal 5
Strengthen a Broad Community in Data Science

Research Software Excellence Initiative (RSEI) Program Goals

- Provide support for open-source software tools driven by NIH research needs
- Support lifecycle of research software development with a focus on innovation and impact
- Adoption of software engineering best practices and support the growing role of the RSE to better sustain and enable their reuse across health domains

The Concept Ask Today

To consider funding opportunity announcements that will better support the building of sustainable foundations and development of novel open software and tools in biomedical and behavioral science:



Anticipated Impact

Collectively, along with the R03 NOFO that funds projects to increase the robustness, reproducibility, and reusability of NIH supported open software tools, the three companion initiatives are expected to:

- Extend impact of the investment – for sustainable reuse; foster communities for open software development; accelerate innovation
- Foster collaborations between biomedical & behavioral scientists and software engineers from NIH funded efforts and beyond
- Engage with the larger community of researchers and funders through the Open Source for Science Fund and other partners

Critical to creating a modernized health data ecosystem that can catalyze advances in science.

Initiative 1: Reissue

Title: NIH Research Software Engineer (RSE) Award (R50 Clinical Trials Not Allowed)
Objective: Support **RSE** to bring unique skills to building sustainable, open software and tools.
Mechanism: R50
Duration of Award: ≤3 years
Funds/Awards: Support RSE salary commensurate with funded effort (≥6 months/year) on existing research grants; set aside of **$3 million**; anticipate ~ **8-10 awards** with exact number contingent on NIH appropriations and sufficient highly meritorious applications.
Due Dates/Award Period: Two receipt dates per year; June and October over three years.

All applications to be reviewed by CSR Special Emphasis Panel

Applicants are encouraged to seek **ICO consultation** prior to submission.

Initiative 2: New

Title: Development of Novel Research Software for Health Research (R21 Clinical Trial Not Allowed)
Objective: Fund development of **novel research software tools, methods, and algorithms; focus is on innovation.**
Mechanism: R21
Duration of Award: 2 years
Funds/Awards: $275K DCs per award; set aside of **$3.0 million** and anticipate **~8-10 grants** with exact number contingent on NIH appropriation and sufficient highly meritorious applications.
Due Dates/Award Period: Two receipt dates per year; June and October over three years

All applications to be reviewed by CSR Special Emphasis Panel

Applicants are encouraged to seek **ICO consultation** prior to submission.

The Purpose of the NOFOs

RSE Award (R50)

Reissue

Support exceptional research software engineers (non-traditional PIs) and offer a solution to the RSE workforce need

Enhance autonomy and career continuity for highly-skilled software engineers working in health research

Sustainable Software Project (R03)

Ongoing

Support robust, sharable, sustainable software and tool development

Bring software development best-practices & emerging technologies to NIH research projects

Novel Software Project (R21)

New

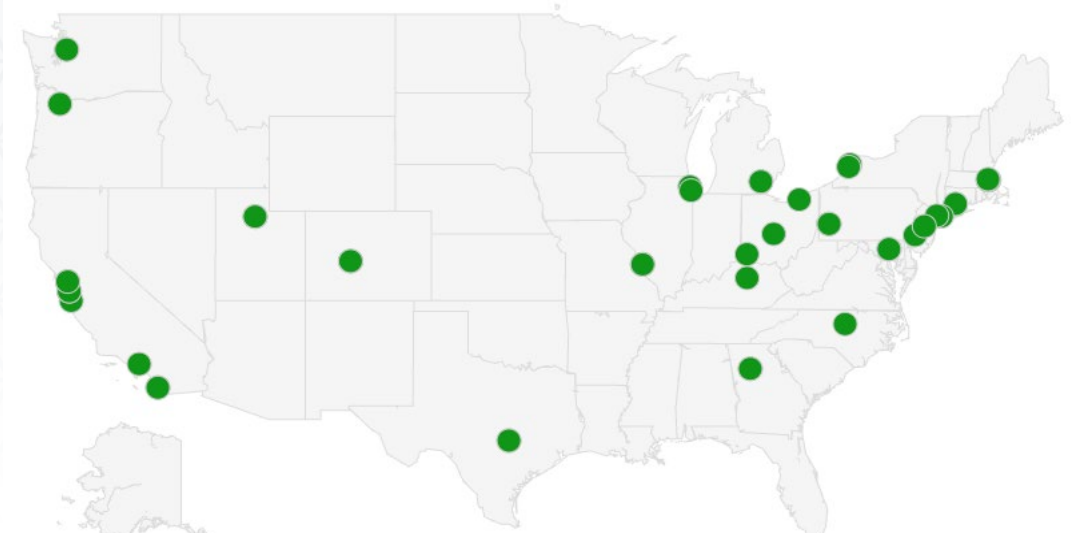
Develop novel software tools, methods, algorithms

Target unmet needs in basic, preventive, diagnostic, translational, epidemiological, and/or clinical research with potential for broad use across various health research domains

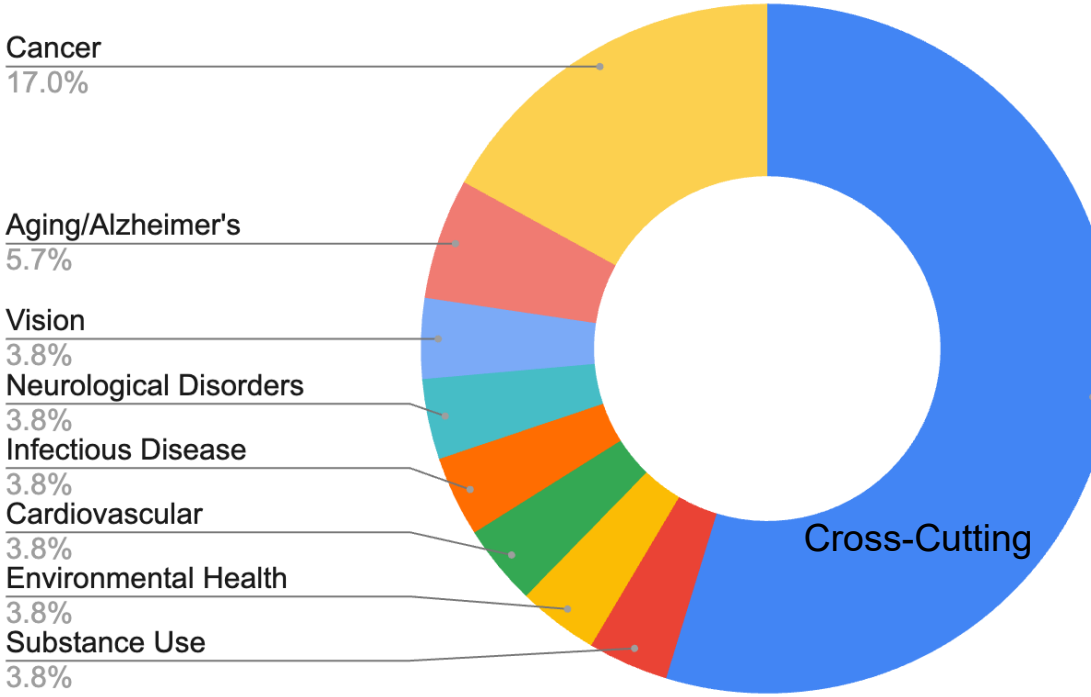
Program Submissions and Awards

R50 RFA-OD-24-011: 265 submitted, 32 awards

R03 RFA-OD-24-010: 203 submitted, 21 awards



Focus Area	Share
Machine learning / AI	42%
Ontologies / standards / metadata / FAIR	38%
Clinical data / EHR / FHIR / interoperability	34%
Genomics / multi-omics / sequencing	32%
Data infrastructure / databases / data sharing / cloud	31%
Medical Imaging / microscopy	31%
Visualization / dashboards	24%
Statistical / computational modeling	11%
Wearables / sensors / signal / voice-acoustic	9%
NLP / text mining	2%



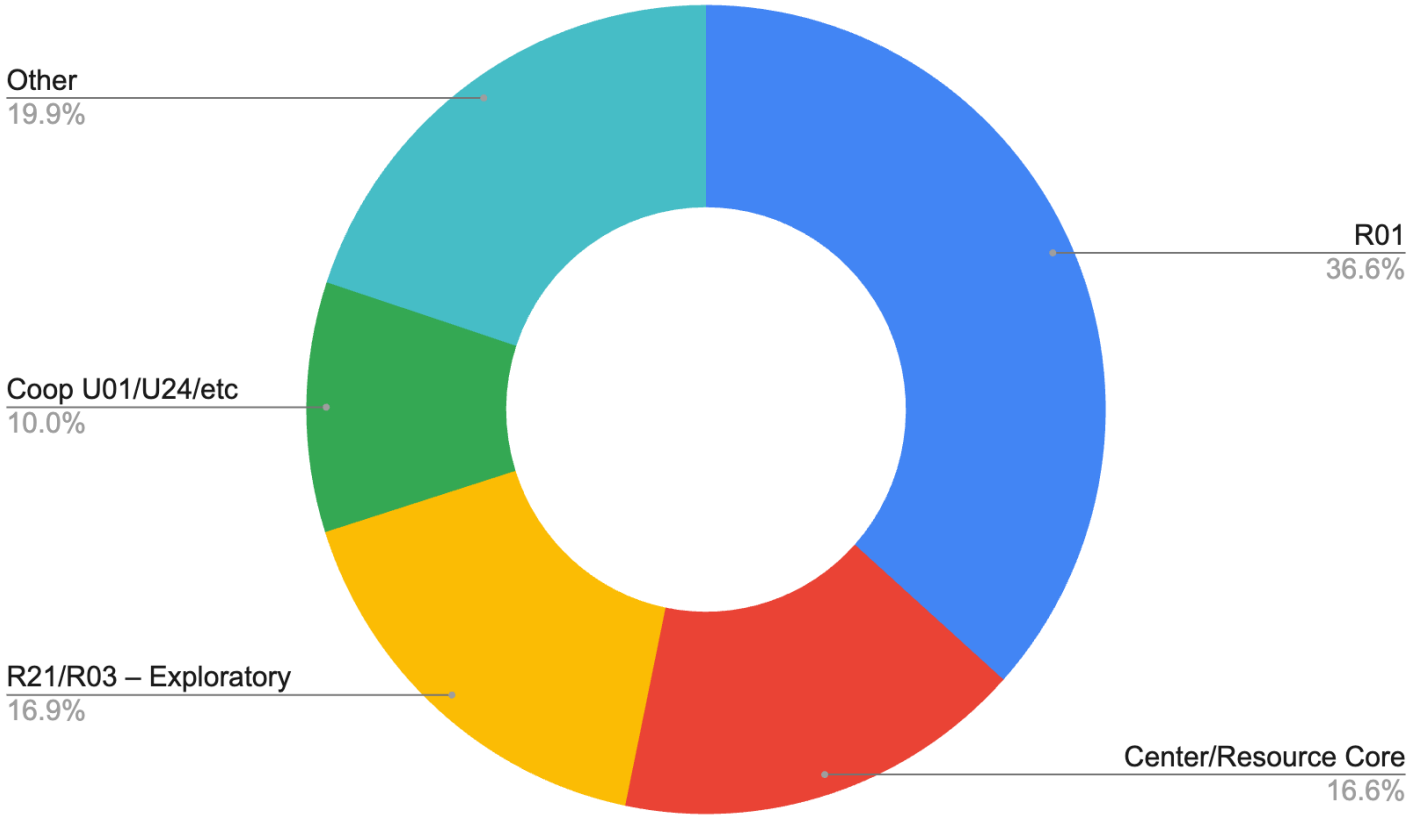
The Software Landscape at NIH: 2020-26

Few Targeted Programs supporting Sustainable Software Development

- NCI *Informatics Technology for Cancer Research* R21(**expired**)/U01/U24
- NHGRI *Informatics Tools for the Pangenome* U01 (**expired**)
- NIAID Data Science Program for Infectious/Immune-Mediated Diseases R21/U01 (**expired**)
- NIH *Cutting Edge Informatics Tools for Illuminating the Druggable Genome* (U01) (**expired**)

- 2361 awards
- Small sliver of overall NIH portfolio
- R01s and Center Cores comprise most





18 ICO Participation in R50

National Eye Institute (NEI)

National Heart, Lung, and Blood Institute (NHLBI)

National Human Genome Research Institute (NHGRI)

National Institute on Aging (NIA)

National Institute on Alcohol Abuse and Alcoholism (NIAAA)

National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)

National Institute of Biomedical Imaging and Bioengineering (NIBIB)

Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)

National Institute of Dental and Craniofacial Research (NIDCR)

National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)

National Institute on Drug Abuse (NIDA)

National Institute of Environmental Health Sciences (NIEHS)

National Institute of Mental Health (NIMH)

National Institute of Neurological Disorders and Stroke (NINDS)

National Institute on Minority Health and Health Disparities (NIMHD)

National Library of Medicine (NLM)

National Center for Complementary and Integrative Health (NCCIH)

National Cancer Institute (NCI)

19 ICO Participation in R03

National Eye Institute (NEI)

National Heart, Lung, and Blood Institute (NHLBI)

National Human Genome Research Institute (NHGRI)

National Institute on Aging (NIA)

National Institute on Alcohol Abuse and Alcoholism (NIAAA)

National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS)

National Institute of Biomedical Imaging and Bioengineering (NIBIB)

Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)

National Institute on Deafness and Other Communication Disorders (NIDCD)

National Institute of Dental and Craniofacial Research (NIDCR)

National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)

National Institute on Drug Abuse (NIDA)

National Institute of Environmental Health Sciences (NIEHS)

National Institute of Mental Health (NIMH)

National Institute of Neurological Disorders and Stroke (NINDS)

National Institute on Minority Health and Health Disparities (NIMHD)

National Library of Medicine (NLM)

National Center for Complementary and Integrative Health (NCCIH)

National Cancer Institute (NCI)

https://datascience.nih.gov/tools-and-analytics/administrative-supplements-to-support-enhancement-of-software-tools-for-open-science

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Council Action: Vote for approval of the reissuance of the RSE Award (R50) and approval of the concept for the Novel Research Software Award (R21).

Discussion