Complement-ARIE: Complement Animal Research In Experimentation

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Common Fund Historical Perspective



2004: NIH Roadmap is launched

December 9, 2006: Congress unanimously reauthorizes the NIH

Establishes the Division of Program Coordination, Planning, and Strategic Initiatives (DPCPSI) within Office of the Director and the NIH Common Fund to provide a dedicated source of funding to enable *trans*-NIH research



The Common Fund Moves the NIH Mission Forward – Faster

Supporting bold scientific programs that **catalyze discovery** across all biomedical and behavioral research

Advances areas of biomedical and behavioral research important to the missions of multiple NIH Institutes and Centers

Spurs subsequent biomedical advances that otherwise would not be possible without an initial strategic investment





Features of Common Fund Programs and How They Catalyze Biomedical Discovery

Making substantial investments in time-limited, goal-driven programs that significantly change the trajectory of biomedical research.





Common Fund Science and Management are Collaborative



Scientists from diverse disciplines provide input as we plan new programs.



Researchers participate in interdisciplinary consortia to tackle shared goals.



Leadership and staff from Institutes, Centers, and the Office of the Director work together to design funding opportunities and oversee the projects.



Statement of Purpose and Goals of Complement-ARIE

<u>**Purpose</u>**: To catalyze the development, standardization, validation and use of **human-based new approach methodologies (NAMs)** that will transform the way we do basic, translational, and clinical sciences</u>

<u>Goals</u>:

- 1. Better model and **understand human health and disease** outcomes **across diverse populations**.
- 2. Develop NAMs that **provide insight into specific biological processes** or disease states.
- 3. Validate mature NAMs to **support regulatory use** and standardization.
- 4. Complement traditional models and make biomedical research more efficient and effective.



Data Ecosystem



Complement-ARIE Working Group



Working Group Co-Chairs

Joni Rutter, NCATS Rick Woychik, NIEHS

Common Fund Program Leaders Margaret Ochocinska, OSC

Working Group Coordinators

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Complement-ARIE Program Development Timeline

NIH Common Fund

Complement-ARIE Working Group

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NIH ACD Working Group on Catalyzing the Development and Use of NAMs to Advance Biomedical Research

June: NIH Common Fund selects concept proposal and convened Complement-ARIE WG	June 2023	June 8-9 ACD WG present preliminary findings
June–October: Program Planning/ Development • <u>Deep landscape analysis</u>	July 2023	June – November: ACD WG Stakeholder Engagement
 data infrastructure needs current use of NAMs Listening sessions (roundtables) 	August 2023	Expert Workshop on "Catalyzing Development and Use of Novel Alternative Methods – August 21-22 (videocast) RFI published: https://grants.nih.gov/grants/guide/notice- files/NOT-OD-23-140.html
 engage investigators and current challenges in NAM development Inter-agency workshop Shared interests with other stakeholders in the NAM space (Oct. 19-20) Ideation/Design Prize engage community identify opportunities in NAM development, validation, and adoption 	Sept 2023	
	Oct 2023	
	Nov 2023	Closed September 5
Nov - Jan: Concept refinement and approvals for continued development and implementation • ICD presentation (Dec 21, 2023) • Council of Councils (January 25, 2024)	Dec 2023	December 14 ACD WG present final report w/recommendations
	Jan 2024	February 2, 2024 NIH Director accepts Recommendations

Complement-ARIE Program: Major Work Products

Program Goals:

NAMs that incorporates the following features:

- Complex *in vitro* models emulating population diversity
- In silico multi-scale systems simulating healthy/diseased individuals
- In chemico cell-free systems capturing dynamic changes
- Combinatorial NAMs and integrated FAIR datasets and AI-engines for all NAMs





Build on NAMs activities across NIH

Digital Twin Models

Digital Twins for treatment of cancers and neuropsychiatric diseases, host-gut microbiome studies



Complex In Vitro Systems

MPS and 3D organoid models for multiple tissues, organs and disease conditions



In Silico Models

In silico and ML/AI models for neurodegenerative disease, wound healing, learning/behavior, SARS-CoV-2 propagation, many other diseases



In Chemico Screening

Tox21 high-throughput studies, biochemical assays for skin irritation, ocular toxicity





Strategic planning activities: Stakeholder outreach

- 3 listening sessions were held with major stakeholders (Academia, Industry, NGO, Government, International)
- Federal Inter-agency retreat Oct 19-20, NIH/Natcher
 - NIH, FDA, EPA, NSF, ARPA-H, BARDA, VA, DARPA, NIST, NASA, CPSC, ICCVAM
- Scientific Needs: Innovate and Transform
 - Chronicity
 - Neuroscience
 - Personalized health
 - Cross-disease pathogenesis
 - **Population diversity**
- Operational Needs: Integrate, Coordinate, and Collaborate
 - Shared data infrastructure
 - Standardized frameworks
 - Validation
 - Training
- Other strategic planning activities informing concept development:
 - Ideation Challenge Prize: <u>https://go.nih.gov/Complement-ARIEPrizeWinners</u>
 - Landscape Analysis: <u>https://commonfund.nih.gov/complementarie/strategicplanning/landscape-analysis</u>







Complement-ARIE Challenge Prize Competition

The NIH is conducting planning activities to inform a Common Fund research program to **Complement Animal Research In Experimentation (Complement-ARIE)** by catalyzing the development, standardization, validation, and use of New Approach Methodologies (NAMs)

The Common Fund issued the Complement-ARIE Challenge Prize Competition to solicit entries for new methods and approaches in NAMs. Winning solutions provided NIH with information about where innovation can be incorporated into NAMs and what types of new NAMs may benefit from further investment.

Twenty Complement-ARIE Challenge prize winners will share the total prize purse of \$1,000,000, with each winning team receiving \$50,000 for their innovative solutions.

View the winners on the NIH Common Fund website: https://go.nih.gov/Complement-ARIEPrizeWinners

Join the Complement-ARIE listserv: <u>go.nih.gov/ComplementARIE_listserv</u>



Link to Complement-ARIE Challenge winner announcement

Complement-ARIE Challenge Prize Competition Winner Highlights

 <u>Click Chemistry Magic for Drug Screening</u>. Novel chemistry NAM for high throughput drug screening, tissue engineering, and precision medicine.

Team: <u>Delaware Click Chemistry</u>

- DevTox Developmental Toxicity Predictor. Comprehensive approach for developmental toxicity prediction to enhance maternal drug safety.
 Team: Predictive, LLC
- Pulse of the Future: AI-human MEHC. Integrated solutions to analyze multi-scale engineered heart constructs (MEHC) and model human cardiovascular health and disease
 Team: Pulse of the Future: AI-human MEHC



Link to Complement-ARIE Challenge winner announcement

Complement-ARIE: Program Components

- Technology Development Centers stimulate the development of NAMs to fill in areas of greatest need, with emphasis on increased biological complexity and throughput, innovative combinatorial approaches, and data sharing.
- NAMs Data Hub & Coordinating Center (NDHCC) create integrated data structures, including standards for model credibility, improve FAIRness (Findability, Accessibility, Interoperability, and Reusability) of NAM-relevant data, create searchable NAMs repository.
- Validation and Qualification Network (VQN) for NAMs Adoption and Implementation establish common data elements and standardized reporting, apply validation/qualification frameworks, accelerate deployment and regulatory implementation of NAMs.
- Community Engagement and Training promote the development of an inclusive, diverse biomedical research workforce with the skills to build/use new NAMs, community engagement, societal and ethical considerations.





Complement-ARIE Consortium



Validation & Qualification Network for NAMs Adoption and Implementation

ICCVAM/Other Agencies • **Regulatory Partners Industry Partners** International • Non-Profits Others Regulatory Authorities Standards Market & Case Surveillance Studies Validation & Market Conformity Regulatory Entrance Assessment Framework Clinical Potential Risks to Safety and Performance User Quality Management System

Complement-ARIE NAMs Technology Development Center Notice of Intent to Publish a Funding Opportunity

The NIH Common Fund Complement Animal Research In Experimentation (Complement-ARIE) Program has released a Notice of Intent to Publish a Funding Opportunity.

The purpose of this Notice is to alert the research community of a pending funding opportunity to **support Complement-ARIE NAMs Technology Development Centers.**

The goal of the Comprehensive NAMs Technology Development Centers is to stimulate the development of combinatorial NAMs to support the areas of greatest need.

The estimated release date of the NOFO is: October 18, 2024.

View the Complement-ARIE NOITP: https://go.nih.gov/iiuNC9v

Explore the Complement-ARIE FAQs: <u>https://commonfund.nih.gov/complementarie/faqs</u>

Join the Complement-ARIE listserv: <u>go.nih.gov/ComplementARIE listserv</u>

Link to Complement-ARIE Notice of Intent to Publish a Funding Opportunity





Exploring Potential Public-Private Partnerships

Validation and Qualification Network (VQN) for the Adoption and Implementation of New Approach Methodologies (NAMs)

- Exploring Public-Private Partnerships to bring industry, NGOs, nonprofits, etc. into the network leveraging existing FNIH PPP infrastructure
- Pre-competitive data sharing and potentially supporting validation activities across labs and locations for specific use cases for implementation
- Support community outreach and training
- Provide a fluid funnel for potential solutions which may be developed through the comprehensive centers
- Include additional Federal partners
- Synergize and coordinate with other global activities on NAMs







Complement-ARIE Validation Network: Three-Phased Approach







Complement-ARIE: Program Flow Diagram



The diagram illustrates the **key components of the Complement-ARIE program** including technology development, centralized data resources, Validation and Qualification, along with key training and dissemination activities to provide a **fluid conduit from stakeholder engagement to implementation**.



Complement-ARIE: Innovate, Integrate, Coordinate, and Transform



Data Ecosystem

- Innovate understanding of human health and disease pathways across diverse populations
- Integrate innovative NAMs

 (*in vitro, in chemico, and in silico*) with AI and
 FAIR data ecosystems
- **Coordinate** with ICs, agencies, and publicprivate partnerships
- **Transform** the way we do basic, translational, and clinical sciences by leveraging the full scientific toolbox



Questions/Discussion

To learn more about Complement-ARIE Program, visit: https://commonfund.nih.gov/complementarie

