Strategic Insights for the Growth and Sustainability of the *All of Us* Research Program

All of Us Reflection and Advancement Working Group Final Report

Russ Altman, MD, PhD September 12, 2024



Pioneering Precision:

Strategic Insights for the Growth and Sustainability of the *All of Us* Research Program

September 12, 2024

All of Us Reflection and Advancement Working Group Report to the All of Us Research Program Advisory Panel

Outline

- Creation of this working group
- Process and evaluation activities
- Summary of working group findings
- Open for Council questions and discussion
- [Council Vote to accept Working Group's report]

Background

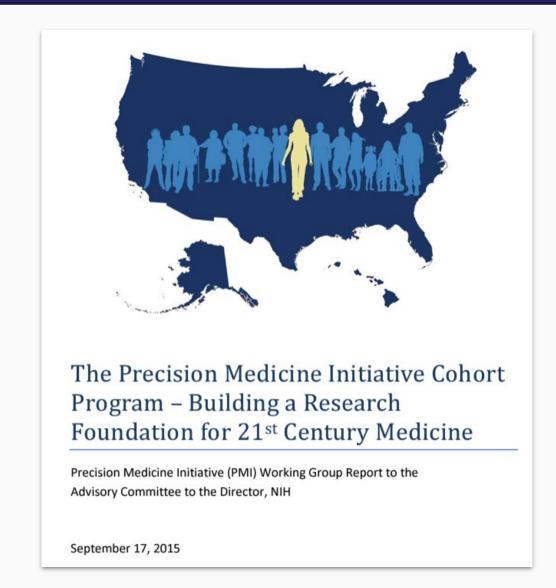
Advisory Panel Mission

The <u>2015 PMI Working Group Report to the NIH ACD</u> recommended the creation of an <u>Independent Advisory Board</u> to provide external oversight.

All of Us Advisory Panel's Objective and Scope:

- Provide feedback and vision and direction on All of Us
- Contribute to the program's strategic five-year goals and how they relate to the broader precision health ecosystem
- Review progress
- Help realize opportunities
- Be thoughtful advocates for the program's success

The panel will ensure at appropriate intervals that the vision continues to adapt to the evolving landscape of research, clinical practice, and participant engagement.



Snapshot of Advisory Panel Impact To Date:

- Inspired & encouraged 2026 5-year goals
- Working Groups on:
 - Reflection and Advancement
 - Child Enrollment Scientific Vision
 - Tribal Collaboration
 - Data Quality & Completeness

Learn more here!

All of Us Advisory Panel Members



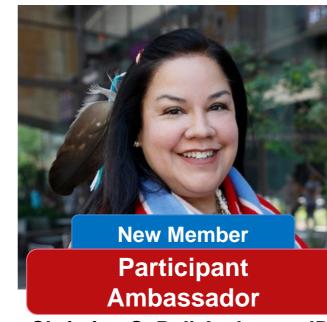
Aaron Abend, MBA



Naomi Allen, D.Phil., MSc, BSc



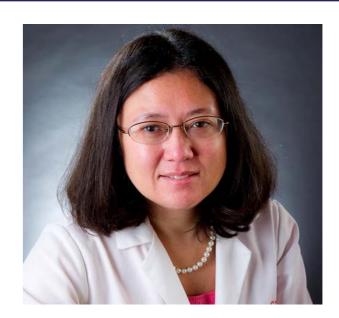
Rhonda Robinson Beale, MD



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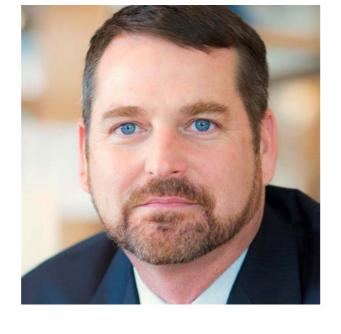
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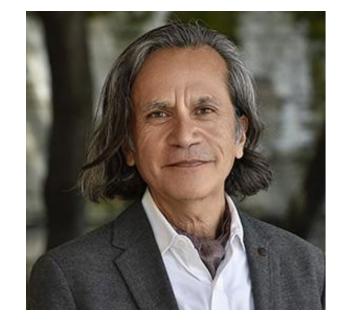
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Elizabeth O. Ofili, MD, MPH, FACC



Evelyn Ortiz



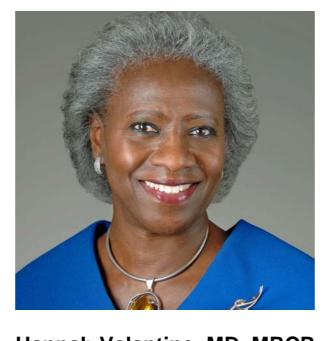
Jesus Ramirez-Valles, PhD, MPH



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Prashant Shah, MS



Hannah Valantine, MD, MRCP



Roberto Vargas, MD, MPH



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Working Group Chair and Co-Vice Chairs

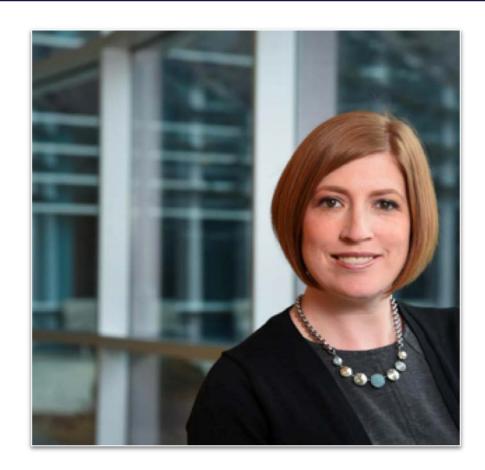


Russ B. Altman, MD, PhD

Stanford University

Kenneth Fong Professor of Bioengineering, Genetics, Medicine and Biomedical Data Science (and Computer Science, by courtesy)

Associate Director, Stanford Institute for Human-Centered Al



Marylyn DeRiggi Ritchie, PhD

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Professor in the Department of Genetics, Director of the Center for Translational Bioinformatics

Associate Director for Bioinformatics in the Institute for Biomedical Informatics

Associate Director for Precision Medicine



Rhonda Robinson Beale, MD

UnitedHealth Group

Senior Vice President, Mental Health Services

Deputy Chief Medical Officer, Mental Health Services

NIH Council of Councils Liaison

Chair Vice Chair

Vice Chair

All of Us Reflection and Advancement Working Group

Purpose: Assess the program's evolution, evaluating achievements, challenges, and opportunities for improvement and advancement since the national launch to shape the program's strategic plan towards maximizing its scientific impact leading up to 2031.

Deliverable: The Working Group developed a report to lay the groundwork for shaping the next iteration and extension of the *All of Us* strategic plan.

Process: Launched in April 2024, the Working Group conducted **five focused input sessions** with Advisory Panel members, program leadership, and subject matter experts to **discuss the program's progress**, **challenges**, **and opportunities**.

The Working Group evaluated **eight strategic questions** to guide the development and writing of the report, which was reviewed for accuracy by the program.

Roster

Chair and Vice Chairs

Russ Altman - Chair Marylyn DeRiggi Ritchie - Vice Chair Rhonda Robinson Beale - Vice Chair

Members & Contributors

Roberto Vargas Aaron Abend **Prashant Shah** Naomi Allen Hannah Valantine Wendy Chung Xiaobin Wang **Gary Miller** Sadiqa Mahmood Christopher O'Donnell Josh Mandel **Evelyn Ortiz*** Karen Wall* Scout Elizabeth Rubinstein* Jesus Ramirez-Valles

*Participant Ambassador (Present and/or Past)

Strategic Questions

Charting Progress (or Forging a Unique Path): Key Metrics and Program Differentiators

- 1. Given the vision outlined in the 2015 ACD Working Group Report, which key indicators or metrics best reflect the program's progress and success thus far?
- 2. What are the most important differentiators of the program? What is, or should be, *All of Us* uniquely positioned to achieve?

Cultivating Established Trust: Future Growth Opportunities for *All of Us*

- **3.** Where are the opportunities for growth or areas for improvement within the program?
- **4.** How can the program amplify the trust established among diverse participants, expanding their engagement and leveraging their involvement and voices

Ensuring Health Equity: The Current and Future Impact of *All of Us* as a National Resource

- **5.** What is the impact of the *All of Us* Research Program and what are the best opportunities for it to change the equitable practice of medicine now and in the future?
- **6.** As the program exceeds 800K participants, and 10K researchers, how should it focus future investments to sustain and grow as a vital national research resource?

Envisioning the Future: The Sustainability and Longitudinality of *All of Us*

- **7.** What prospective actions can *All of Us* take to minimize long-term infrastructure costs to taxpayers while improving overall efficiency and effectiveness?
- **8.** How can *All of Us* strategically contribute to future cost savings for researchers within the scientific ecosystem, leveraging initiatives like the passport and cloud model?

Report Themes

Figure 1: Progress Toward All of **Us' Five-Year Goals (2021-2026)**

FIGURE 1: PROGRESS TOWARD ALL OF US' FIVE-YEAR GOALS (2021-2026)



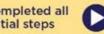
1. Enrollment and Retention

Enroll 1 million participants who reflect the diversity of the U.S., cover the lifespan, and have shared all baseline elements. Of these participants, 500,000 participate in ongoing data donation opportunities.

>834,000 adult >566,000 completed all initial steps >730 enrollment sites









87% participants

from underrepresented backgrounds in biomedical research

47% self-identify as racial or ethnic minorities **OVER**

452,000 linked electronic health records - and -

586,000 provided biosamples

75% participants share ongoing data through EHRs or wearables

46% participate in ongoing surveys and follow-up activities

Launched limited pediatric enrollment in 2024



2. Data Available to Researchers

Expand data available for 1 million participants to include surveys, health data streams, a whole genome sequence, environmental data, and physical measures.

LAUNCH DATES:

- 2018 NATIONAL ENROLLMENT
- 2019 PUBLICLY ACCESSIBLE DATA BROWSER
- 2020 RESEARCHER WORKBENCH
- 2022 GENOMIC DATA FOR RESEARCH

FALL 2024 DATA RELEASE INCLUDES MORE THAN:

- 633,000 PARTICIPANTS WITH SURVEY DATA
- 414,000 WITH WGS
- 393,000 WITH EHR DATA
- 59,000 WITH FITBIT RECORDS

One of the largest and most diverse genomic datasets, featuring variants at 1B+ locations, including 275M novel genetic variants (Nature, 2023)



3. Ancillary Studies

Launch ancillary studies as a core and scalable capability, expanding the cohort and delivering phenotypic, lifestyle, environmental, and biologic data.

LAUNCHED 4 ANCILLARY STUDIES:

- Nutrition for Precision Health
- Exploring the Mind
- Environmental Health and Exposomics
- COVID-19 Serology

12 NEW STUDIES IN DEVELOPMENT:

Use of stored specimens, cognitive tasks, surveys, and new imaging

Supported **novel COVID-19 research**:

- SEROLOGY STUDY: tested over 24,000 samples for antibodies
- RAPID DEPLOYMENT OF REPEATED SURVEY on pandemic experiences and effect on mental health, well-being, and everyday life



4. Researcher Access and Impact

Establish a diverse global community of 10,000 researchers productively using All of Us data.

600+

from racial and ethnic >12,400 researchers 9,500 underrepresented in the biomedical minority groups

880 institutions completed Data Use and

Registration Agreements 179 minority-serving institutions

142 international institutions

12,500+

active projects on the Researcher Workbench

28.6 hours

publications median time from researcher onboarding use All of Us to data access

Accessible to academic, not-for-profit, health care, and commercial organizations



5. Participant Return of Value

Incorporate participant return of value into data collections and assess its impact, including return of information to participants on genomics and EHR.

144,000+ participants received health-related genetic results

106,000 learned their body processes some medications differently

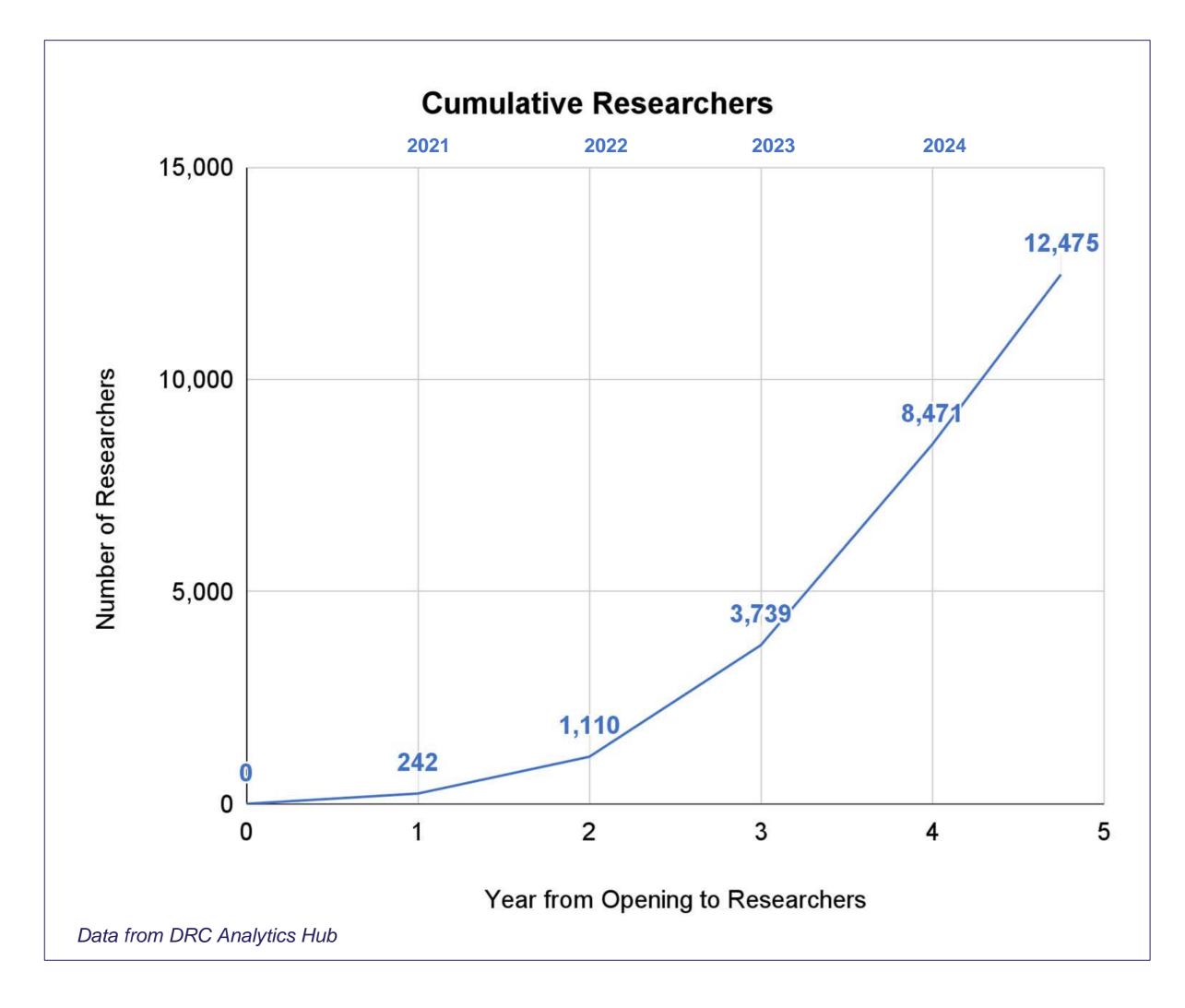
notified of genetic variants associated 3,300 with serious health conditions that are preventable or treatable

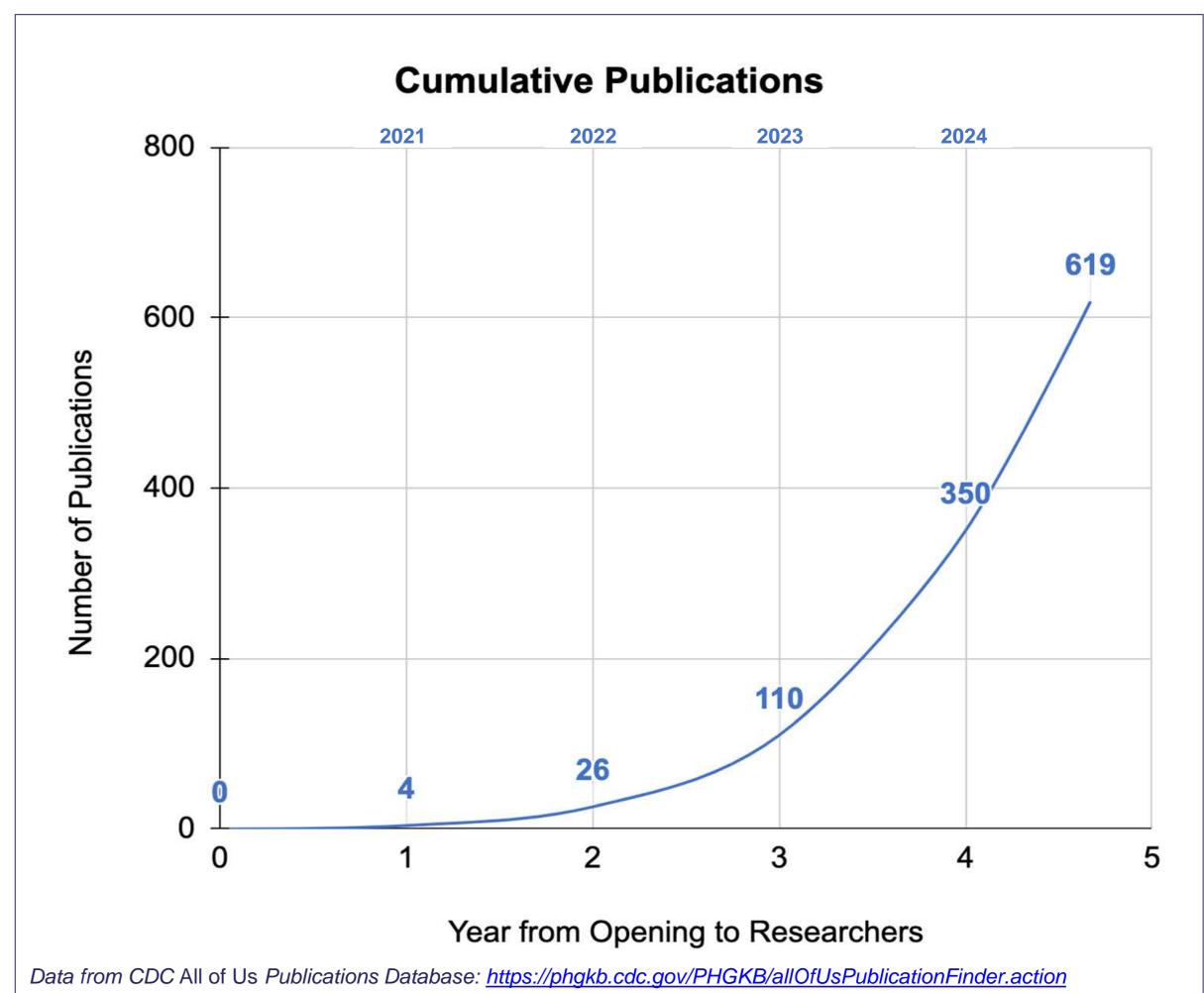
330,000+ participants

offered results on genetic ancestry and traits

IN 2023: Partners hosted 1,240 community engagement events reaching 613,000+ attendees

Figure 2 - Growth of Researchers and Publications





Executive Summary (slide 1 of 3)

- 1
- The primary strength is the **diversity** of the *All of Us* cohort particularly among participants underrepresented in biomedical research
- Build and engage cohort

- 2
- Enrollment should continue to goal of at least 1,000,000 participants
- Ensure that participants engage, contribute, and take pride in their participation and the resulting biomedical discoveries

- 3
- Add a pediatric cohort to observe health through the full life span
- Link to family members in the cohort (e.g., observe generational effects)

Executive Summary (slide 2 of 3)

- Robust platforms for intake and dissemination
- "Buy vs. build" decisions for better economics and flexibility
- Competitive awards and evolving partners
- Match diversity of cohort with diversity of researchers (and questions)
 - Include: Academia, industry, payors, government, NGO, multiple disciplines
- Build trust with high-quality communications to participants, returning results
 - Recruit participants into collaborative, ancillary, supplementary studies
 - Become key research resource for translational research (with NIH ICs)
 - Support research in science of translation
 - Contribute core research results to inform equitable healthcare

Executive Summary (slide 3 of 3)

8

9

10

- Use All of Us for collaborative projects that add data at low cost (or free)
 - Help NIH ICs recruit cohorts from All of Us quickly and economically
 - New research partners for new data, new researchers, new questions
 - In face of budgetary uncertainty, stable core budget and staff is key
 - All decisions must be made with a 30+ year project horizon
 - Clear ability to identify "must haves" and "nice to haves"
 - All of Us should be a research arm for national health emergencies (e.g., Covid-19)
 - Build and test capabilities with multi-institution collaborations in areas of ongoing health issues (opioids, dementia, obesity, depression, cancer, etc...)

Reflections on Budget

- Loss of stable funding threatens long-term intended outcomes for the country
- _o Budget pressure necessitates razor sharp focus, consolidation, strategic partnerships
- Maintenance of existing cohort (data and samples) is required under all circumstances

Discussion

Council Action:

Vote to accept the Working Group's report

Thank You!