



scan Update

Sarah Biber, PhD

May 2, 2023 – ADRC Spring Meeting

Imaging Core Session

SCAN Overview

Mission: Collect large quantities of standardized imaging data, integrate it with other data modalities available via NACC, and share it with researchers around the world to advance the field

The logo for SCAN, featuring the word "scan" in a white, lowercase, sans-serif font. The letter "c" is stylized with a white circular graphic element inside it. The text is centered on a solid blue rectangular background.

scan

In January 2022, NIA requested that NACC provide additional support for SCAN

GOALS

- 1) Identify and address barriers**
- 2) Facilitate ADRC participation**
- 3) Support data quality**
- 4) Provide data access**

In January 2022, NIA requested that NACC provide additional support for SCAN

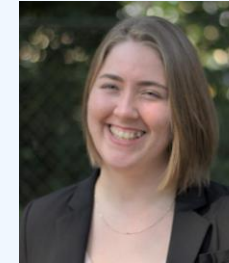
GOALS

- 1) Identify and address barriers
- 2) Facilitate ADRC participation
- 3) Support data quality
- 4) Provide data access

Goal 1. Identify and Address Barriers

Interviewed 20 ADRCs

- Interviews conducted in May and June of 2022
- Identified needed solutions
 - SCAN Dashboard
 - Rapid QC feedback loop
 - Submission interface with verification step



Brittany Hale
NACC Project Manager



Cerise Elliott, PhD
NIA Program Director



Sterling Johnson, PhD
Imaging SC Chair



Sarah Biber, PhD
NACC Program Director

Institution	SCAN Connection
UNIVERSITY OF CALIFORNIA AT DAVIS	SCAN Collaborator, Imaging Steering Committee
MAYO CLINIC ROCHESTER	SCAN Co-I, Imaging Steering Committee
UNIVERSITY OF MICHIGAN AT ANN ARBOR	SCAN Collaborator
UNIVERSITY OF SOUTHERN CALIFORNIA	SCAN Collaborator, Supplement
UNIVERSITY OF WISCONSIN-MADISON	Imaging Steering Committee, Supplement
STANFORD UNIVERSITY	Imaging Steering Committee
RUSH UNIVERSITY MEDICAL CENTER	Imaging Steering Committee, Supplement
UNIVERSITY OF PENNSYLVANIA	Imaging Steering Committee
NORTHWESTERN UNIVERSITY AT CHICAGO	Imaging Steering Committee
NEW YORK UNIVERSITY	Supplement
UNIVERSITY OF KENTUCKY	Supplement
UNIVERSITY OF KANSAS MEDICAL CENTER	Supplement
MOUNT SINAI	Supplement
UNIVERSITY OF CALIFORNIA, SAN DIEGO	Supplement
EMORY UNIVERSITY	Supplement
UNIVERSITY OF WASHINGTON	Supplement
UNIVERSITY OF PITTSBURGH AT PITTSBURGH	Supplement
UNIVERSITY OF CALIFORNIA, SAN FRANCISCO	Supplement
CLEVELAND CLINIC LERNER COM-CWRU	Supplement
UNIVERSITY OF CALIFORNIA-IRVINE	Supplement

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Goal 2. Facilitate ADRC Participation

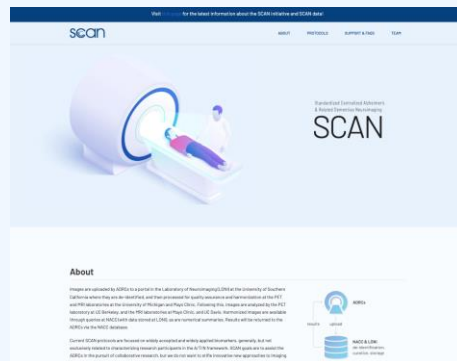
- **Developed and Deployed SCAN Checklists**
 - Roadmap for getting SCAN ready
 - Standard tool for assessing SCAN progress and participation
 - Self-service updates possible via REDCap
 - Incorporated into the SCAN Manuals (PET/MRI)



100% of the 20 ADRCs found them beneficial

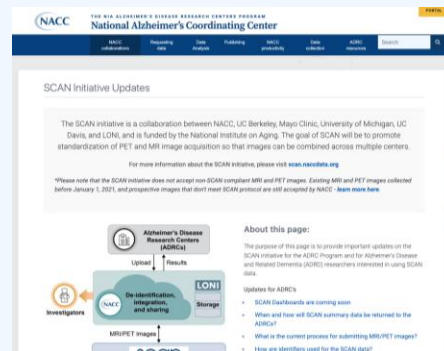
- **Launched SCAN Webpages:**

SCAN NACC Data



scan.naccdata.org/

SCAN Initiative Updates



naccdata.org/nacc-collaborations/scan-updates

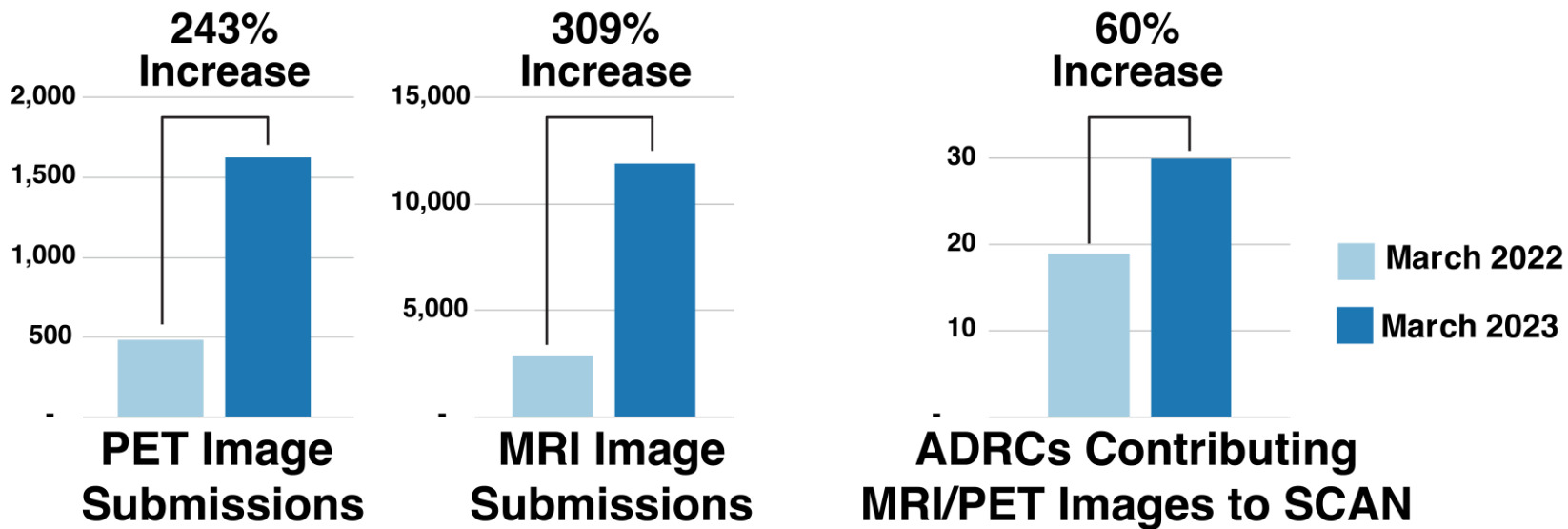
Non-Standard Image Submission



naccdata.org/data-collection/nonstandard-image-submission

Goal 2. Facilitate ADRC Participation

- **NACC's support has contributed to a dramatic increase in SCAN submissions over the past year**
 - **Counts as of March 2023**
 - 1,626 PET scans from 18 sites
 - 11,896 MRI scans collected from 30 sites



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Goal 3. Support Data Quality

SCAN QC Dashboards (MRI and PET)

- Available via ADRC Portals within the NACC Data Platform
 - Sites can track the QC status of their MRI and PET submissions, allowing them to rapidly address errors
 - Serves as an auditable record of all SCAN MRI and PET data submitted to date, downloadable as a csv file

PET Example

[Site-Specific Dashboard](#) > Western Iowa PET Data

Alert: PLEASE NOTE THAT THIS EXAMPLE DATA HAS BEEN FABRICATED AND DOES NOT REPRESENT ANY REAL ADRC, PARTICIPANT, OR DATA.

Review PET Data

Copy CSV Show 10 entries

Search:

ADRC	NACC ID	PTID	Study				QC Status	If failed, why?
			Study Date and Time	Image UID	Scanner Model	PET radiotracer		
Western Iowa	NACC462907	188	6/1/2022 0:00	I10160420	Biograph Horizon	Florbetapir	Passed	
Western Iowa	NACC114092	1189	4/1/2022 0:00	I10150975	Biograph Horizon	Flortaucipir	Passed	
Western Iowa	NACC228673	728	6/1/2022 0:00	I10150995	Biograph Horizon	PIB	Passed	
Western Iowa	NACC228673	728	6/1/2022 0:00	I10150996	Biograph Horizon	Flortaucipir	Passed	
Western Iowa	NACC42459	450	7/1/2021 0:00	I10033850	Biograph Horizon	NAV4694	Passed	

Goal 3. Support Data Quality

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MRI Example

[Site-Specific Dashboard](#) > Central South Dakota MRI Data

Alert: PLEASE NOTE THAT THIS EXAMPLE DATA HAS BEEN FABRICATED AND DOES NOT REPRESENT ANY REAL ADRC, PARTICIPANT, OR DATA.

Review MRI Data

Copy CSV Show 10 entries

Search:

ADRC	NACCID	PTID	Study					Series						Visual QC	QC Comments
			Study Date and Time	Scanner Model	Study UID	Exam Compliance	Study Comments	Series Time and Date	Series Number	Series Type	Released for Analysis	Protocol Status	Protocol Comments		
Central South Dakota	NACC18247	916	9/1/2022 0:00	Achieva dStream	2.16.124.113543.6...	-1		9/1/2022 0:00	301	T2w	-1	3	Matching SQS parameters did not match		
Central South Dakota	NACC293187	493	12/1/2021 0:00	Achieva dStream	2.16.124.113543.6...	-1		12/1/2021 0:00	301	FLAIR	1	1			
Central South Dakota	NACC293187	493	12/1/2021 0:00	Achieva dStream	2.16.124.113543.6...	-1		12/1/2021 0:00	201	T1w	1	1			

Goal 3. Support Data Quality

- **March 2023 Audit – Completed by 100% of ADRCs**
- **Collaborating with LONI, SCAN, and the ADRCs to build a verification step for the LONI Submission Interface**

In January 2022, NIA requested that NACC provide additional support for SCAN

GOALS

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- 4) Provide data access**

ADRCs Access



SCAN data returned
to ADRCs by NACC
via REDCap



Free for Researchers Everywhere

ADRCs Access



SCAN data returned to ADRCs by NACC via REDCap



SCAN data available via the NACC ADRC Portals:

- SCAN QC Dashboards (MRI/PET)
- All SCAN variables



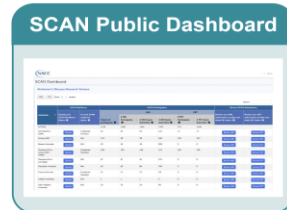
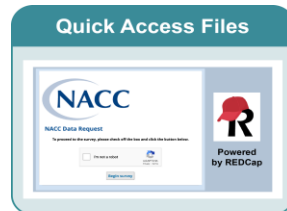
NACC Data Front Door

- **Quick Access File:** SCAN metadata and analysis (connected to NACC IDs)

- **SCAN Dashboard (Public)**

LONI Data Request

- Raw images



Free for Researchers Everywhere

ADRCs Access

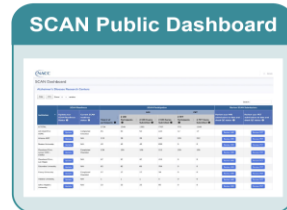
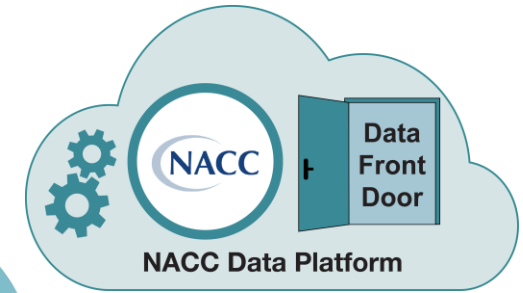
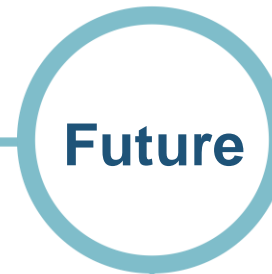


SCAN data returned to ADRCs by NACC via REDCap



SCAN data available via the NACC ADRC Portals:

- SCAN QC Dashboards (MRI/PET)
- All SCAN variables



NACC Data Front Door

- **Quick Access File:** SCAN metadata and analysis (connected to NACC IDs)
- **SCAN Dashboard (Public)**

LONI Data Request

- Raw images

NACC Data Front Door

- **Cohort Selection Tool:** Build your own multimodal dataset!
- **Secure Enclave:** Download your dataset into a secure enclave for analysis



Free for Researchers Everywhere

ADRCs Access



SCAN data returned to ADRCs by NACC via REDCap



Q3 2022

SCAN data available via the NACC ADRC Portals: ★

- SCAN QC Dashboards (MRI/PET)
- All SCAN variables

Q3 2023

NACC Data Front Door ★

- Quick Access File: SCAN metadata and analysis (connected to NACC IDs)

- SCAN Dashboard (Public)

LONI Data Request

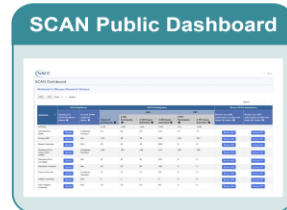
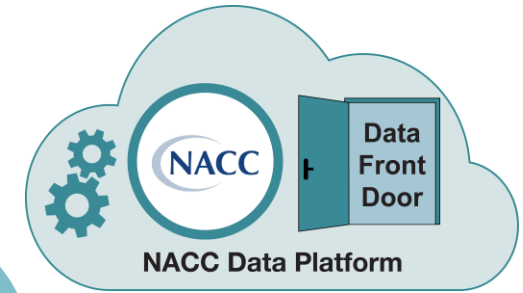
- Raw images

Future

NACC Data Front Door ★

- Cohort Selection Tool: Build your own multimodal dataset!

- Secure Enclave: Download your dataset into a secure enclave for analysis



★ *Dependent on funding via the 2023 NACC Admin Supplement*



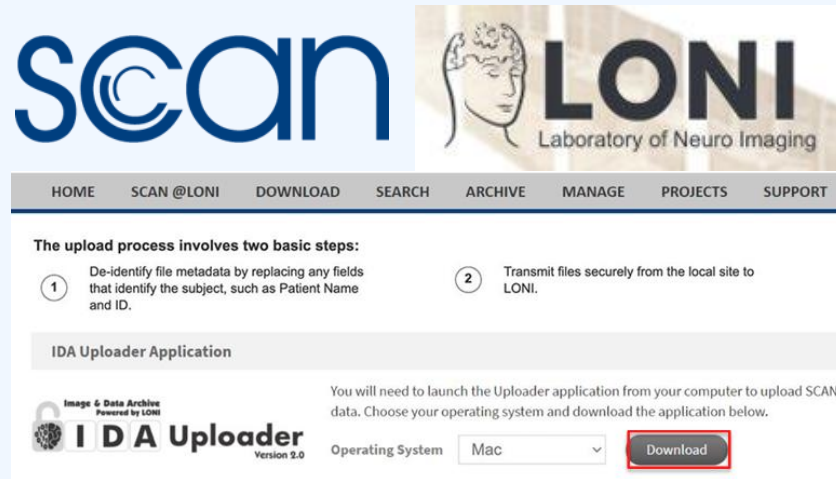
Free for Researchers Everywhere

Important Notice to ADRCs

ONLY Submit SCAN-Compliant MRI and PET Images to SCAN/LONI

Submit SCAN-Compliant Data Here:

<https://ida.loni.usc.edu/>



The screenshot shows the SCAN website interface. At the top, there are navigation links: HOME, SCAN @LONI, DOWNLOAD, SEARCH, ARCHIVE, MANAGE, PROJECTS, and SUPPORT. Below the navigation, a section titled "The upload process involves two basic steps:" lists two steps: 1. De-identify file metadata by replacing any fields that identify the subject, such as Patient Name and ID. 2. Transmit files securely from the local site to LONI. Below this, there is a section for the "IDA Uploader Application" with a "Download" button highlighted in red. The text below the button says: "You will need to launch the Uploader application from your computer to upload SCAN data. Choose your operating system and download the application below." There is a dropdown menu for "Operating System" set to "Mac".

Submit Non-SCAN-Compliant MRI and PET Images to NACC

Submit Non-SCAN-Compliant Data:

<https://nacccdata.org/data-collection/nonstandard-image-submission/>



SCAN compliance details: <https://scan.nacccdata.org/>

SCAN: Update Webpage Hosted on NACC Website

NACC THE NIA ALZHEIMER'S DISEASE RESEARCH CENTERS PROGRAM
National Alzheimer's Coordinating Center

NACC collaborations Requesting data Data Analysis Publishing NACC productivity Data collection ADRC resources Search

SCAN Initiative Updates

The SCAN initiative is a collaboration between NACC, UC Berkeley, Mayo Clinic, University of Michigan, UC Davis, and LONI, and is funded by the National Institute on Aging. The goal of SCAN will be to promote standardization of PET and MR image acquisition so that images can be combined across multiple centers.

For more information about the SCAN initiative, please visit <https://scan.naccdata.org/>

Alzheimer's Disease Research Centers (ADRCs)

Upload ↓ Results ↑

De-identification, integration, and sharing (NACC, LONI Storage)

Investigators ←

MRI/PET Images ↑

scan (Quality control, harmonization, and analysis)

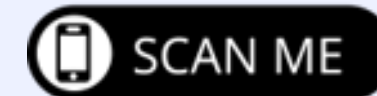
Pipeline for standardized MRI/PET data collection, harmonization, analysis, and sharing.

About this page:

The purpose of this page is to provide important updates on the SCAN initiative for the ADRC Program and for Alzheimer's Disease and Related Dementia (ADRD) researchers interested in using SCAN data.

Updates for ADRC's

- When and how will SCAN summary data be returned to the ADRCs?
- What is the current process for submitting MRI/PET images?
- How are identifiers used for the SCAN data?
- How are MRI and PET imaging submissions from ADRCs currently being tracked?
- How will MRI and PET imaging submissions be tracked in the future?
- How will ADRCs who contribute data to SCAN be acknowledged?



For updates visit:
<https://naccdata.org/nacc-collaborations/scan-updates>



SCAN MRI team

- Clifford Jack MD (PI)
- Charles DeCarli, MD
- Chadwick Ward
- Bret Borowski
- Christopher Schwarz
- Denise Reyes
- Leonard Matoush
- Robert Reid
- Anne Efron
- Gregory Preboske MS
- Jeffrey Gunter PhD
- Matthew Senjem MS



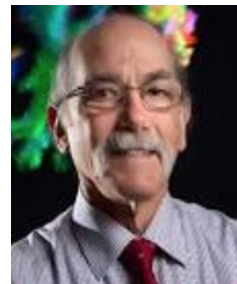
SCAN PET team

- William Jagust MD (PI)
- Bob Koeppe, PhD
- Susan Landau, PhD
- Tessa Harrison
- Suzanne Baker
- JiaQie Lee
- Trevor Chadwick
- Pablo Aguilar



NACC Team

- Bud Kukull, PhD
- Sarah Biber PhD
- **Brittany Hale**
- Brendan Smith
- Zach Stark
- Jessica Culhane
- Melissa Lerch



LONI

- Arthur Toga, PhD
- Karen Crawford, MLIS

Imaging Core Steering Committee



Connect with NACC

Sarah Biber, PhD

Biber@uw.edu



The slide features a decorative network pattern on both the left and right edges. This pattern consists of a series of interconnected nodes and lines, forming a complex, web-like structure. The nodes are represented by small circles in various shades of blue and teal, while the lines are thin and light blue. The overall effect is a modern, technical aesthetic.

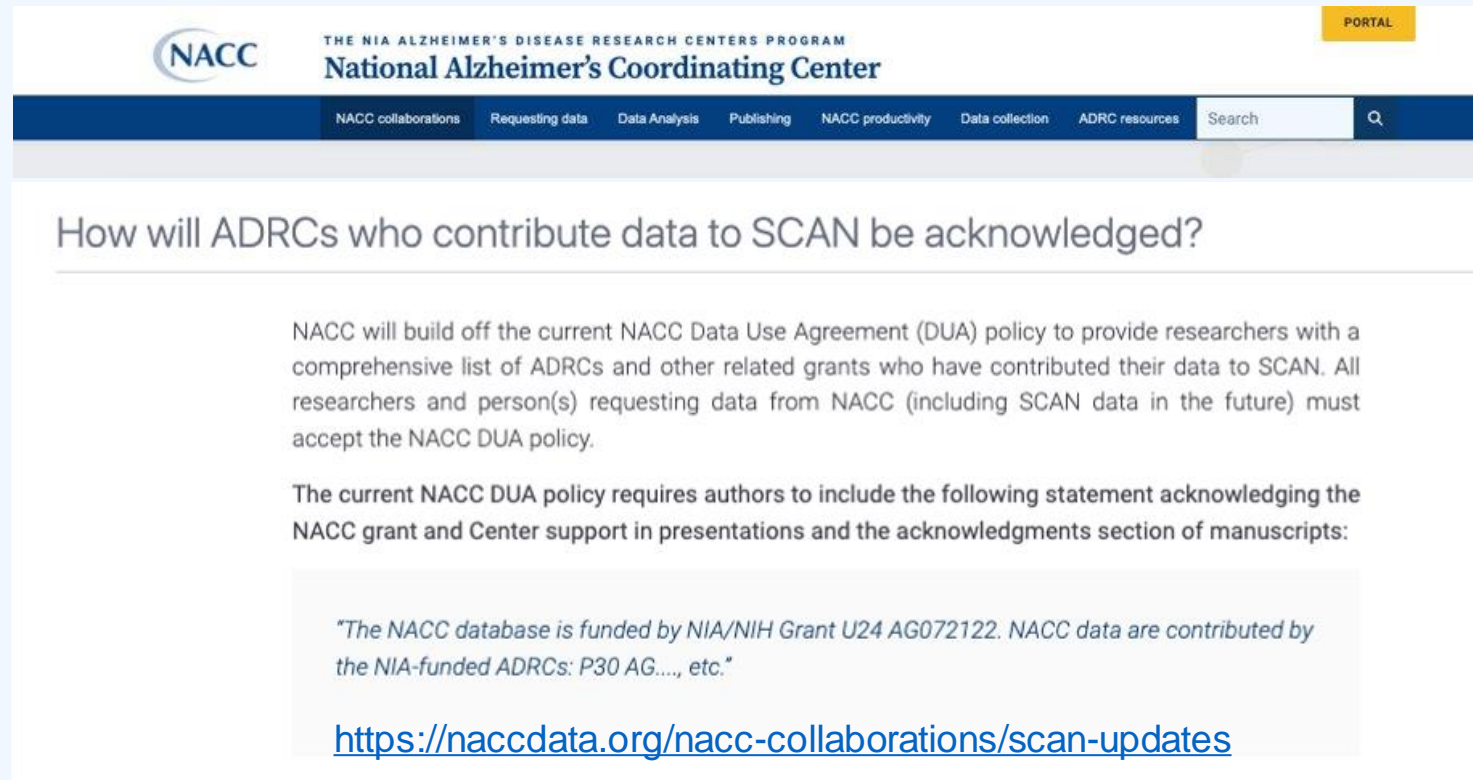
Extra Slides

Goal 3. Ensure Data Quality

- **March 2023 Audit**
 - **Results**
 - 100% response rate - All 33 sites submitting data to SCAN
 - Identified 476 ID errors - Across 20 ADRCs
 - **Next Steps**
 - **Correct data:**
 - SCAN team is correcting data marked as invalid through the audit
 - ADRCs will be asked to resubmit data that was deleted
 - **Initial data return to ADRCs:** NACC will share SCAN analysis data back to ADRC's via REDCap
- **Collaborating with LONI, SCAN, and the ADRCs to build a verification step for the LONI Submission Interface**

Goal 4. Provide Data Access and Transparency

- **Acknowledging ADRCs that contribute data**
 - **March 2023 Survey**
 - 100% of surveyed sites (36 in total) agreed with the proposed Acknowledgement plan for SCAN



The screenshot shows the NACC website header with the logo and the text 'THE NIA ALZHEIMER'S DISEASE RESEARCH CENTERS PROGRAM National Alzheimer's Coordinating Center'. A navigation bar includes links for 'NACC collaborations', 'Requesting data', 'Data Analysis', 'Publishing', 'NACC productivity', 'Data collection', 'ADRC resources', and a search box. The main content area features the title 'How will ADRCs who contribute data to SCAN be acknowledged?' followed by two paragraphs of text and a highlighted acknowledgment statement.

NACC will build off the current NACC Data Use Agreement (DUA) policy to provide researchers with a comprehensive list of ADRCs and other related grants who have contributed their data to SCAN. All researchers and person(s) requesting data from NACC (including SCAN data in the future) must accept the NACC DUA policy.

The current NACC DUA policy requires authors to include the following statement acknowledging the NACC grant and Center support in presentations and the acknowledgments section of manuscripts:

"The NACC database is funded by NIA/NIH Grant U24 AG072122. NACC data are contributed by the NIA-funded ADRCs: P30 AG..., etc."

<https://naccddata.org/nacc-collaborations/scan-updates>

SCAN: Public Dashboard

Real-time Public Dashboard coming soon!

- Will track each ADRC's SCAN readiness and participation
- Self-service tool for sites to update their readiness and track their SCAN submissions
- Provides ADRC's and researchers with up-to-date information on the number of standard MRI and PET images that are available for analysis
- Will link to site-specific MRI and PET dashboards available via ADRC Portals hosted on NACC's new Data Platform

SCAN Dashboard

This dashboard tracks the number of SCAN-compliant MRI/PET images and the number of participants that images have been submitted for by each Alzheimer's Disease Research Center to LONI/NACC. [Learn more about the Dashboard.](#)

Alzheimer's Disease Research Centers

CSV

Search

Institution	SCAN Readiness	SCAN Participation					
	Current SCAN readiness status	Total # of Participants	MRI			PET	
			# MRI participants	# MRI exams submitted	# MRI series submitted	# PET participants	# PET scans submitted
ADRC 0	Ready to Submit Data	256	236	251	567	117	237
ADRC 1	Ready to Submit Data	108	106	112	222	79	79
ADRC 2	Ready to Submit Data	25	25	25	64	0	0
ADRC 3	Ready to Submit Data	119	111	137	430	105	105
ADRC 4	Ready to Submit Data	96	96	96	288	0	0
ADRC 5	Ready to Submit Data	62	62	63	1033	0	0
ADRC 6	Ready to Submit Data	42	42	43	477	0	0

SCAN Data Sharing Survey

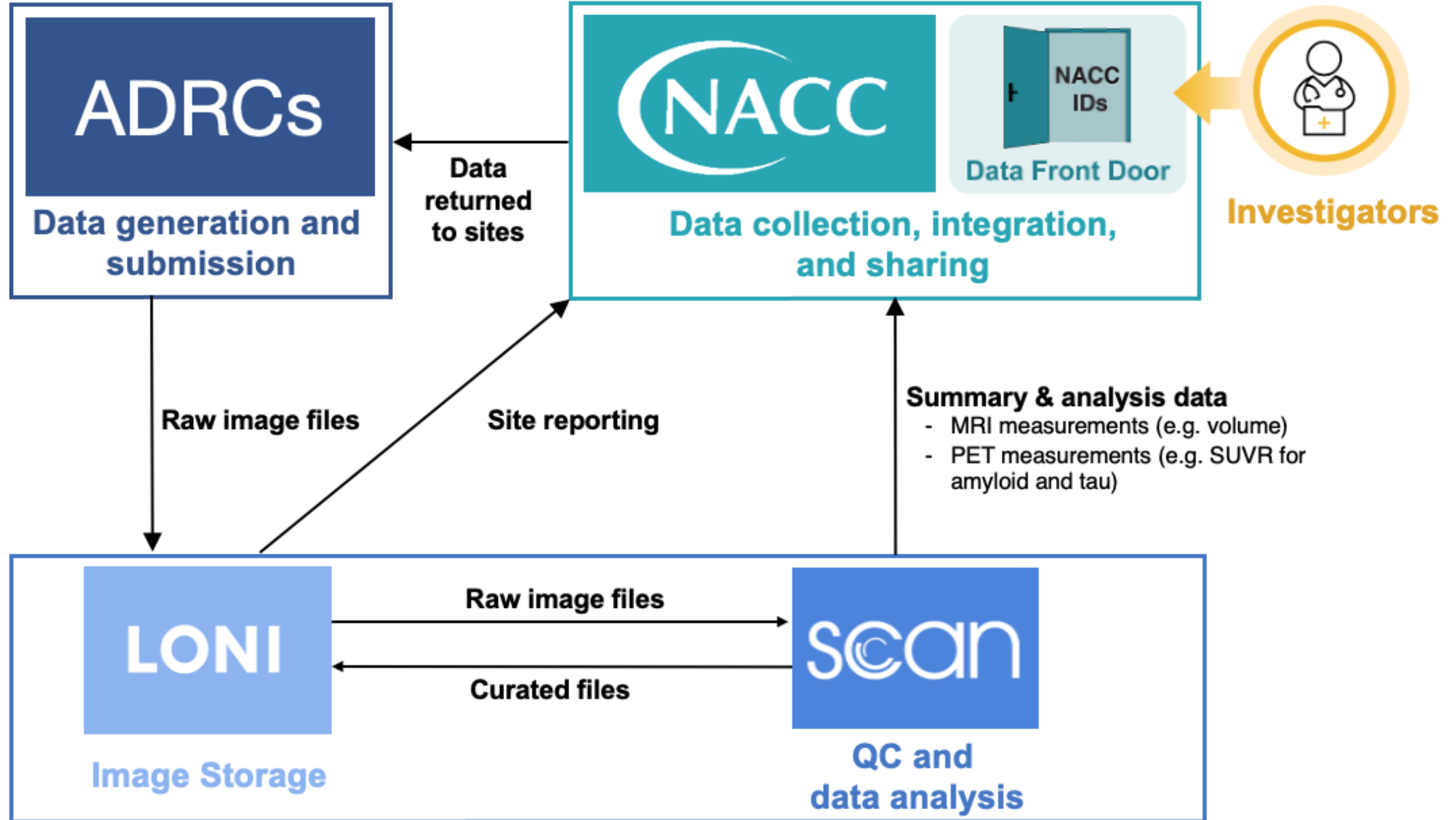
SCAN Data Sharing Survey Summary

NACC emailed all ADRCs on March 17, 2023 to provide important updates on the SCAN initiative and to solicit ADRC input on the following:

- **SCAN data sharing plan, DUA, and IRB barriers**
- **Acknowledgement plan for SCAN**
- **Confirmation step requirements for the new LONI upload system**

Results

- 36 of 37 ADRCs responded to the survey
- 89% of sites said that the SCAN data sharing plan would not impact their IRBs
- 100% of sites agreed with the Acknowledgement plan for SCAN
- 92% of sites are able to provide Year of Birth for the LONI confirmation step
- 92% of sites prefer to upload data using the PTID vs the NACC ID or NIA GUID
- 42% of sites are currently using the NIA GUID module



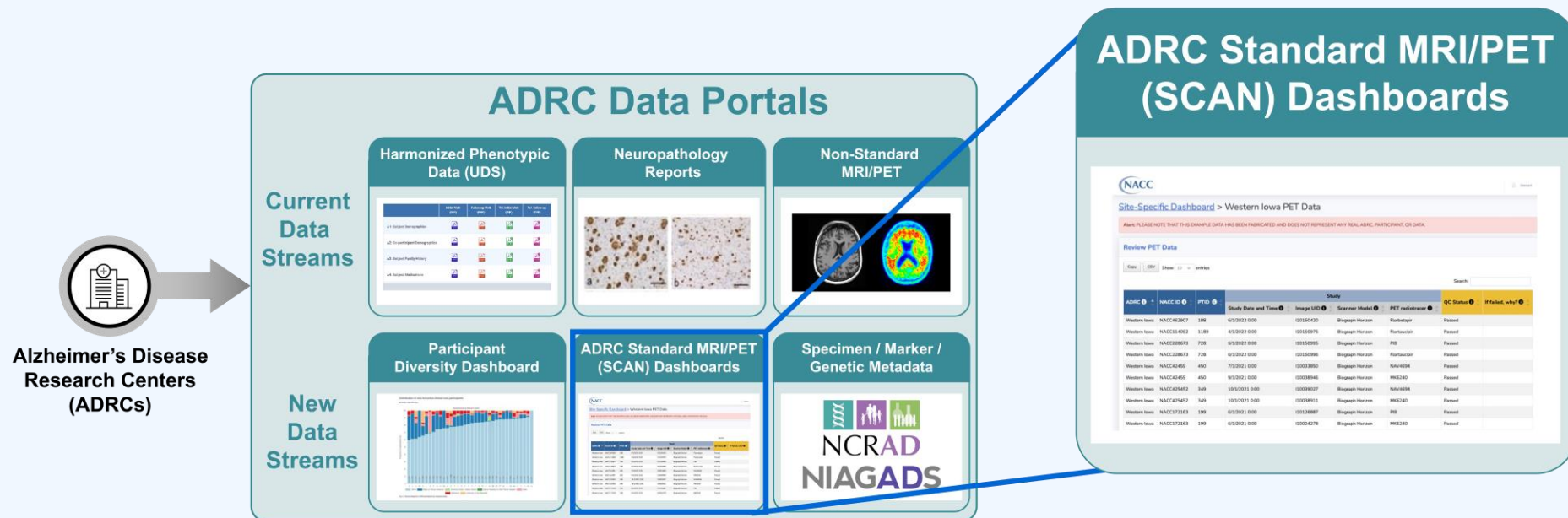
Goal 4. Provide Data Access and Transparency

- Return SCAN Data to the ADRCs

- Phase 1: REDCap data return

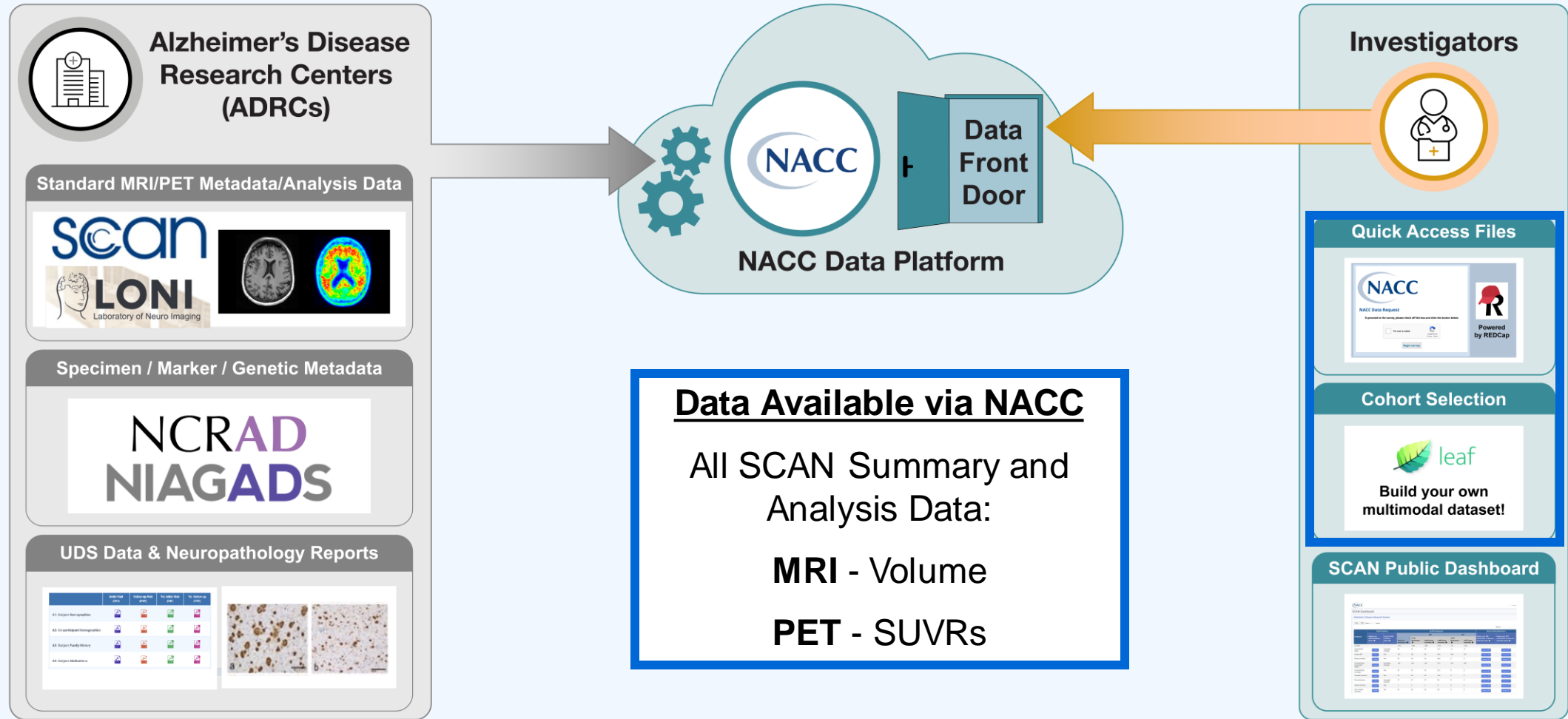
- All validated SCAN data will be returned to ADRCs via REDCap along with the SCAN data dictionary

- Phase 2: On-demand data access via the ADRC Data Portals at NACC



Goal 4. Provide Data Access and Transparency

- Share data with researchers everywhere via the NACC Data Front Door



Goal 4. Provide Data Access and Transparency

- **Acknowledging ADRCs that contribute data**
 - **March 2023 Survey**
 - 100% of surveyed sites (36 in total) agreed with the proposed Acknowledgement plan for SCAN
- **Next steps...**