Data Access Framework (DAF)

All Hands Community Meeting

October 19, 2016

Meeting Etiquette

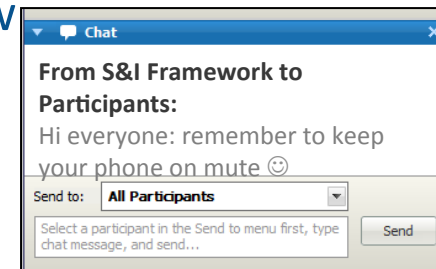- If you are not speaking, please keep your phone on mute

- DO NOT place your phone on hold, if you need to take another call or step away, please hang up and dial in again

  » Hold = Elevator Music = Challenge for Speakers and Participants

- This meeting is being recorded and will be archived on the DAF Wikipage, under "DAF Materials" → "DAF Past Meetings"

- Feel free to use the "Chat" feature for any questions, comments or any items you would like the moderator or participants to know

From S&I Framework to Participants:
Hi everyone: remember to keep your phone on mute ☺

Send to: All Participants

Select a participant in the Send to menu first, type chat message, and send...

Send

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Agenda

Topic	Estimated Time
General Announcements	5 minutes
HL7 Updates	10 minutes
pSCANNER: Pilot Report-Out	40 minutes
Next Steps & Questions	5 minutes

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MOVING DAY!

- Beginning **October 1st, 2016**, ONC initiatives have a new home!

- S&I Framework Wiki has moved to a new Confluence platform within the ONC Tech Lab's Standards Coordination area:

  https://oncprojectracking.healthit.gov/wiki/display/TechLabSC/ONC+Tech+Lab+Standards+Coordination+Home

- ONC Tech Lab provides a central location for ONC resources.

- Confluence offers exciting features allowing community members to easily access content.

- These features include:

  » Enhanced user interface

  » Improved navigation across initiative pages

  » Collaborative work environment for federal contractors and community members

  » Mobile-friendly browsing

- Please contact confluencesupport@esacinc.com for questions or comments.

General Announcements

- **DAF All Hands Community Meeting**

  » Our next All Hands meeting will be on **Wednesday, November 2nd, 2016 at 12:00 PM (ET).** The meeting details can be accessed on the homepage: https://oncprojectracking.healthit.gov/wiki/display/TechLabSC/DAF+Home

- **Consolidation of DAF TWG 1 and TWG 2**

  » The DAF pilot TWG 1 and TWG 2 have been consolidated into one meeting. The combined TWG calls meet on Wednesday's from 10-11 am ET.

- **DAF Pilot Wikipage**

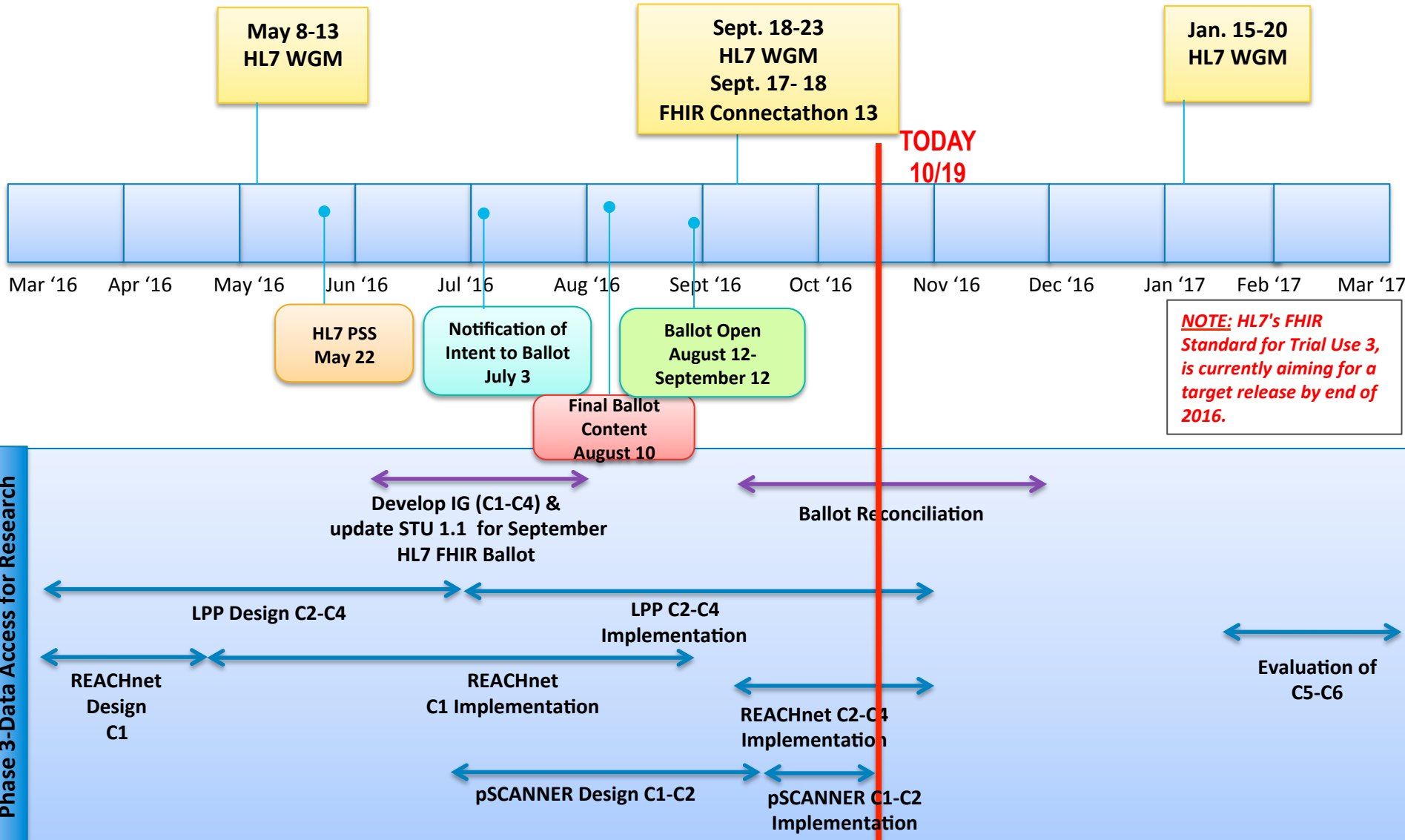 » To track the latest Phase 3 pilot activities, please visit: https://oncprojectracking.healthit.gov/wiki/display/TechLabSC/DAF+Pilots

- **Past Meeting Materials**

  » To access materials and meeting recordings from the All Hands meetings and technical WG calls, please visit: https://oncprojectracking.healthit.gov/wiki/display/TechLabSC/DAF+Past+Meetings

Notional Timeline

May 8-13 HL7 WGM

**Sept. 18-23 HL7 WGM
Sept. 17- 18
FHIR Connectathon 13**

Jan. 15-20 HL7 WGM

TODAY 10/19

Mar '16　Apr '16　May '16　Jun '16　Jul '16　Aug '16　Sept '16　Oct '16　Nov '16　Dec '16　Jan '17　Feb '17　Mar '17

HL7 PSS May 22

Notification of Intent to Ballot July 3

Ballot Open August 12- September 12

Final Ballot Content August 10

NOTE: HL7's FHIR Standard for Trial Use 3, is currently aiming for a target release by end of 2016.

Develop IG (C1-C4) & update STU 1.1 for September HL7 FHIR Ballot

Ballot Reconciliation

Phase 3-Data Access for Research

LPP Design C2-C4

LPP C2-C4 Implementation

REACHnet Design C1

REACHnet C1 Implementation

REACHnet C2-C4 Implementation

Evaluation of C5-C6

pSCANNER Design C1-C2

pSCANNER C1-C2 Implementation

REACHnet to follow Lincoln Peak Timeline for development of C2-C4. C5 and C6 are deferred until C1-C4 pilot activities have been sufficiently completed.

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DAF HL7 September Ballot Descriptions

1. *HL7 FHIR® IG: Data Access Framework (DAF), Release 1 (PI ID: 1265)*
   » Ballot Voting Results:
     - **Affirmative: 27**
     - **Negative: 53**
     - **Comments: ~119**
   » Ballot reconciliation started at the WGM and will be ongoing via HL7 InM WG meetings.
     - The next InM WG meeting is October 24, 2016 1-2pm ET. That meeting information can be found at the following link:
       http://www.hl7.org/Special/committees/inm/index.cfm
   » **The name of the IG has been renamed to US Core IG.** It was updated to be able to clearly identify the core profiles that US implementations should support. It was approved by HL7 US Realm Steering Committee on Thursday 9/22 at the WGM in Baltimore, MD

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2. HL7 FHIR® IG: Data Access Framework (DAF) Research, Release 1 (1st Comment-Only Ballot) (PI ID: 1265)

» Ballot Voting Results:
  - **Affirmative: 27**
  - **Negative: 30**
  - **Comments: ~90**

» Ballot reconciliation will begin after the US Core IG ballot reconciliation is completed as those changes may influence changes need in the DAF research ballot.
  - Those comments will be addressed with here in a DAF Community All Hands call or within the appropriate WG at HL7, they will all be voted up within HL7 following those guidelines

» NIB was submitted to HL7 and was approved by FHIR infrastructure on 10/17
» DAF Research IG will go from Comment-Only Ballot to STU-1 Ballot

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Preparing for DAF HL7 January 2017 Ballot Cycle

» **HL7 January Ballot Cycle Pool Sign-up Fast Approaching**

– With ballot submissions underway, we ask any community members that are also current HL7 members to please sign-up for the DAF consensus or review group for the January 2017 Ballot Cycle starting **Monday, November 7 through Thursday, December 8th**

– **NOTE:** This deadline also applies to non-members who wish to sign up for non-member participation in a ballot cycle

» **Please sign up on the HL7 Ballot Desktop:**
http://www.hl7.org/ctl.cfm?action=ballots.loginchoice

» **Ballot instructions can be found at:**
http://www.hl7.org/participate/onlineballoting.cfm?ref=nav

» Voting and comments are open during the ballot comment period **from December 9 through January 9**

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pSCANNER
Pilot Report-Out

Agenda

- Background

- Accomplishments

- Lessons Learned

- Ideas for Path Forward

- Questions

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Background

Goal

DAF Phase 3 (data access for research) aims to enable researchers to access data from multiple organizations and data sources within a Learning Health System (LHS) infrastructure.

Use Case

We will map an OMOP database to the DAF FHIR profiles and perform periodic ETL from Altamed OMOP databases to populate a DAF data mart.

Drivers

- Increase availability of Cerner and NextGen data for research and population health
- Enable participation of OMOP data marts and the OHDSI collaborators in DAF
- Promote adoption of APIs by research networks.

Pilot Goal

The pScanner Pilot completed an implementation of DAF-Research Capabilities 1 and 2.

C1: Standardize data extraction mechanism from clinical data sources to populate data marts.

C2: Standardize metadata about data marts, CDRN's, PPRN's and data sources.

Project Milestones

🚀	Project kick-off	7.11.16	🚩	Install & Connect Platform to live DB	8.20.16
🚩	Resource Level Mapping	7.15.16	🚩	Mapping to Live DB	8.27.16
🚩	Field Level Mapping	7.22.16	🚩	Task Resource Implementation	8.23.16
🚩	Value Set/Code Gap Analysis	7.26.16	🚩	Metadata resource implementation	9.05.16
🚩	Implementation with Test Data	8.01.16	🏁	End to end testing	9.30.16

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Providers, Partners and the Pilot Team

Pilot Team

▸ Daniella Meeker (Team Lead, pScanner Co-Principal Investigator)

▸ Hugh Gordon (Tech Lead, Akido Labs)

Collaborating Research Organizations:

▸ [Patient-Centered Scalable National Network for Effectiveness Research](#)

▸ [University of Southern California Keck School of Medicine](#)

▸ [AltaMed](#)

▸ [Southern California Clinical and Transformational Science Institute](#)

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Pilot Team: pSCANNER
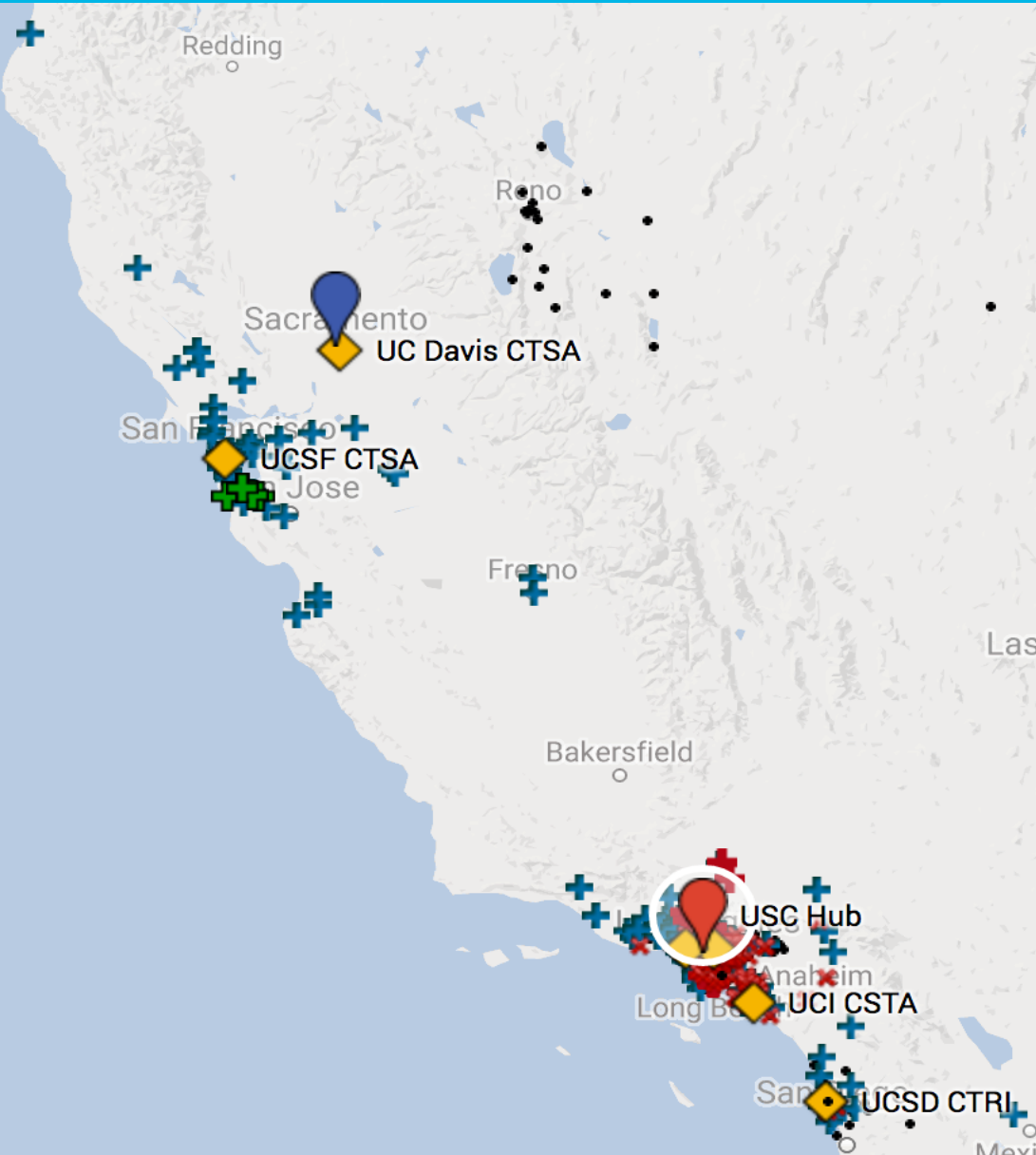
- pSCANNER is a PCORnet CDRN

- 12 health systems and data from > 20M patients.

- 5 Academic Medical Centers

- Los Angeles Department of Health Services

- 3 Federally Qualified Health Centers

- Veterans Administration Central Data Warehouse (VINCI)

- 4+ Different EHR platforms

16

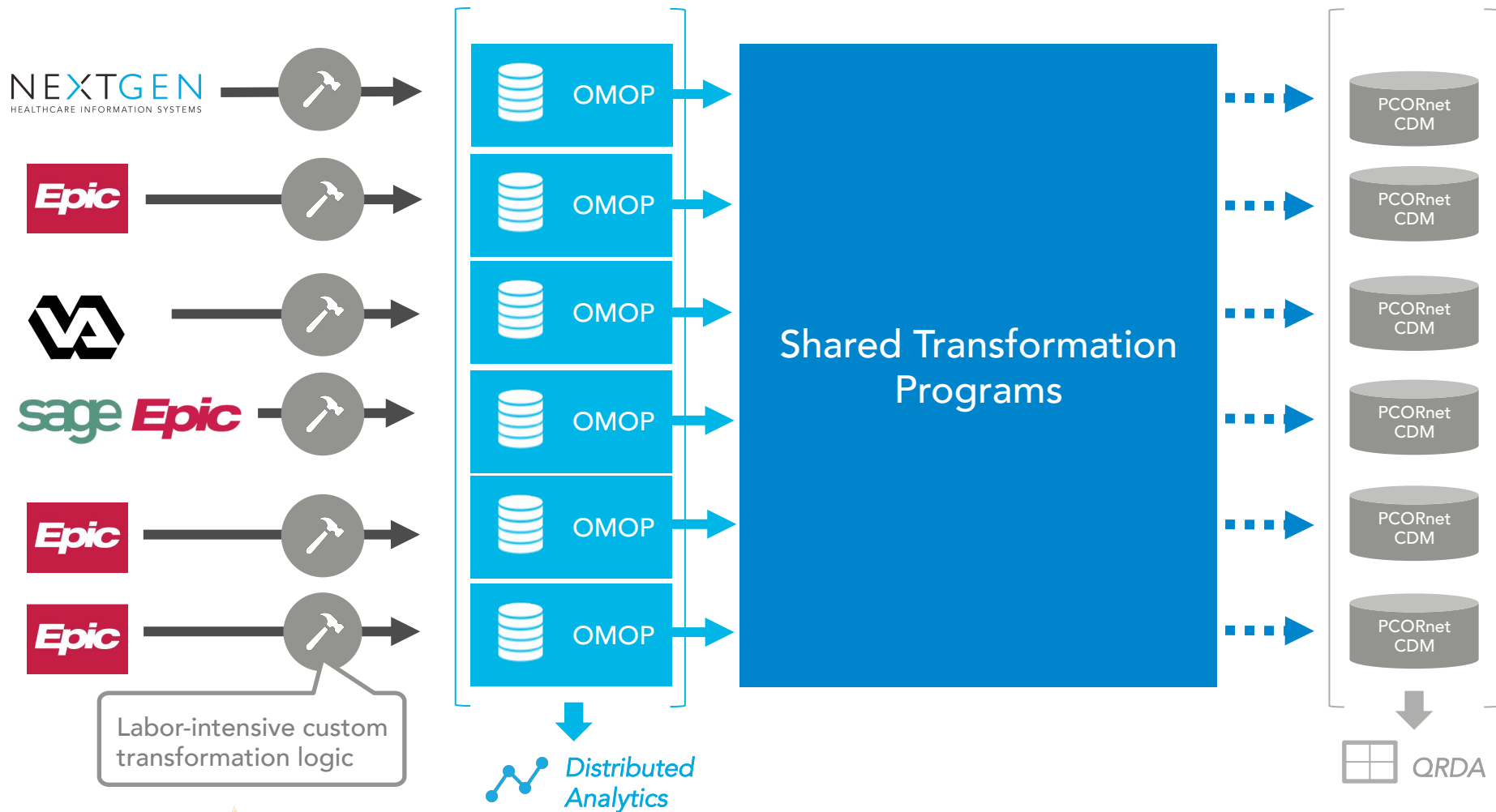## Akido Labs

Akido is a healthcare data management and technology company that was spun out of the University of Southern California's Digital Health Lab.

We work with leading health systems, large research organizations, and other healthcare companies to help them better manage, secure, access, and build solutions on top of their data.

Architecture before pilot

Architecture before pilot
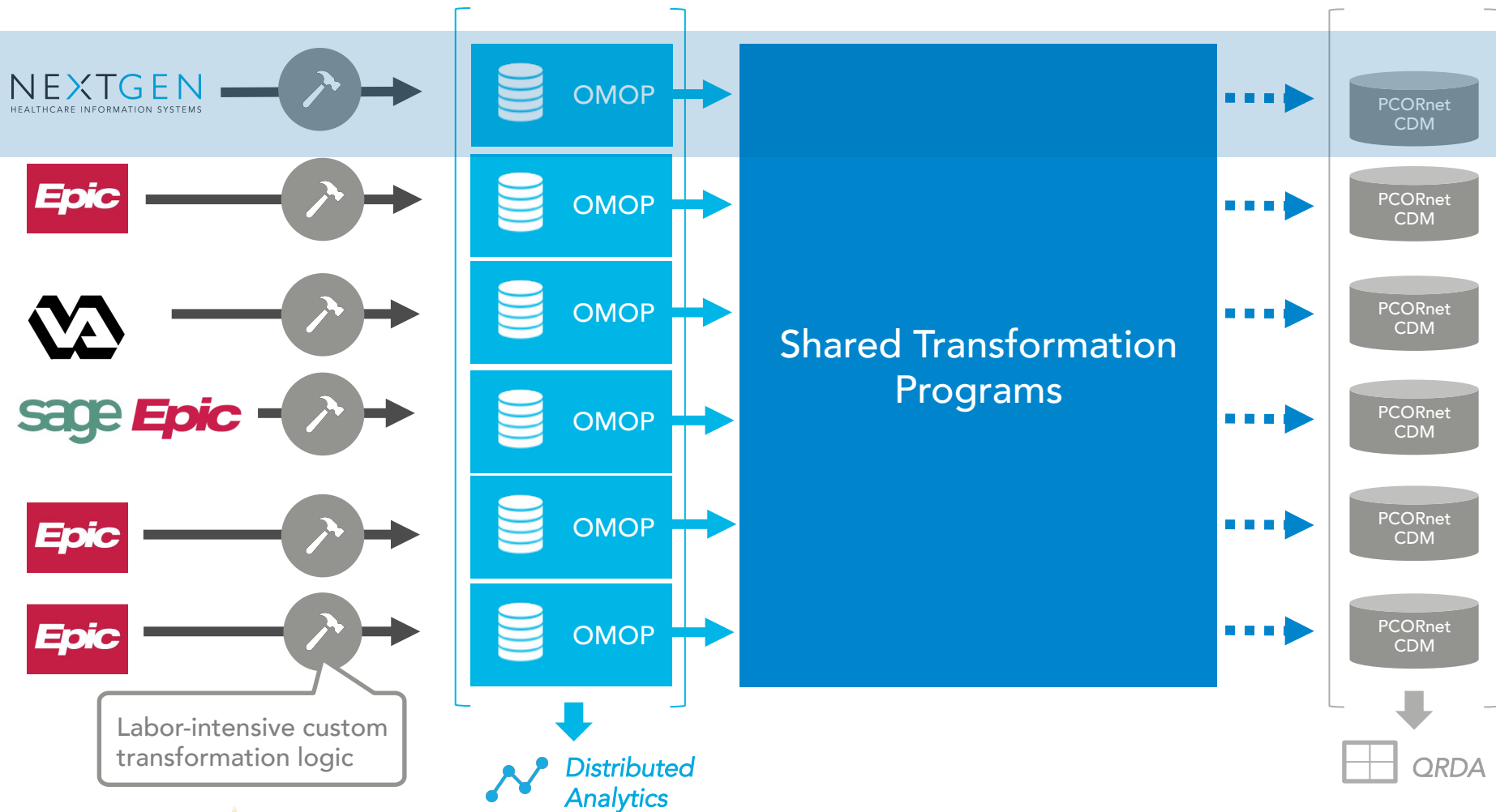
Detailed Architecture after Pilot

1 NextGen extract is transmitted as CSV via SFTP to Keck Research Cloud, where it is transformed and stored according to OMOP standard.

2 Data is extracted from OMOP storage, transformed and stored in Akido database.

3 DAF FHIR API endpoints are exposed for PopMedNet users with appropriate permissions.

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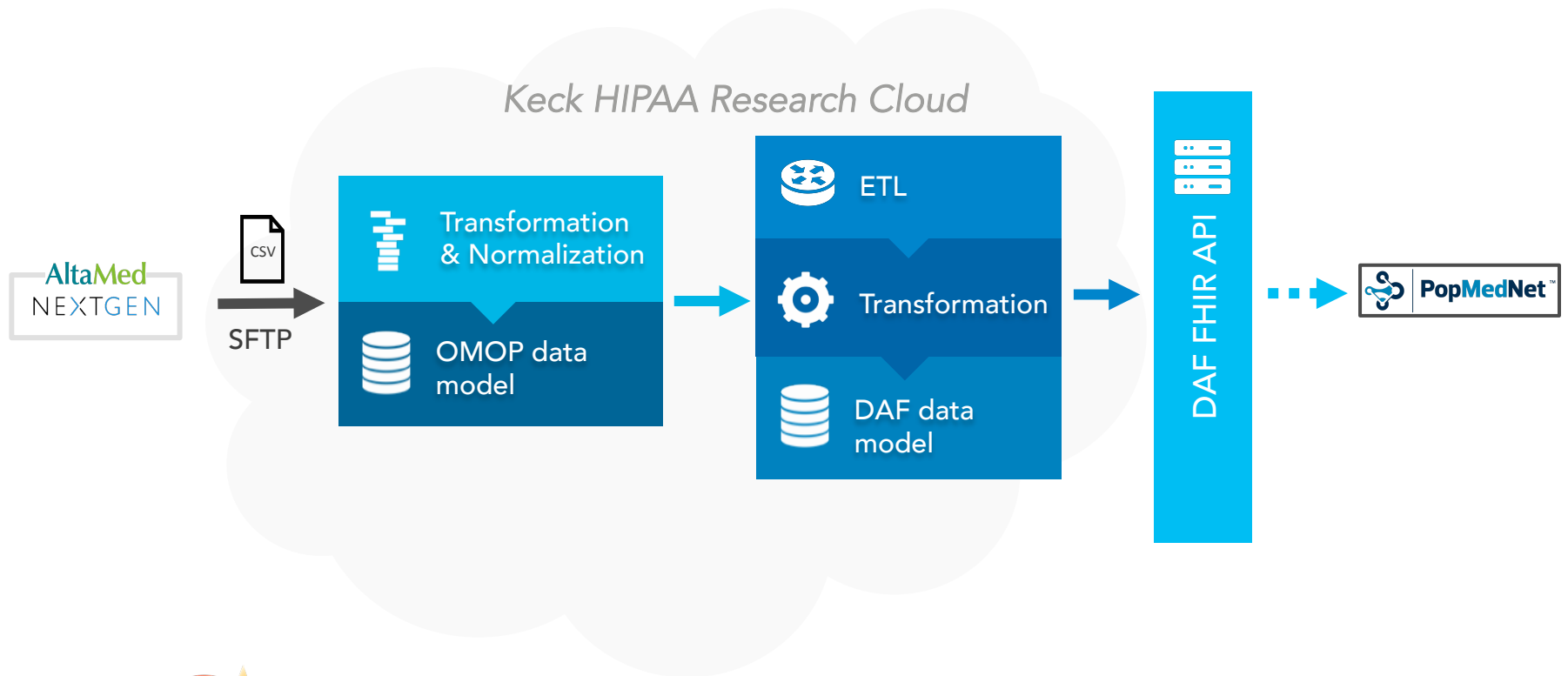
Accomplishments

Capabilities Implemented Overview

Capability	Description:
C1	Standardize data extraction mechanism from clinical data sources to populate data marts.
C2	Standardize metadata about data marts, CDRN's, PPRN's and data sources.
C3	Standardize Query Distribution mechanism.
C4	Standardize Query Results for returning aggregate data.
C5	Standardize Query Results for returning de-identified or identified patient data.
C6	Standardize Query Structure and Queries for identifying cohorts/populations.

Capabilities Implemented: C1 Details

C1-1	Data Sources SHALL document a mechanism to identify one or more patients whose data needs to be exported to a Data Mart.
C1-2	Data Sources SHALL document the mechanism to obtain patient consent prior to releasing data for research.
C1-3	Data Sources SHALL document the mechanisms used to exclude patients from the list of patients whose data is being released for research purposes.
C1-4	Data Sources SHALL document a mechanism to add new patients to the list of patients whose data is being exported to the Data Marts.
C1-5	Data Sources SHOULD support, as a minimum, the common clinical data set extraction, using standardized mechanisms
C1-6	Data Sources SHALL provide an API to extract data for a list of patients for research purposes.
C1-7	Data Sources SHALL provide an API to extract incremental data for a list of patients for research purposes.
C1-8	Data Sources SHALL provide the ability to invoke the extraction API's on regularly scheduled time intervals.
C1-9	Data Sources SHALL provide the ability to invoke extraction API's on demand
C1-10	Data Sources SHALL provide the data in a structured form using the DAF FHIR profiles.
C1-11	Data Sources SHALL identify the DAF FHIR profiles used for exporting data.
C1-12	Data Sources SHALL maintain an audit log of data exported.
C1-13	Data Sources SHALL be able to perform exports distinctly for each Data Mart.
C1-14	Data Sources SHOULD de-identify, or anonymize/pseudonymize and maintain cross-link for PHI as required by policy and agreements.

C1-15	Data Marts SHALL ingest data from one or more Data Sources
C1-16	Data Marts SHALL extract and preserve provenance metadata for each Data Source.
C1-17	Data Marts SHOULD support, as a minimum, the common clinical data set
C1-19	When a Data Mart uses a data model that is not based on PCORnet CDM, Data Marts SHALL create a mapping from DAF FHIR profiles to the Data Mart data model.
C1-20	Data Marts SHALL maintain an audit log of the events triggering data updates.
C1-21	Data Marts SHALL be capable of invoking the data extraction API for a single patient or list of patients from a Data Source.
C1-22	Data Marts SHALL be capable of invoking the incremental data extraction API for a single patient or list of patients from a Data Source.
C1-23	Data Marts SHALL be capable of adding new patients to the list of patients whose data is being extracted from a Data Source
C1-24	Data Sources SHALL document the mechanism to obtain patient consent prior to releasing data for research
C1-25	Data Sources SHALL document the mechanisms used to exclude patients from the list of patients whose data is being released for research purposes.

Capabilities Implemented: C2 Details

C2-1	Data Mart Metadata SHALL be defined to identify the characteristics of the Data Mart population.
C2-2	Data Mart Metadata SHALL be defined to facilitate verification of data loading from Data Sources.
C2-3	Data Marts SHALL populate a Data Mart Metadata resource based on the data loaded from the Data Source.
C2-4	Data Mart Metadata SHALL NOT contain any PII or PHI information.
C2-5	Data Mart Metadata SHALL be exposed via RESTful APIs.
C2-6	Data Mart Metadata SHALL be capable of tracking changes across data loading activities.

Pilot Deliverables: Documentation

Deliverables

▸ [OMOP to FHIR mapping spreadsheet](#)

▸ [Learning and timeline document](#)

▸ [pScanner installation plan](#)

▸ [pScanner AltaMed Extract database analysis](#)

▸ Source code for the test database creation

▸ Source code for the test mapping

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Pilot Deliverables: Demo

▸ Video of demo available

▸ Sample JSON of FHIR resources (link will be emailed out to DAF team)

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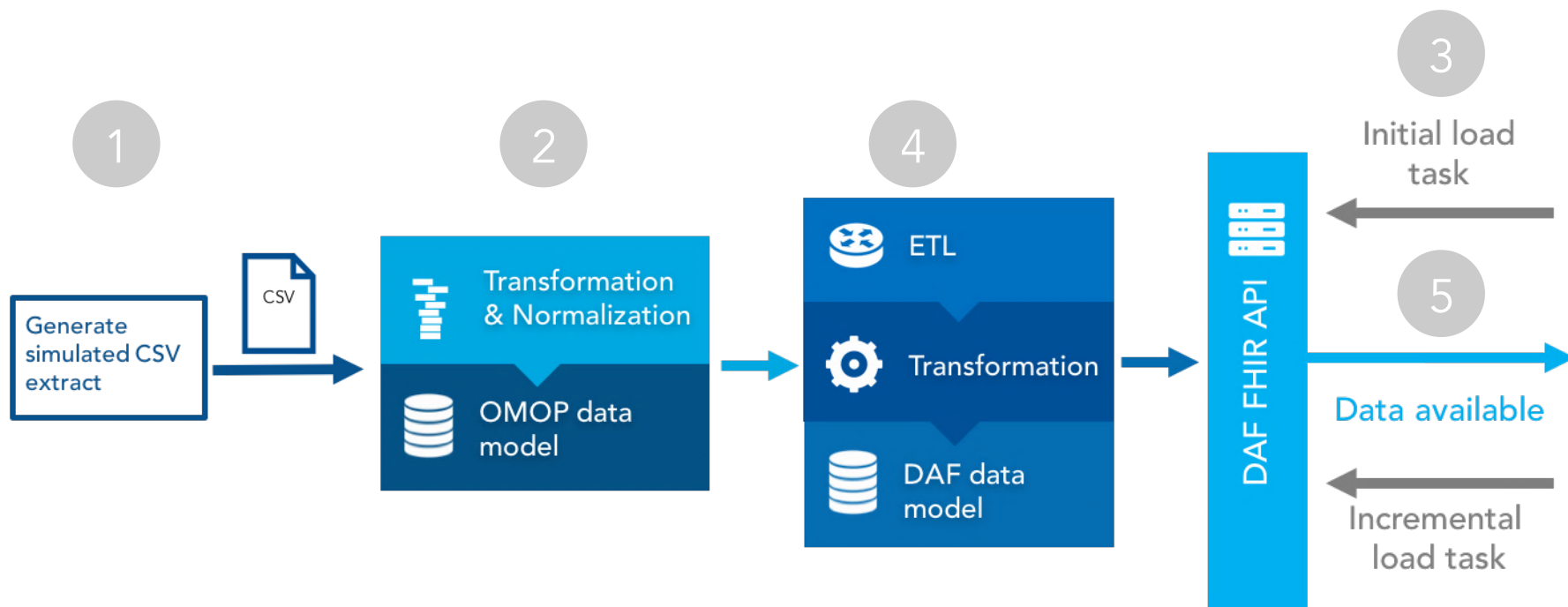
Capability: Functional Requirements

Functional Requirements	Corresponding Functional Requirements ID
Passed and Completed 1. Administrative 2. Resource Level Mapping (7/11/16) 3. Field Level Mapping (7/22/16) 4. Value Set/Code Gap Analysis (7/26/2016) 5. Implementation with Test Data (8/1/16) 6. Installation and connection of Akido platform to live database (8/20/16) 7. Mapping of live database (8/27/16) 8. Task resource implementation (8/23/2016) 9. Metadata resource implementation (9/5/2016) 10. End to end testing (9/30/16)	1. C1-1,2,3,4,14,24,25 2. C1-5 3. C1-17,19 4. C1-11 5. C1-23 6. C1-10,12,13,15 7. C1-16 8. C1-6,7,8,9,20,21,22 9. C2-1,2,3,4,5,6
Incomplete Data Marts SHALL use the DAF FHIR profiles to PCORnet CDM mapping when the Data Mart implements the PCORnet CDM based model. *** Reason is :* *Out of scope for our pilot. We created and used OMOP CDM to FHIR models*	▸ C18

Content: Implementation Guide

Implementation Guide

- ▸ Step by step explanation of C1 and C2 implementation was very useful ([DAF Research Implementation Guide](#))

- ▸ DAF-Core profiles for each FHIR object were also useful ([DAF-Core Profiles](#))

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- Unit testing with jUnit

- Integration and validation testing with custom built scripts

  - Testing for data import accuracy

  - Testing for basic functionality

- Manual testing of each object

  - Visual inspection and comparison to examples

  - Timing of insertion and read operations

- Full test implementation with test data

  - 1000 fully anonymized patients derived from CMS data

  - End to end test of extraction, transformation and load

  - End to end test of all capabilities

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Final Results

▸ Successful implementation of all C1 and C2 capabilities (aside from C-18 which was not applicable)

▸ Ability to load data upon POST of an appropriate TASK resource

   o Full load

   o Incremental load

▸ Ability to query resulting data through typical FHIR queries

▸ Performance bottlenecks

   o Need to scan all data even during incremental load

   o Need to copy all data during load, doubling storage requirements

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Final Results: Pilot Metrics

	Pilot	Test	Demo
Size of dataset	~16.63 GB	~31 MB	~10 MB
Number of Patients	812,796	1000	30
Number of Visits	12,901,835	47,458	1781
Number of Observations	52,242,228	13,482	442
Number of Objects Implemented	10	9	9
Update frequency	Weekly	N/A	N/A
Time to import one row	~100 ms	~250 ms	~250 ms
Time to fetch one object	80 ms	80 ms	80 ms
Time to fetch one page with 1000 objects	~250 ms	~750 ms	~750 ms

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Lessons Learned

Mapping

Resource Level Mapping	‣ Data models can differ in incompatible ways ‣ Overlap in FHIR resources
Field Level Mapping	‣ Mapping from source systems is very difficult ‣ Mapping OMOP Concept, Domain, Class to FHIR deemed out of scope
Value Set/Code Gap Analysis	‣ Vocabulary mapping is site specific and tricky

Implementation

Implementation with Test Data	‣ Test dataset does not mirror production – hard to get good test data
Task Resource Implementation	‣ None
Installation and Connection of Akido Platform to Live Database	‣ Oauth not widely adopted on our host systems ‣ Security remains a difficult area with no clear standards
Mapping of Live Database	‣ None

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Security, Privacy, and Provenance

‣ The pilot leveraged pre-existing relationships between pSCANNER and participating institutions

‣ Security was achieved primarily at the network level

  o IPSEC or SFTP for protection of data in transit

  o Firewalls, secure datacenters and limited host access for protection at rest

‣ The provenance of the data was tracked through the presence of different data exports

  o One provenance resource was constructed per extract

  o The origin of the export was derived from the file names or database names.

‣ HIPAA compliance and institutional privacy and security concerns were addressed by pre-existing agreement

‣ Patient MRNs were encrypted at the source system

‣ Encrypted MRNs were stored with the records

‣ All other data was de-identified

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Path Forward

Next Steps

▸ We are seeking signals for a business case - interoperability with other emerging FHIR initiatives that are intended to operate on multiple records, including future DAF activities in support of Population Health, Registries, and the Clinical Quality Framework

▸ Alternatively, if ResDAC indicated they would map CMS data to DAF, and expose to PopMedNet, it would be a "game changer"

▸ We may schedule a presentation of DAF3 Framework as a candidate for Precision Medicine Initiative (All of US) and other PCORnet CDRNs

▸ We will be investigating use of DAF3 as a framework for population health measurement and development of decision support tools

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Next Steps

▸ Next steps for pSCANNER will be dependent upon (1) the PopMedNet implementation and (2) the extent to which PMN implementations for DAF are interoperable with pSCANNER adapter for PMN

  ▸ Production implementation across pSCANNER is not resourced, but would be worthwhile if it fits with other pSCANNER projects that have funding

  ▸ We would be more likely to seek resources if DAF were part of either PMI or CQF standards

Recommendations for other PCORnet CDRNs:

▸ With the APIs that have been implemented on existing databases, primarily there are opportunity costs associated with implementing technology locally

  ▸ PCORnet technical teams have multiple competing priorities, and are more focused on PCOR products and sustainability

  ▸ There is not yet a business case for adoption - there no graphical user interface to query DAF API that is an improvement upon I2b2, OHDSI, or PopMedNet (this may depend on success of C3-6)

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Useful Links and Completed Artifacts

Deliverables
- [OMOP to FHIR mapping spreadsheet](#)
- [Learning and timeline document](#)
- [pScanner installation plan](#)
- [pScanner AltaMed Extract database analysis](#)
- Source code for the test database creation
- Source code for the test mapping

References
- [FHIR Resource List](#)
- [OMOP Resource List](#)
- DAF P3 Functional Requirements spreadsheet
- [OMOP Sample Data](#)
- [Common Clinical Data Set](#)
- [OMOP Standard Vocabularies](#)
- [OMOP Standard Vocabularies Presentation](#)
- [OHDSI Standardized Vocabularies Requirements](#)
- [Research IG](#)
- [Core IG](#)
- [Core Security](#)

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Contacts

pScanner

Daniella Meeker

dmeeker@usc.edu

Akido Labs

Hugh Gordon

hugh@akidolabs.com

Next Steps

- **Upcoming Meetings**

  » **HL7 Infrastructure and Messaging (InM) WG:** October 24, 2016 at 1:00 PM (ET)
    - Meeting information can be found by visiting:
      http://www.hl7.org/Special/committees/inm/index.cfm

  » **Combined Pilot Technical Workgroup (TWG):** Wednesday, October 26, 2016 at 10:00 AM (ET)

  » **All Hands Community Call:** Wednesday, November 2, 2016 at 12:00 PM (ET)

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DAF Support Team

- **ONC Sponsor:**
  - » Farrah Darbouze Farrah.Darbouze@hhs.gov
- **S&I & DAF Initiative Coordinator:**
  - » Johnathan Coleman jc@securityrs.com
- **Support Team:**
  - » Project Management:
    - – Jamie Parker jamie.parker@esacinc.com
    - – Gayathri Jayawardena gayathri.jayawardena@esacinc.com
  - » Project Support:
    - – Nik Reineke nikolas.reineke@esacinc.com
    - – Swapna Bhatia swapna.bhatia@esacinc.com
  - » Technical SME:
    - – Nagesh (Dragon) Bashyam nagesh.bashyam@drajer.com
  - » Standards SME:
    - – Brett Marquard brett@riverrockassociates.com
    - – Ed Larsen ed_larsen@comcast.net
  - » Software Developer:
    - – Douglas Harley douglas.andrew.harley@gmail.com
  - » Privacy and Security SME:
    - – Glen Marshall gfm@securityrs.com
  - » Standards Development Support:
    - – Angelique Cortez angelique.j.cortez@accenturefederal.com

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DAF Publications

- **DAF FHIR IG DSTU (HL7)**
  - » On September 23, 2015, Health Level Seven® International (HL7®) published Release 2 of the HL7 Fast Healthcare Interoperability Resources (FHIR®) Draft Standard for Trial Use (DSTU). Additionally, we are pleased to announce that the DAF FHIR Implementation Guide, a US-realm specific implementation guide, has also been published! The DAF FHIR IG identifies and recommends standards for the interoperable representation and transmission of data using the notion of a Query Stack which modularizes the various layers of the Data Access Framework.

- **DAF Document Metadata Based Access IG (IHE)**
  - » On September 24, 2015, the Integrating the Healthcare Enterprise (IHE) Patient Care Coordination (PCC) Technical Committee published The Data Access Framework (DAF) Document Metadata Based Access Implementation Guide. This US National Extension provides requirements and guidance on accessing clinical documents created during clinical workflows. The guide accomplishes this using RESTful resources based on HL7 FHIR® and the more traditional SOAP based IHE Profiles.

  - » On October 24, 2014, the IHE Patient Care Coordination (PCC) domain published the DAF White Paper, A Data Access Framework Using IHE Profiles as a resource artifact under the IHE technical framework resources.

Useful Links

DAF Wiki Homepage: https://oncprojectracking.healthit.gov/wiki/display/TechLabSC/DAF+Home

DAF Initiative Signup: https://oncprojectracking.healthit.gov/wiki/display/TechLabSC/Join+the+DAF+Initiative

DAF Past Meetings: https://oncprojectracking.healthit.gov/wiki/display/TechLabSC/DAF+Past+Meetings

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