Alzheimer's Mapping Project

A "quick" but potentially important project.

Project Introduction, Update, and Discussion

Meredith Nahm Zozus, PhD
Professor, Div. Chief and Director of Clinical Research Informatics
Keith M. Orme and Pat Vigeon Orme Endowed Chair in Alzheimer's and Neurodegenerative Diseases
University of Texas Health Sciences Center San Antonio
Joe R. and Teresa Lozano Long School of Medicine

UT Health San Antonio
Joe R. & Teresa Lozano Long School of Medicine

The Project

HL7 FHIR® Resources (EHR Standards)

Alzheimer's Disease Research Centers (ADRC) Uniform Data Set (UDS)

CDISC Alzheimer's Therapeutic Area User Guide (FDA Submission Stds.)

1. Mapping → Potential for streamlining data collection

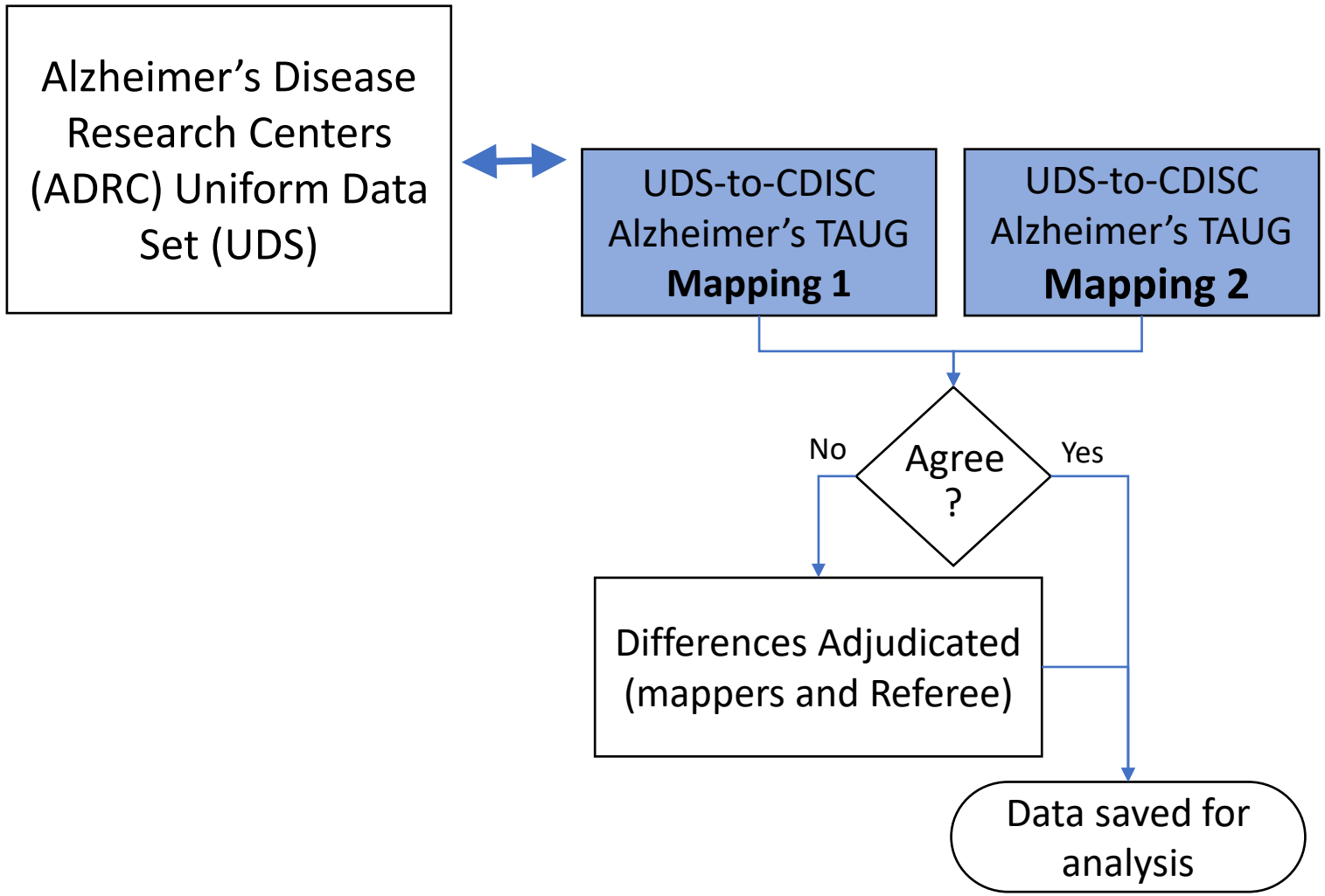
2. Mapping → Potential for increasing reuse

3. Identification of Differences → Potential for harmonization
Potential to improve standards

Why do we care about CDISC mapping?

- FDA and the regulated industry is starting to use Real World Evidence (RWE) based on Read World Data (RWD) in regulatory decision-making
  - Post-market Commitments / Requirements
  - Safety evaluation
  - New indications, and
  - New drugs
- FDA considers Longitudinal, Observational data collection and Registries to be an important source of RWD
  → pharma or FDA are likely to inquire about use of UDS data.
- FDA submission for trial and RWD requires submission of data in the CDISC standards.
- The CDISC standard includes an Alzheimer's therapeutic area user guide.
- Identifying opportunities for possible harmonization could be impactful.
  - e.g., may help assess post-market safety and even efficacy toward slowing cognitive decline or functional progression

Mapping Methods



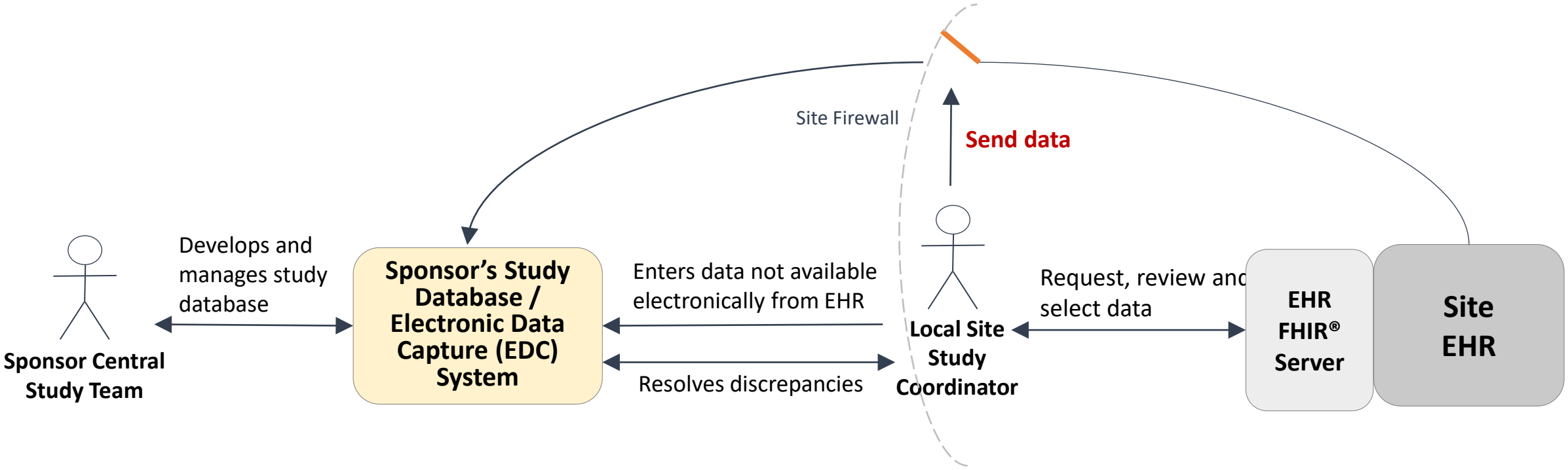
CDISC Adjudicated Mapping Results

Packet	Number of Data Elements	CDASH Domain Mapping IRR (%)	CDASH Domain Mapping rate n (%)	CDASH Data Element Mapping IRR (%)	CDASH Data Element Mapping rate n (%)
UDS IVP	963	98%	934(97%)	96%	934(97%)
UDS FVP	893	98%	859(96%)	97%	859(96%)
UDS TIP	994	99%	936(94%)	98%	936(94%)
UDS FIP	850	97%	790(93%)	97%	790(93%)
UDS 4	883	98%	837(95%)	97%	837(95%)
FTLD TVP	342	100%	342 (100%)	100%	342 (100%)
FTLD TFP	346	100%	346(100%)	100%	346(100%)
LBD IVP	285	100%	285(100%)	100%	285(100%)
LBD FVP	286	100%	286(100%)	100%	286(100%)
CLD	31	100%	31(100%)	100%	31(100%)
AD	11	64%	10(91%)	64%	10(91%)
COVID-19	70	100%	64(91%)	100%	64(91%)
Total	5,954	98%	5,776(96%)	98%	5,776(96%)

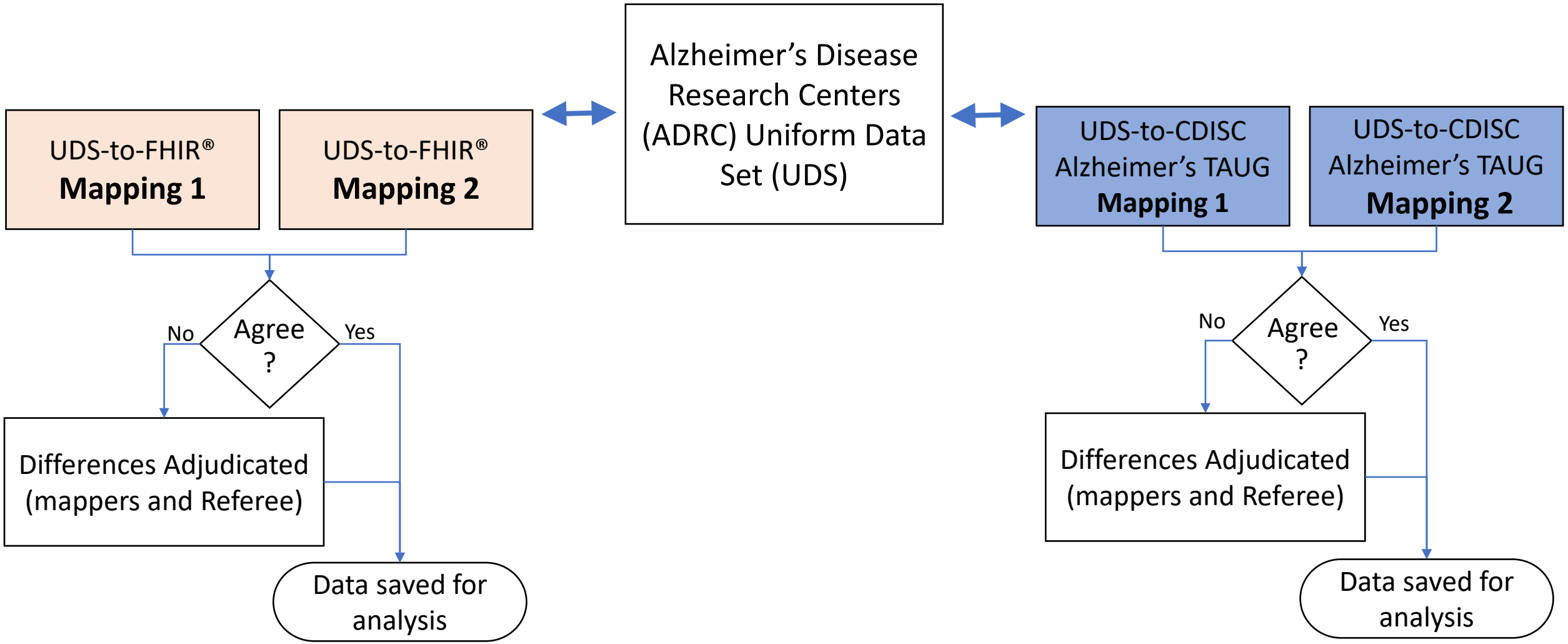
Why do we care about FHIR® mapping ?

FHIR®: Fast Healthcare Interoperability Resources

Diagram is an example, there are multiple approaches.



Why do we care about FHIR® mapping ?



FHIR Adjudicated Mapping Results

Packet	Number of Data Elements	FHIR® Mapping IRR n (%)	FHIR® Mapping Rate n (%)
UDS IVP	963	87%	407 (42%)
UDS FVP	893	83%	403 (45%)
UDS TIP	994	85%	437 (44%)
UDS FIP	850	82%	350 (41%)
UDS 4	883	86%	361 (41%)
FTLD TVP	342	57%	75 (22%)
FTLD TFP	346	57%	75 (22%)
LBD IVP	285	53%	116 (38%)
LBD FVP	286	58%	129 (42%)
CLD	31	45%	4 (13%)
AD	11	100%	3 (27%)
COVID-19	70	94%	55 (79%)
Total	5,954	79%	2,399 (40%)

Things to Consider

1. Questionnaires may “map” but they wont be available unless they are actually in the EHR
2. FHIR® Mapping results reflect presence of a structured field in the standard with which EHR data may be associated
   → An EHR vendor may not map anything to it
   →Facilities, specialties and providers may not use the field that maps to the FHIR® resource; we observed a ~10% variability among three sites where we mapped three studies.
   →THUS - mapping should be repeated at sites
3. Data may not be complete or of acceptable quality
   →These should be measures at sites
4. Sites may differ wrt participants actually being patients at the facility. The care relationship with a participant impacts the type and extent of data available from the EHR UNLESS sites document research visits in the EHR .

Example Findings From the *ACE-RWD* Program

- ~10% site-to-site variability in FHIR® mapping
- Incorrect LOINC code mapping in the EHR
- EHR lab values in different units – took three weeks to resolve
- 3 case verification for lab data
  - 3 patients, 8 visits
  - 696 fields compared, 4 discrepancies, all confirmed error in manual abstraction
  - Traditional Data Collection Error rate = 0.57% 95% CI (0.18, 1.57)
  - FHIR Lab Data Error rate = 0 %
- Study Coordinators, "*Just getting labs and medications will save us 40% of the data entry time*"

1. 

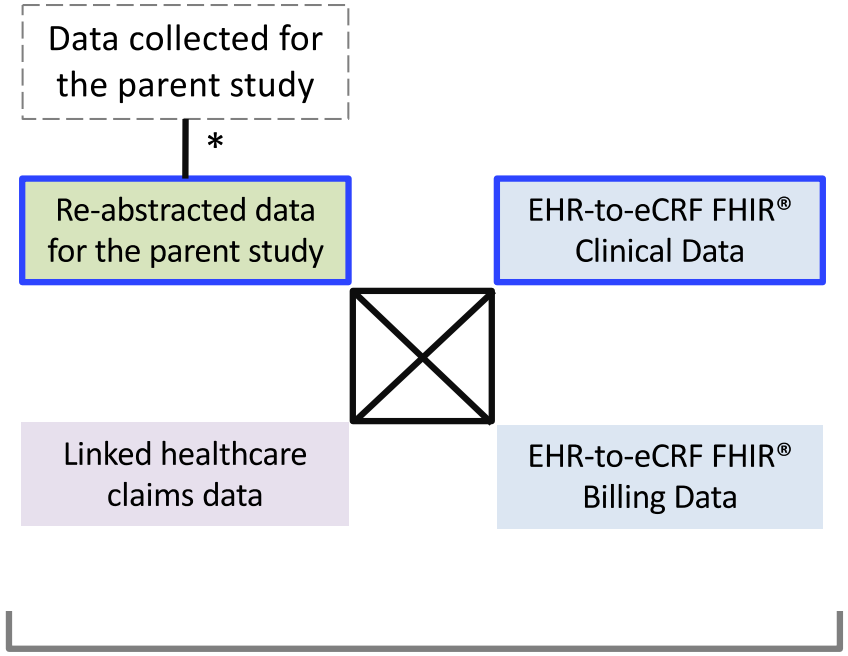
can populate data forms with FHIR® data.

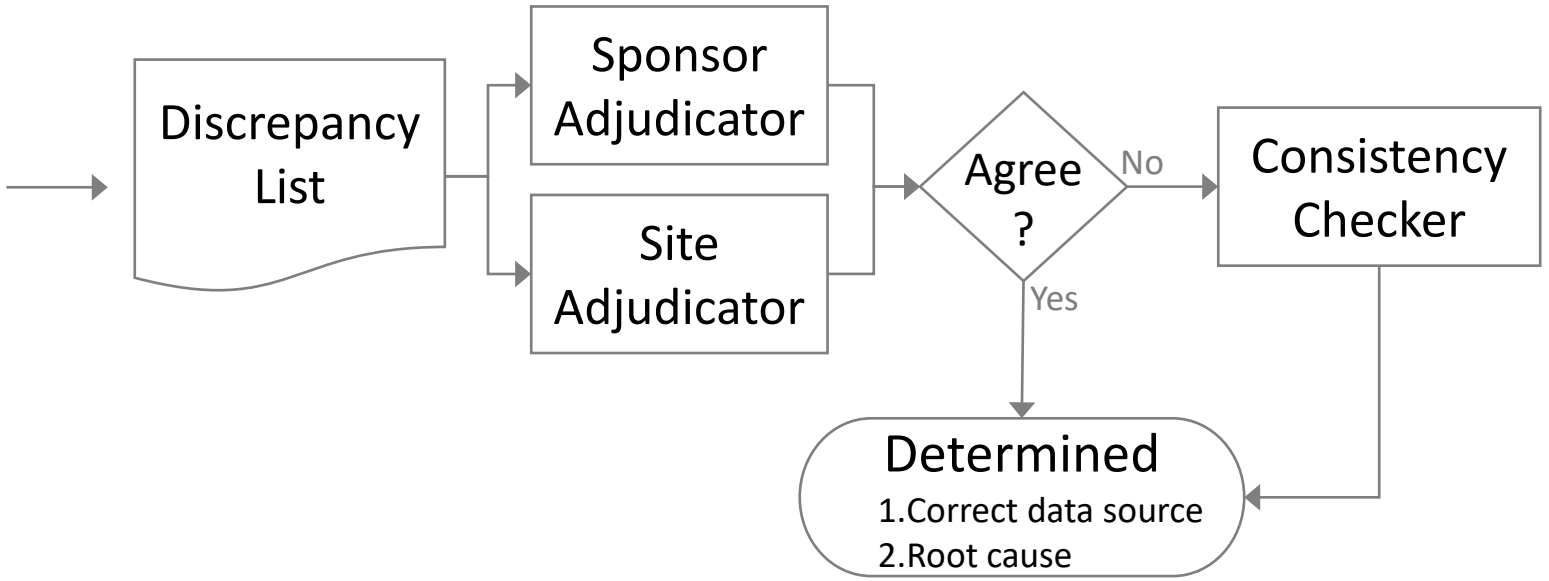
   Based on UDS 3 data, the mapping rate looks to be ~ 14%
   We could potentially use FETCH on FHIR® to extend
   We could consider an ADRC Health Level Seven (HL7) FHIR® Profile to standardize FHIR® data collection

2. We would need to update the mapping for UDS 4.

3. We should do an accuracy assessment.

Accuracy Assessment (*ACE-RWD*) Method





Parent Study Sponsor Identifies & Sends Discrepancies

Imported into Adjudication System

Adjudication for
1. Correct Data Source
2. Root Cause

Informatics Consistency Check

* Pairwise comparison of query-clean parent study data to query-clean re-abstracted data to calculate the Inter- or Intra-rater reliability for Medical Record Abstraction

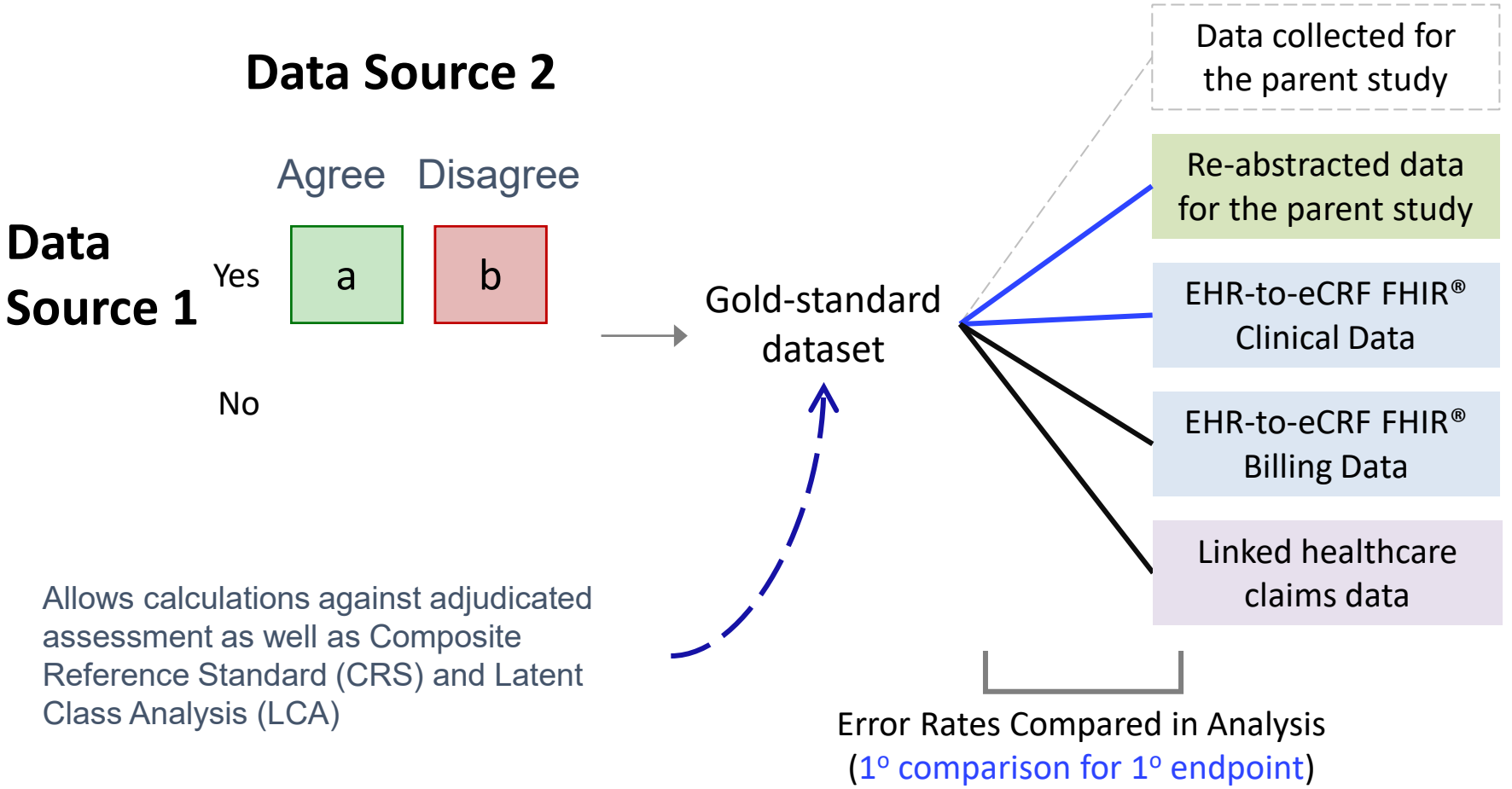
☒ Pairwise comparison of data values between evaluated data sources

Accuracy Analysis

All comparisons performed for all data values

Measures:
- Location
- Frequency
- Extent of errors

Adjudication:
- Which source in error
- Root cause



Big Thank You To Those Who Worked on the FHIR® and CDISC Mapping !

- Helen Foster, UT Health San Antonio, South Texas ADRC
- Gary Walker, CDISC
- Bess LeRoy, CDISC
- Rhonda Facile, CDISC
- Amy Palmer, CDISC
- Zhan Wang, UT Health San Antonio, South Texas ADRC
- Kayla Torres, UT Health San Antonio, South Texas ADRC
- Maryam Garza, University of Arkansas for Medical Sciences,
  HL7 Working Group and VULCAN Operations co-chair.