Supporting Clinical and Translational Researchers with Electronic Patient Data

Thomas R. Campion, Jr., Ph.D.
Associate Professor of Research in Healthcare Policy & Research
Director, Research Informatics
Overview

- Problem
- Approach
  - Research Computing at Weill Cornell Medicine
  - Architecture for Research Computing in Health (ARCH)
- Discussion
Problem

- Obtaining electronic health record (EHR) data for clinical and translational research is difficult
  - Repurpose transactions for research
  - Use one or more tools
  - Understand strengths and limitations
  - Obtain approval
- Optimal approaches are unknown
- Research Informatics can help investigators
  - Obtain EHR data
  - Collect novel measures
  - Integrate data
Approach: Research Computing at WCM

- Conduct
  - Scientific Computing
  - Research Informatics
  - Research Administrative Computing

- Administration

Information Technology Infrastructure
ARCH: Architecture for Research Computing in Health

Retrospective

- Multi-institutional Data Sharing
- College-wide Cohort Discovery
- EHR Reporting
- Research Data Repositories
- Electronic Data Capture (EDC)
- EDC integrated with EHR

Prospective

- EHR Interventions

Consent

WCM-NYP-CUMC Data Sharing

Biobank and Ancillary Omics

Data Core

Data Integration  Clinical Translation  Compliance & Planning  Scientific Computing
ARCH: Architecture for Research Computing in Health

Retrospective

Multi-institutional Data Sharing
College-wide Cohort Discovery
EHR Reporting
Research Data Repositories
Electronic Data Capture (EDC)
EDC integrated with EHR

Prospective

Data Integration
ARCH: Architecture for Research Computing in Health

Retrospective

- Multi-institutional Data Sharing
- College-wide Cohort Discovery
- EHR Reporting
- Research Data Repositories
- Electronic Data Capture (EDC)
- EDC integrated with EHR

Propective

Data Integration
ARCH: Architecture for Research Computing in Health

Retrospective

- Multi-institutional Data Sharing
- College-wide Cohort Discovery
- EHR Reporting
- Research Data Repositories
- Electronic Data Capture (EDC)
- EDC integrated with EHR

Prospective

Data Integration

Model

ARCH: Architecture for Research Computing in Health

Retrospective

- Multi-institutional Data Sharing
- College-wide Cohort Discovery
- EHR Reporting
- Research Data Repositories
- Electronic Data Capture (EDC)

Prospective

- EHR integrated with EHR
- EHR Interventions

Model

Data Integration

Clinical Translation

**ARCH**: Architecture for Research Computing in Health

- **Retrospective**
  - Multi-institutional Data Sharing
  - College-wide Cohort Discovery
  - EHR Reporting
  - Research Data Repositories
  - Electronic Data Capture (EDC)
  - EDC integrated with EHR

- **Prospective**
  - EHR Interventions

**Data Integration**

**Clinical Translation**

ARCH: Architecture for Research Computing in Health

- Retrospective
  - Multi-institutional Data Sharing
  - College-wide Cohort Discovery
  - EHR Reporting
  - Research Data Repositories
  - Electronic Data Capture (EDC)
  - EDC integrated with EHR

- Prospective

POIS or NYP

Technology Provider
ARCH: Architecture for Research Computing in Health

Multinstitutional Data Sharing  College-wide Cohort Discovery  EHR Reporting  Research Data Repositories  Electronic Data Capture (EDC)  EDC integrated with EHR

Tripartite Request Assessment Committee (TRAC)

POIS or NYP
ARCH: EHR Reporting

Step 1: obtain raw EHR data describing diagnoses assigned in patients encounters

Image redacted
ARCH: EHR Reporting

Step 2: match raw EHR data describing diagnoses to ICD-9 codes

Image redacted
ARCH: EHR Reporting

Step 3: transform raw EHR data describing ICD-9 codes into dichotomous scientific variable

Image redacted
ARCH: EHR Reporting

Step 4: repeat process to define additional diagnosis dichotomous variables

Image redacted
ARCH: EHR Reporting

Step 4: repeat process to transform raw EHR data for medications and other domains (raw data for medications and other domains not pictured)
ARCH: Architecture for Research Computing in Health

Retrospective

Multi-institutional Data Sharing
College-wide Cohort Discovery
EHR Reporting
Research Data Repositories
Electronic Data Capture (EDC)
EDC integrated with EHR

Prospective

Epic
Allscripts™
i2b2

Technology Provider

ITS POIS or NYP
ARCH: i2b2
ARCH: i2b2

The image shows a screenshot of the i2b2 Query & Analysis Tool. The tool is used for finding patients and analyzing clinical data. The screen displays various medical conditions and diagnoses, such as infectious and parasitic diseases, neoplasms, endocrine, nutritional, and metabolic diseases, and more. There is a section for entering query names, temporal constraints, and data from different groups. The tool allows for the exclusion of certain dates and conditions, indicating flexibility in data analysis.
ARCH: i2b2
ARCH: i2b2
ARCH: i2b2
ARCH: i2b2
ARCH: i2b2
ARCH: i2b2
ARCH: i2b2
ARCH: i2b2
ARCH: Architecture for Research Computing in Health

- Retrospective
  - Multi-institutional Data Sharing
  - College-wide Cohort Discovery
  - EHR Reporting
  - Research Data Repositories
  - Electronic Data Capture (EDC)
- Prospective
  - EDC integrated with EHR

Technology Provider
- HPR & ITS
- ITS
- POIS or NYP
ARCH: Architecture for Research Computing in Health

Retrospective

- Multi-institutional Data Sharing
- College-wide Cohort Discovery
- EHR Reporting
- Research Data Repositories
- Electronic Data Capture (EDC)
- EDC integrated with EHR

Prospective

- INSIGHT Clinical Research Network
- Epic
- Allscripts™
- i2b2
- WCM
- NYP
- Montefiore
- CDN

Weill Cornell Medicine
ARCH: Architecture for Research Computing in Health

Retrospective

Multi-institutional Data Sharing
College-wide Cohort Discovery
EHR Reporting
Research Data Repositories
Electronic Data Capture (EDC)
EDC integrated with EHR

Prospective

INSIGHT Clinical Research Network
i2b2
Epic
Allscripts

HPR & ITS
ITS
POIS or NYP

Technology Provider
ARCH: Architecture for Research Computing in Health

Retrospective

- Multi-institutional Data Sharing
- College-wide Cohort Discovery
- EHR Reporting
- Research Data Repositories
- Electronic Data Capture (EDC)
- EDC integrated with EHR

Prospective

Technology Provider

- HPR & ITS
- ITS
- POIS or NYP

INSIGHT Clinical Research Network

TriNetX

i2b2

Epic

Allscripts™
ARCH: Architecture for Research Computing in Health

Retrospective

| Multi-institutional Data Sharing | College-wide Cohort Discovery | EHR Reporting | Research Data Repositories | Electronic Data Capture (EDC) | EDC integrated with EHR |

Prospective

- INSIGHT Clinical Research Network
- Epic
- Allscripts™
- TriNetX
- i2b2
- ACT The ACT Network

Technology Provider

- HPR & ITS
- ITS
- POIS or NYP
ARCH: NCATS ACT – Investigator-Initiated Trials

- 37 CTSA hubs
- 100+ million patients
- Launched 2018
- Experimental
ARCH: NCATS ACT – Investigator-Initiated Trials

About the ACT Network

37 sites connected to the ACT Network.
20 sites staging for connection to ACT.
100 million+ estimated total patients represented in first 37 ACT sites.

Connected to ACT:

Boston University
Children’s National
Columbia University*
Duke University
Emory Univ./Morehouse Univ.
Harvard University*
Indiana University
Johns Hopkins University
Mayo Clinic
Medical College of Wisconsin
Medical Univ. of South Carolina
New York University
Northwestern University*
Oregon Health & Science Univ.*
Pennsylvania State University
Stanford University
Univ. of Alabama at Birmingham*
Univ. of Ark. for Medical Sciences*
University of California, Davis*
University of California, Irvine*
University of California, Los Angeles
University of California, San Diego
Univ. of California, San Francisco
U of Cincinnati/Cincinnati Children’s
U of Colo/Children’s Hosp. Colo.*
University of Florida*
University of Kansas*
University of Kentucky
University of Minnesota
UNC-Chapel Hill
University of Pittsburgh*
UT Health San Antonio
UT Southwestern*
Vanderbilt University Medical Center
Virginia Commonwealth
Washington Univ. in St. Louis*
Weill Cornell Medicine

Staging for ACT:

Case Western University
Dartmouth College
Ohio State University
Scripps Research
Tufts University
University at Buffalo*
Univ. of Illinois-Chicago
Univ. of Massachusetts
University of Miami
University of Michigan
University of New Mexico
University of Rochester
Univ. of Southern California
UT Houston
UT Medical Branch
University of Utah
University of Virginia
University of Washington*
U of Wisconsin-Madison*
Wake Forest University

*sites currently represented in ACT workgroups
ARCH: NCATS ACT – Investigator-Initiated Trials
ARCH: NCATS ACT – Investigator-Initiated Trials
ARCH: Architecture for Research Computing in Health

- Retrospective
  - Multi-institutional Data Sharing
  - College-wide Cohort Discovery
  - Big Data Analytics
  - EHR Reporting
  - Research Data Repositories

- Prospective
  - Electronic Data Capture (EDC)
  - EDC integrated with EHR

Technology Provider:
- HPR & ITS
- ITS
- ITS
- POIS or NYP
ARCH: Big Data Analytics - OHDSI

“All of the EHR data”
~14,000 proprietary database tables
ARCH: Big Data Analytics - OHDSI

“All of the EHR data”

~14,000 proprietary database tables

"All of the EHR data"
~14,000 proprietary database tables

"All you really need"
~20 standardized database tables


For Big-Data Scientists, ‘Janitor Work’ Is Key Hurdle to Insights
ARCH: Big Data Analytics - OHDSI
ARCH: Architecture for Research Computing in Health

Multi-institutional Data Sharing
College-wide Cohort Discovery
Big Data Analytics
EHR Reporting
Research Data Repositories
Electronic Data Capture (EDC)
EDC integrated with EHR

Retrospective
Prospective

NYC-CDRN
New York City Clinical Data Research Network
TriNetX
i2b2
OHDSI
NLP
Allscripts

HPR & ITS
ITS
ITS
POIS or NYP
ARCH: Natural Language Processing

- EHR data are **structured** (e.g., codes) & **unstructured** (e.g., notes)
- Natural language processing (NLP) can extract structured clinical concepts from unstructured notes to inform clinical investigations
  - PHQ-9 scores - depression severity (PMID: 30815052)
  - LVEF values - heart failure (PMID: 29888051)
  - Bone marrow biopsy reports – leukemia response
  - Surgical pathology reports – colon cancer surveillance
  - Race and ethnicity – health equity
ARCH: NLP – Support for Black & Hispanic Populations

- Black and Hispanic patients are underrepresented in research
- EHR systems often describe patients’ race and ethnicity as “Declined” in **structured** fields, complicating ACT/i2b2 queries
ARCH: NLP – Support for Black & Hispanic Populations

- Black and Hispanic patients are underrepresented in research
- EHR systems often describe patients’ race and ethnicity as “Declined” in **structured** fields, complicating ACT/i2b2 queries
- Extraction of race and ethnicity from **unstructured** notes can fill void
ARCH: NLP – Support for Black & Hispanic Populations

- Black and Hispanic patients are underrepresented in research
- EHR systems often describe patients’ race and ethnicity as “Declined” in structured fields, complicating ACT/i2b2 queries
- Extraction of race and ethnicity from unstructured notes can fill void
ARCH: NLP – Support for Black & Hispanic Populations

- Natural language processing (NLP) of progress notes identified:
  - 26% more Black patients
  - 20% more Hispanic patients
- Race and ethnicity values extracted from notes may help trial recruitment
ARCH: Architecture for Research Computing in Health

Retrospective

- Multi-institutional Data Sharing
- College-wide Cohort Discovery
- Big Data Analytics
- EHR Reporting
- Research Data Repositories

Prospective

- Electronic Data Capture (EDC)
- EDC integrated with EHR

Technology Providers:

- NYC-CDRN
- OHDSI
- Epic
- REDCap
- i2b2
- NLP
- Allscripts

HPR & ITS
ITS
ITS
POIS or NYP
CTSC
ARCH: Architecture for Research Computing in Health

Retrospective

Multinstitutional Data Sharing
College-wide Cohort Discovery
Big Data Analytics
EHR Reporting
Research Data Repositories

Prospective

Electronic Data Capture (EDC)
EDC integrated with EHR

Technology Provider

NYC-CDRN
TriNetX
ACT
HPR & ITS
ITS
NLP

i2b2

OHDSI
Epic
Allscripts

P

REDCap
SUPER
REDCap
REDCap

CTSC
CTSC & ITS
POIS or NYP

Provider

POIS or NYP
ITS
ITS

CTSC & ITS
### De-ID SUPER REDCap Project

**Demographics And Enrollment**

<table>
<thead>
<tr>
<th>Record ID</th>
<th>29</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRN</td>
<td></td>
</tr>
<tr>
<td>First name</td>
<td></td>
</tr>
<tr>
<td>Last name</td>
<td></td>
</tr>
<tr>
<td>Date of birth</td>
<td></td>
</tr>
</tbody>
</table>

**Enrollment**

- Breast
- Leukemia
- Lymphoma

---

**ARCH: SUPER REDCap**
Now that you have entered a value for the Source Identifier Field, click the Save button below to save the value and automatically begin fetching data from the source system.
ARCH: SUPER REDCap

Adjudicate data from ARCH WZ Data

Displayed below is the data fetched from the external source system. It will display all the mapped REDCap fields that have source data returned. To import the source data values into REDCap, select the source value by clicking the radio button for the desired value in the row. Some fields may have multiple values returned, so you must choose the best or most correct value. Once you made all your selections, press the Save button below to save the source values into REDCap.

Fetching data for Record ID "29"

New items: 3
Time of last data fetch: less than a minute ago
- Display all items (all forms)
- Display only this form's items

<table>
<thead>
<tr>
<th>REDCap Field</th>
<th>REDCap Date/Time</th>
<th>ARCH WZ Data Source Date/Time</th>
<th>REDCap Current Value</th>
<th>ARCH WZ Data Source Value</th>
<th>Import?</th>
</tr>
</thead>
<tbody>
<tr>
<td>first_name &quot;First name&quot;</td>
<td>-</td>
<td>-</td>
<td>A</td>
<td>Ztest</td>
<td>reset</td>
</tr>
<tr>
<td>last_name &quot;Last name&quot;</td>
<td>-</td>
<td>-</td>
<td>res</td>
<td></td>
<td>reset</td>
</tr>
<tr>
<td>date_of_birth &quot;Date of birth&quot;</td>
<td>-</td>
<td>-</td>
<td>1955-12-16</td>
<td>res</td>
<td>reset</td>
</tr>
</tbody>
</table>
ARCH: SUPER REDCap

De-ID SUPER REDCap Project

### Demographics And Enrollment

**Record ID**: 29

- **Record ID**: 29
- **MRN**: 601987
- **First name**: A
- **Last name**: Ztest
- **Date of birth**: 1955-12-16
- **Enrollment**:
  - Breast
  - Leukemia
  - Lymphoma
ARCH: SUPER REDCap

De-ID SUPER REDCap Project

Laboratory Results

<table>
<thead>
<tr>
<th>Record ID</th>
<th>29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit date</td>
<td></td>
</tr>
<tr>
<td>1 K/uL = 1000 cells per micro liter</td>
<td></td>
</tr>
<tr>
<td>1 M/uL = 1000000 cells per micro liter</td>
<td></td>
</tr>
<tr>
<td>% = Percentage</td>
<td></td>
</tr>
<tr>
<td>Platelets (K/uL)</td>
<td></td>
</tr>
<tr>
<td>Neutrophils (K/uL)</td>
<td></td>
</tr>
<tr>
<td>Monocytes (K/uL)</td>
<td></td>
</tr>
<tr>
<td>Lymphocytes (K/uL)</td>
<td></td>
</tr>
<tr>
<td>Leukocytes (K/uL)</td>
<td></td>
</tr>
<tr>
<td>Erythrocytes (M/uL)</td>
<td></td>
</tr>
</tbody>
</table>
ARCH: SUPER REDCap

Weill Cornell Medical College
Clinical and Translational Science Center

De-ID SUPER REDCap Project

Laboratory Results

Edit existing Record ID 29

Record ID: 29

Visit date: 02-02-2010

1 K/μL = 1000 cells per micro liter
1 M/μL = 1000000 cells per micro liter

% = Percentage

Platelets (K/μL)
Neutrophils (K/μL)
Monocytes (K/μL)
Lymphocytes (K/μL)
Leukocytes (K/μL)

8 new items from source system
**ARCH: SUPER REDCap**

Displayed below is the data fetched from the external source system. It will display all the mapped REDCap fields that have source data returned. To import the source data values into REDCap, select the source value by clicking the radio button for the desired value in the row. Some fields may have multiple values returned, so you must choose the best or most correct value. Once you made all your selections, press the Save button below to save the source values into REDCap.

**Fetching data for Record ID "29" using ± 150 days**

**New items:** 8

**Time of last data fetch:** just now

<table>
<thead>
<tr>
<th>REDCap Field</th>
<th>REDCap Date/Time</th>
<th>ARCH WZ Data Source Date/Time</th>
<th>REDCap Current Value</th>
<th>ARCH WZ Data Source Value</th>
<th>Import?</th>
</tr>
</thead>
<tbody>
<tr>
<td>platelets &quot;Platelets (K/uL)&quot;</td>
<td>2010-02-02 (00:00)</td>
<td>2009-09-29 00:00</td>
<td>265</td>
<td></td>
<td>reset</td>
</tr>
<tr>
<td></td>
<td>2009-10-07 00:00</td>
<td>2009-09-29 00:00</td>
<td>287</td>
<td></td>
<td>reset</td>
</tr>
<tr>
<td></td>
<td>2009-11-02 00:00</td>
<td>2009-11-03 00:00</td>
<td>188</td>
<td></td>
<td>reset</td>
</tr>
<tr>
<td></td>
<td>2009-11-03 00:00</td>
<td>2009-11-03 00:00</td>
<td>219</td>
<td></td>
<td>reset</td>
</tr>
<tr>
<td></td>
<td>2009-11-09 00:00</td>
<td>2009-11-09 00:00</td>
<td>317</td>
<td></td>
<td>reset</td>
</tr>
<tr>
<td></td>
<td>2009-11-17 00:00</td>
<td>2009-12-29 00:00</td>
<td>245</td>
<td></td>
<td>reset</td>
</tr>
<tr>
<td></td>
<td>2009-11-20 00:00</td>
<td>2009-12-29 00:00</td>
<td>172</td>
<td></td>
<td>reset</td>
</tr>
<tr>
<td></td>
<td>2009-12-11 00:00</td>
<td>2014</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
ARCH: SUPER REDCap

A screen capture of the Adjudicate data from ARCH WZ Data interface. It shows the data fetched from the external source system, which includes all the mapped REDCap fields that have source data returned. The screen allows users to import source data values into REDCap by selecting the source value. The data is displayed with options for displaying all items, just the current form's items, or specific hidden items. The table contains columns for REDCap Date/Time, ARCH WZ Data Source Date/Time, REDCap Current Value, and ARCH WZ Data Source Value with options to import or reset values. A refresh button is available for updating data.
ARCH: SUPER REDCap

Weill Cornell Medical College
Clinical and Translational Science Center

De-ID SUPER REDCap Project

Laboratory Results

Editing existing Record ID 29

Record ID 29

Visit date

1 K/uL = 1000 cells per micro liter
1 M/uL = 1000000 cells per micro liter
% = Percentage

Platelets (K/uL)
29

Neutrophils (K/uL)
2.4

Monocytes (K/uL)
0.5

Lymphocytes (K/uL)
2.2

Leukocytes (K/uL)
5.2
ARCH: Architecture for Research Computing in Health

Retrospective

- Multi-institutional Data Sharing
- College-wide Cohort Discovery
- EHR Reporting
- Research Data Repositories
- Electronic Data Capture (EDC)
- EDC integrated with EHR

Prospective

RedCap

Research Electronic Data Capture
ARCH: Architecture for Research Computing in Health

- Retrospective
  - Multi-institutional Data Sharing
  - College-wide Cohort Discovery
  - EHR Reporting
  - Research Data Repositories
  - Electronic Data Capture (EDC)

- Prospective
  - EDC integrated with EHR

Epic

REDCap
ARCH: Architecture for Research Computing in Health

<table>
<thead>
<tr>
<th>Retrospective</th>
<th>Prospective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multi-institutional Data Sharing</td>
<td>EDC integrated with EHR</td>
</tr>
<tr>
<td>College-wide Cohort Discovery</td>
<td>Electronic Data Capture (EDC)</td>
</tr>
<tr>
<td>EHR Reporting</td>
<td>Research Data Repositories</td>
</tr>
</tbody>
</table>

Epic

Allscripts

REDCap

Research Electronic Data Capture
ARCH: Architecture for Research Computing in Health

- Retrospective
  - Multi-institutional Data Sharing
  - College-wide Cohort Discovery
  - EHR Reporting
  - Research Data Repositories
  - Electronic Data Capture (EDC)
  - EDC integrated with EHR

- Prospective

Epic
Allscripts™
CompuRecord
**ARCH:** Architecture for Research Computing in Health

- Retrospective
  - Multi-institutional Data Sharing
  - College-wide Cohort Discovery
  - EHR Reporting
  - Research Data Repositories
  - Electronic Data Capture (EDC)

- Prospective
  - EDC integrated with EHR

**Tools:**
- Epic
- REDCap
- Allscripts™
- CompuRecord
- Biobank
ARCH: Architecture for Research Computing in Health

- Retrospective
  - Multi-institutional Data Sharing
  - College-wide Cohort Discovery
  - EHR Reporting
- Prospective
  - Research Data Repositories
  - Electronic Data Capture (EDC)
  - EDC integrated with EHR

Epic
Biobank
REDCap
CompuRecord
Allscripts
ARCH: Research Data Repository
ARCH: Research Data Repository
ARCH: Research Data Repository

Tools
- i2b2

Data

Breast RDR

- Epic
- Allscripts
- REDCap
- Other

Workflows
- Discovery
  - Hypothesis generation
  - Patient counts
- Collection
  - Capture of novel measures
  - Annotation of existing data
- Analysis
  - Scientific variable definition
  - Hypothesis testing

Workflows

Microsoft SQL Server
ARCH: Research Data Repository

**Tools**
- i2b2

**Workflows**
- **Discovery**
  - Hypothesis generation
  - Patient counts
- **Collection**
  - Capture of novel measures
  - Annotation of existing data
- **Analysis**
  - Scientific variable definition
  - Hypothesis testing

**Data**
- Breast RDR
  - Epic
  - Allscripts
  - REDCap
  - Other

**Workflows**
- Study 1
- Study 2
- Study n: future

**Tools**
- SUPER
  - REDCap

**SQL Server**
- Microsoft
ARCH: Research Data Repository

- All of Us Research Program (Kaushal)
- Anesthesiology (Turnbull)
- Center for Advanced Digestive Care (Shah)
- Clinical and Translational Neuroscience Unit (Kamel)
- Dalio Institute (Min)
- Health Informatics (Pathak/Zhang)
- Leukemia Program (Roboz)
- Myeloproliferative Neoplasms (Scandura)
- Neurological Surgery (Hoffman)
- Ophthalmology (D’Amico)
- Pediatric Epilepsy (Grinspan)
- Pediatric Pulmonology (Ono)
- Pulmonary and Critical Care (Schenck)
- Urology (Hu)
- Trauma and Surgical Critical Care (Winchell)
Architecture for Research Computing in Health (ARCH)

Multi-institutional Data Sharing
College-wide Cohort Discovery
Big Data Analytics
Research Data Repositories
Electronic Data Capture (EDC)
EDC integrated with EHR
EHR Interventions

Retrospective
Prospective

- INSIGHT Clinical Research Network
- TriNetX
- i2b2
- OHDSI
- NLP
- REDCap
- SUPER
- Epic
- SQL Server
Discussion

- Research Informatics can help investigators
  - Obtain EHR data
  - Collect novel research data
  - Integrate data
- Big data analytics require “janitor work”
- ARCH matches investigators with right tools and services with respect to
  - Study design
  - Data sources
  - Cost
Acknowledgments

**Funding**
- Clinical and Translational Science Center (UL1 TR000457)
- Joint Clinical Trials Office

**ARCH Leadership**
- Curtis Cole, MD
- John Leonard, MD

**ITS Project Management**
- Cindy Chen
- Tony DiFazio
- Julie Oetinger

**ITS Research Informatics**
- Sajjad Abedian
- Prakash Adekkanattu
- Marcos Davila
- Xiaobo Fuld
- David Kraemer
- Steven Flores
- Joseph Kabariti
- Ryan McGregor
- Sean Pompea
- Evan Sholle
- Scott Turner
- Jacob Weiser
Questions

• Access and inquiries
  – ARCH inquiries: arch-support@med.cornell.edu
  – i2b2 access: i2b2-support@med.cornell.edu

• Web resources
  – ARCH: http://arch.weill.cornell.edu
  – NYC-CDRN: http://www.nyccdrn.org
  – TRAC: https://webapps.nyp.org/trac

• Tom Campion
  – thc2015@med.cornell.edu
  – 646-962-2345
  – http://vivo.med.cornell.edu/display/cwid-thc2015