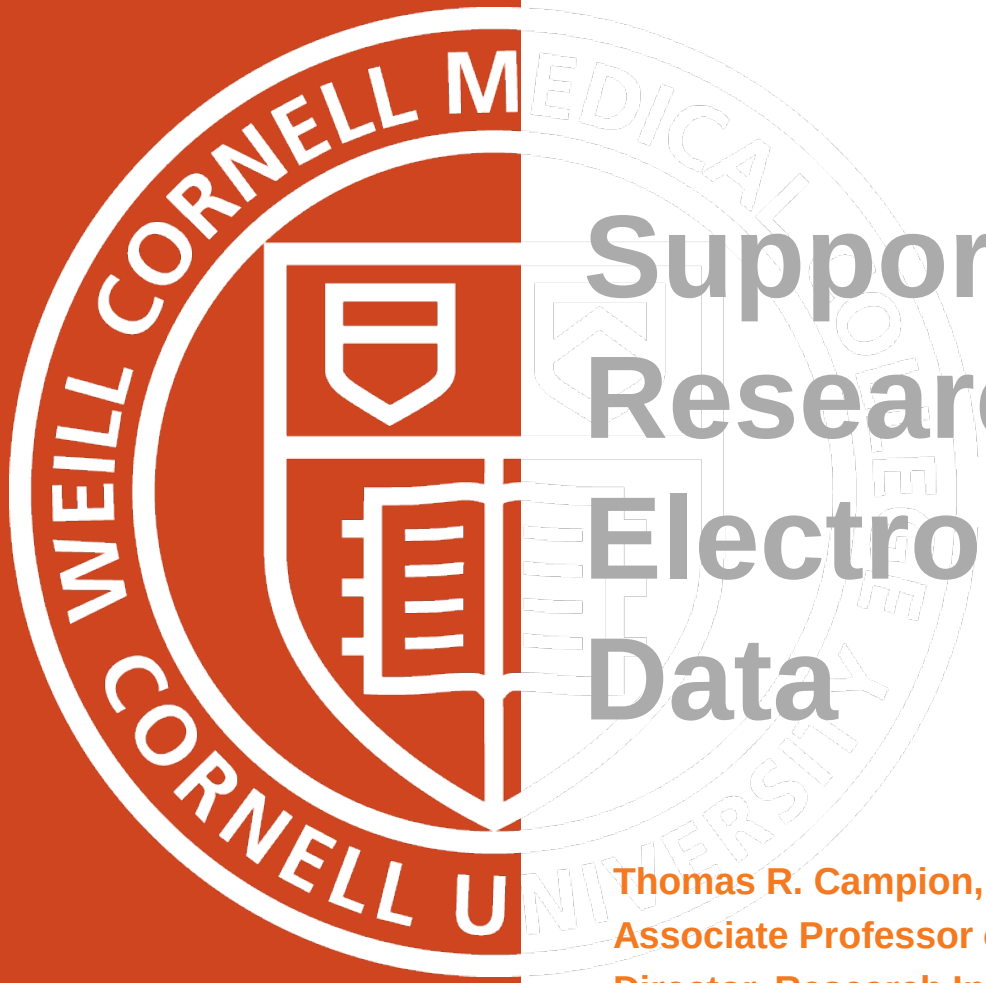


Supporting Researchers with Electronic Patient Data

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

12.5.19

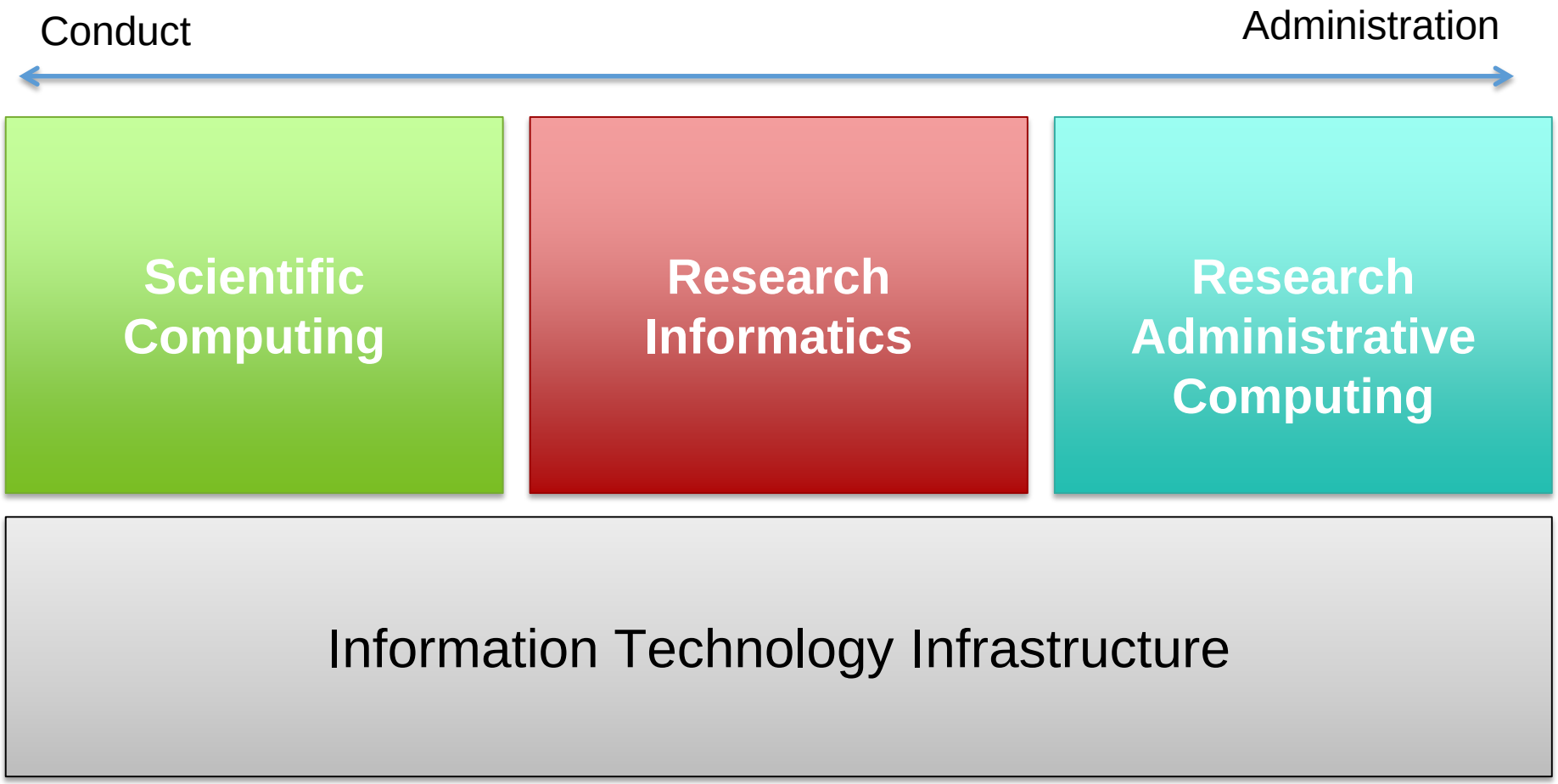
Overview

- 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



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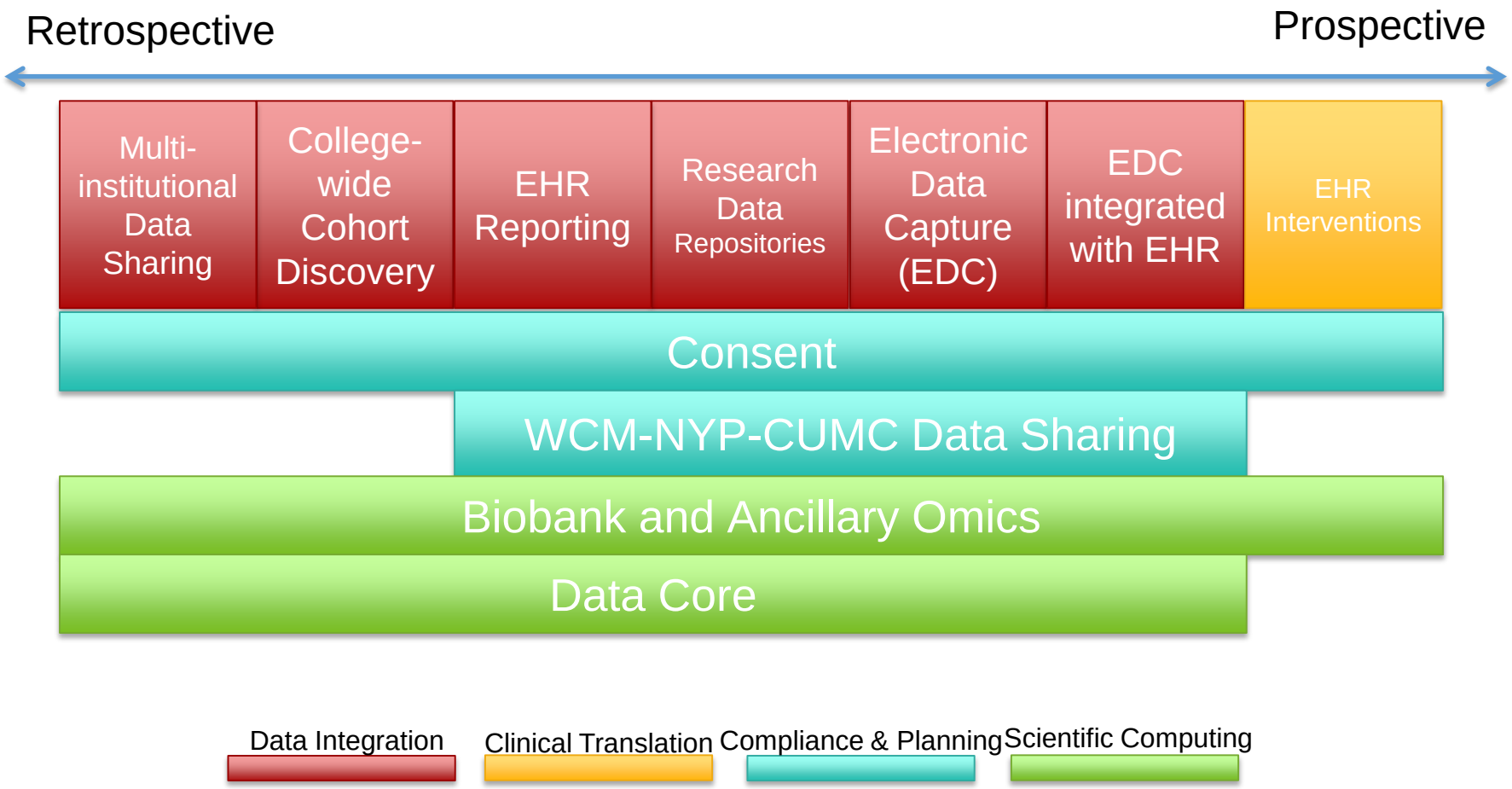

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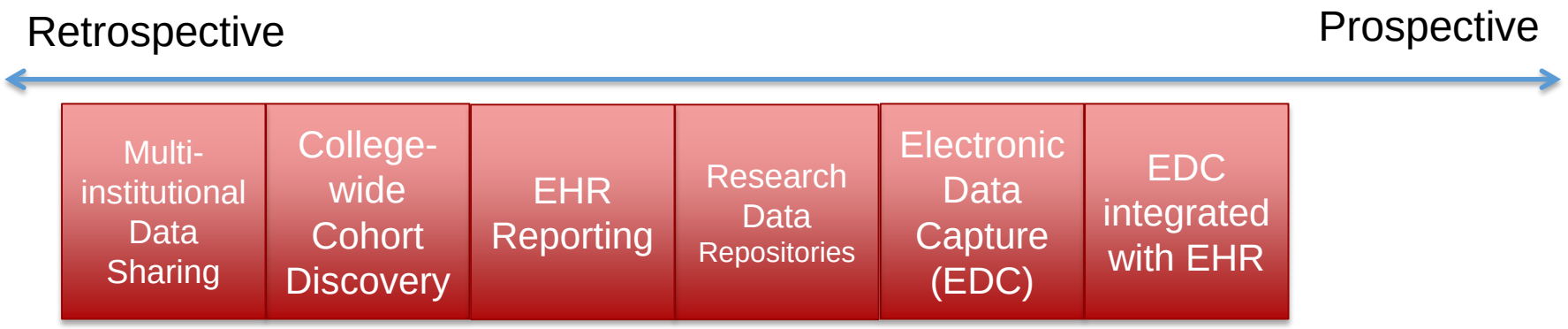

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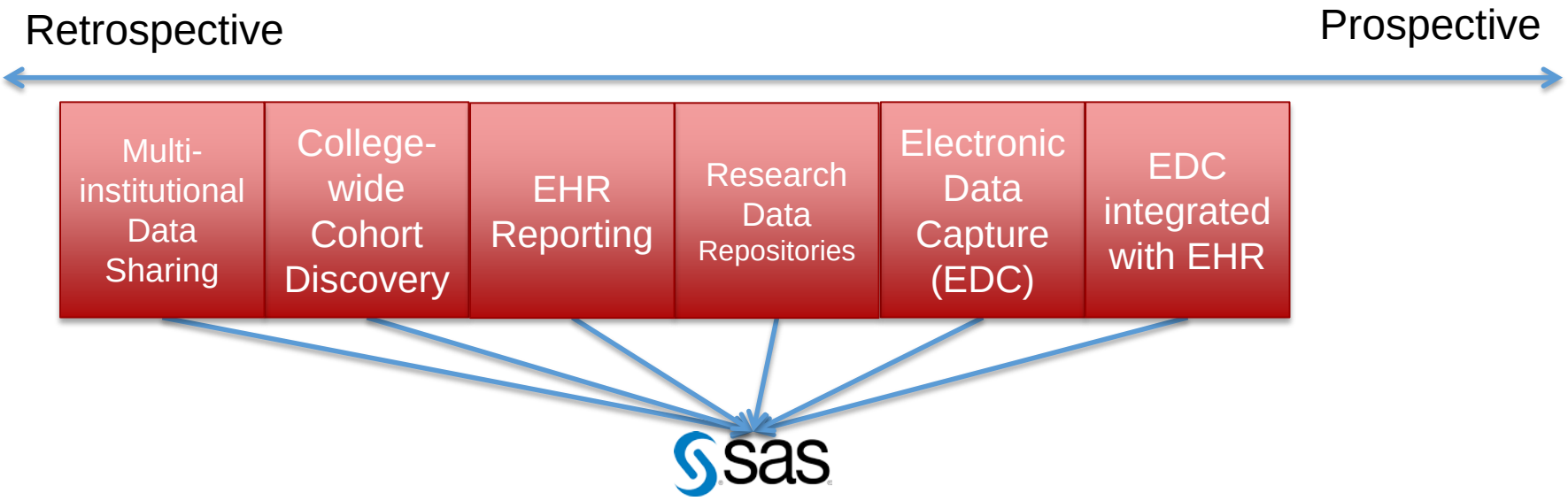

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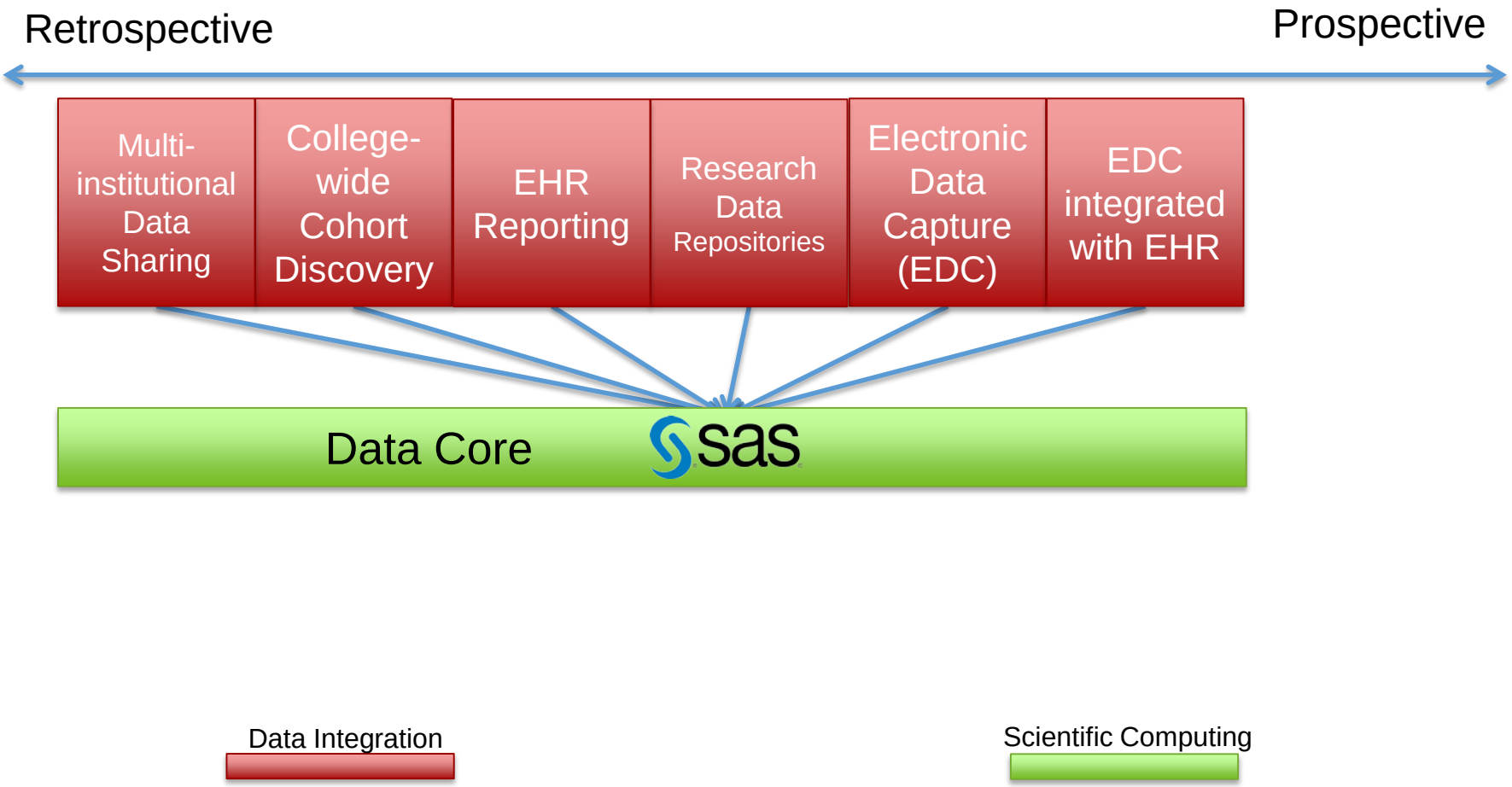

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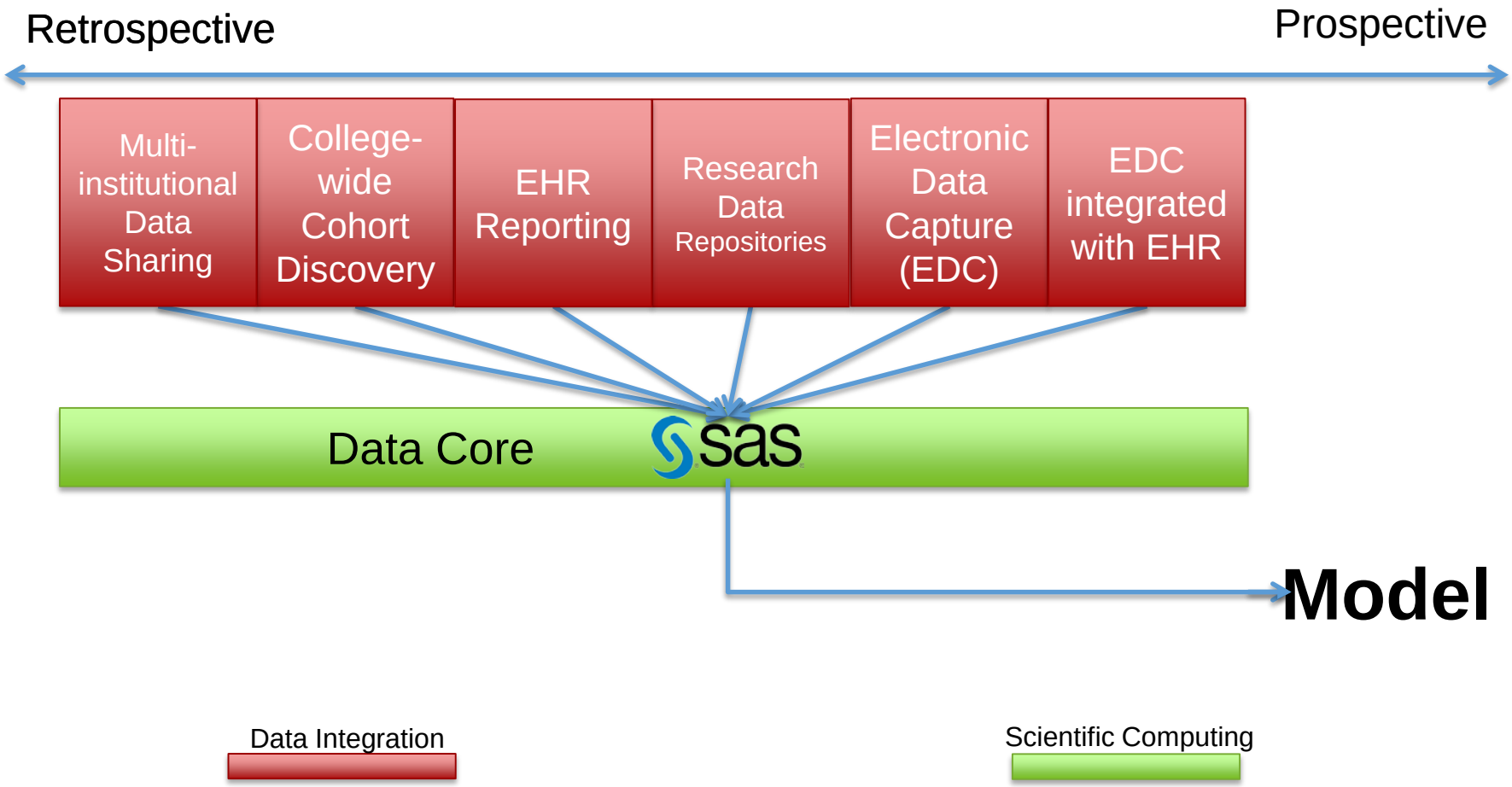
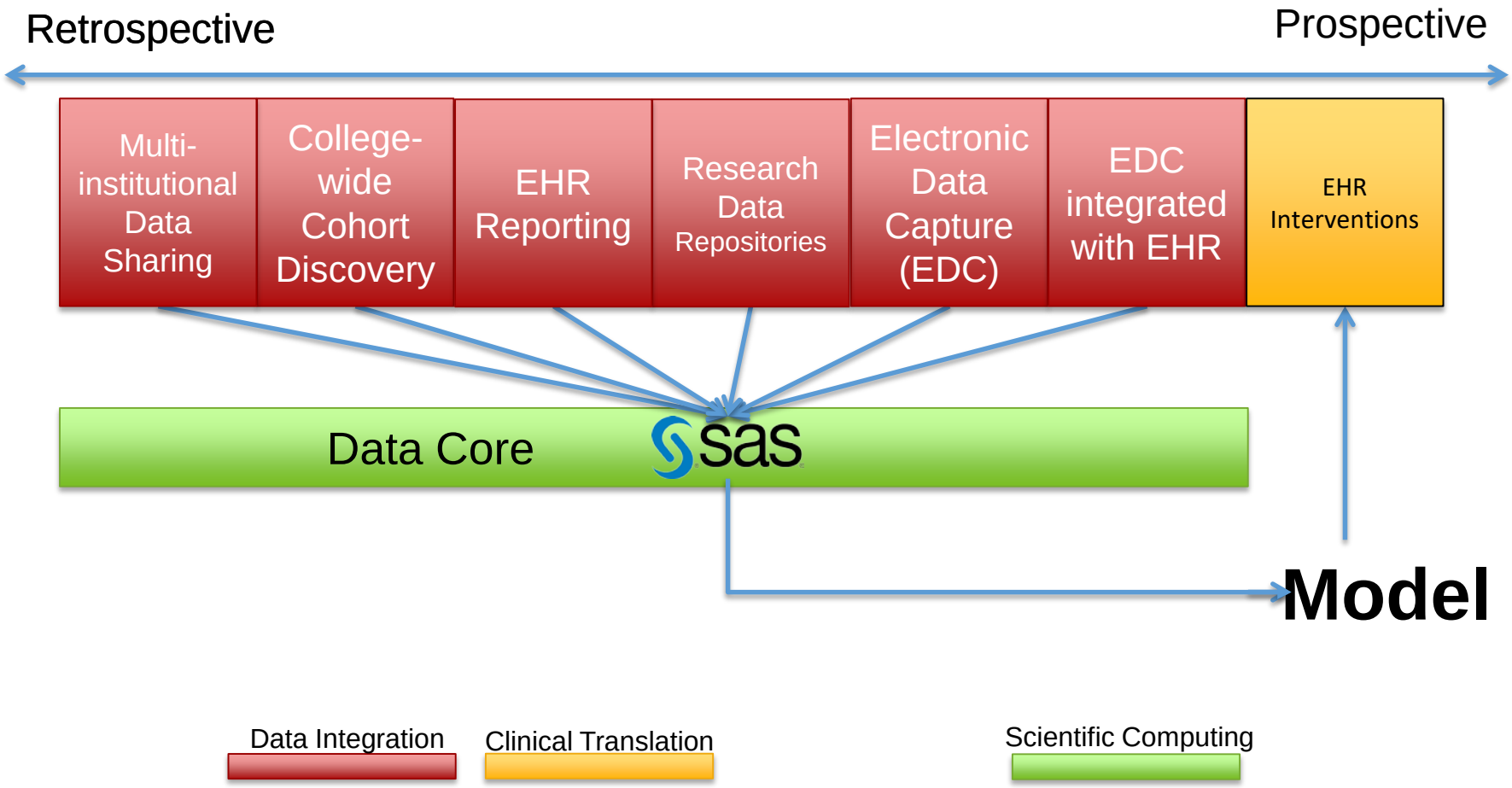


Grumbach K, Lucey CR, Johnston SC. JAMA. 2014 Mar 19;311(11):1109-10

Architecture for Research Computing in Health (ARCH)



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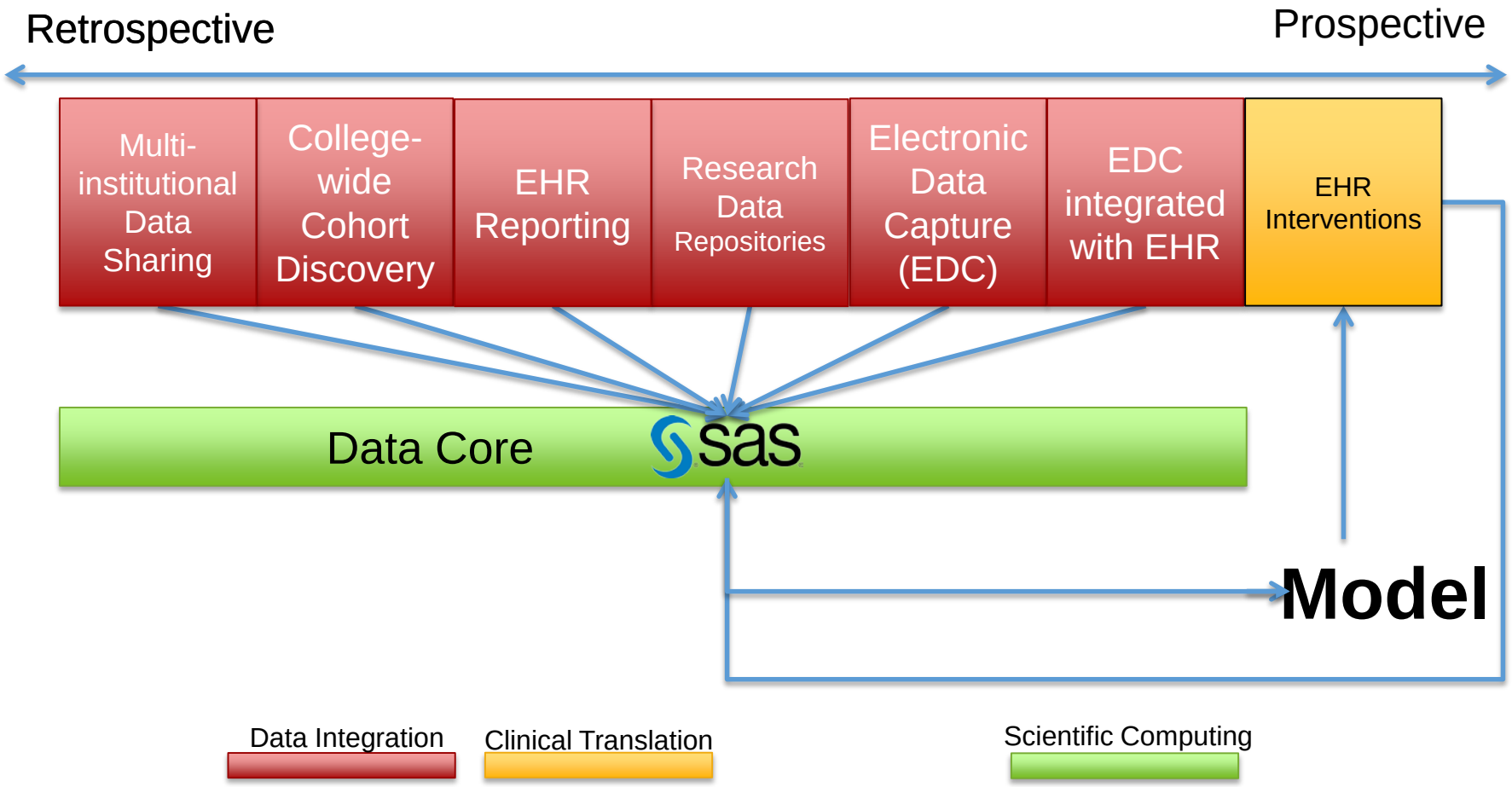

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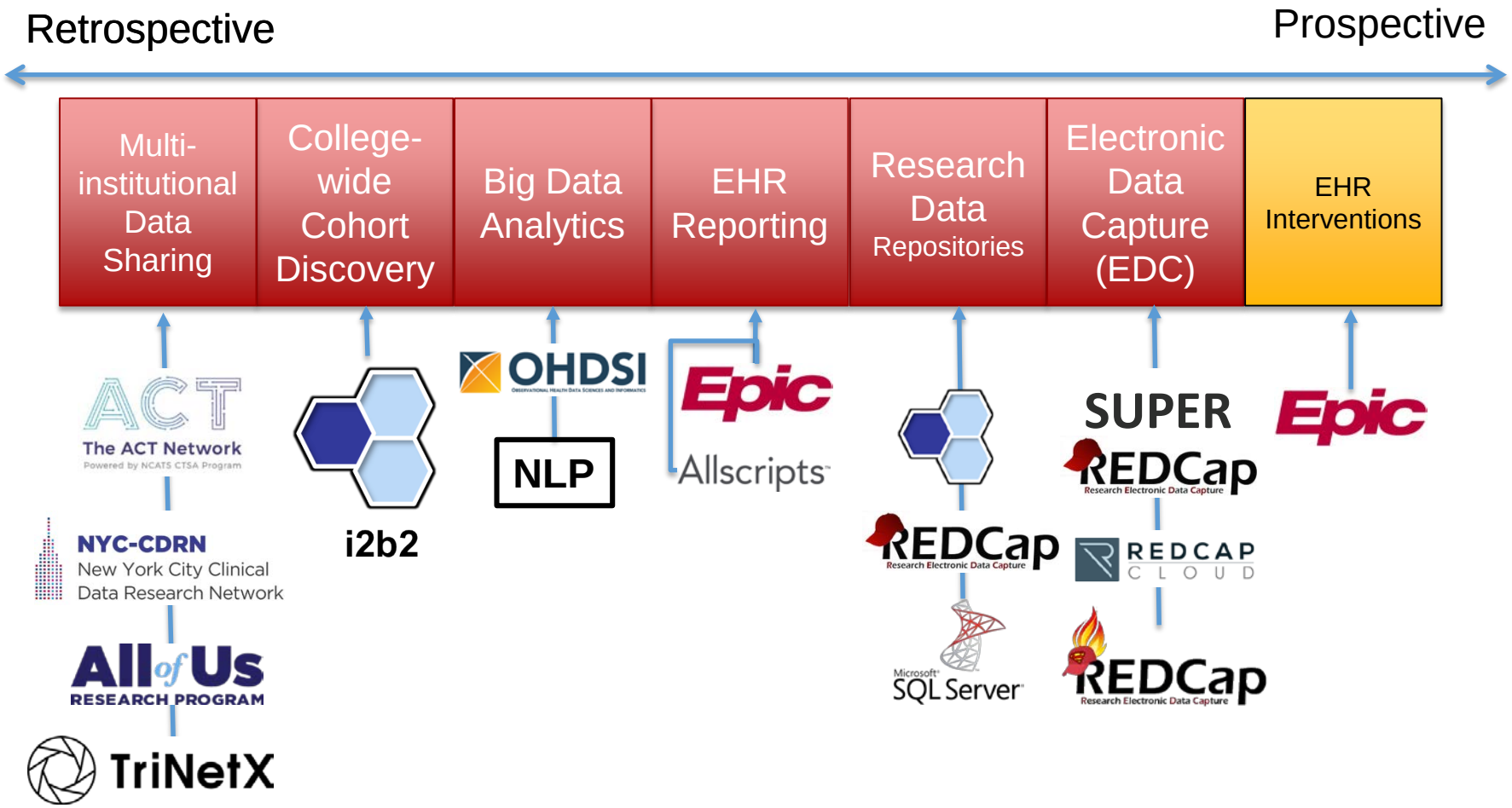

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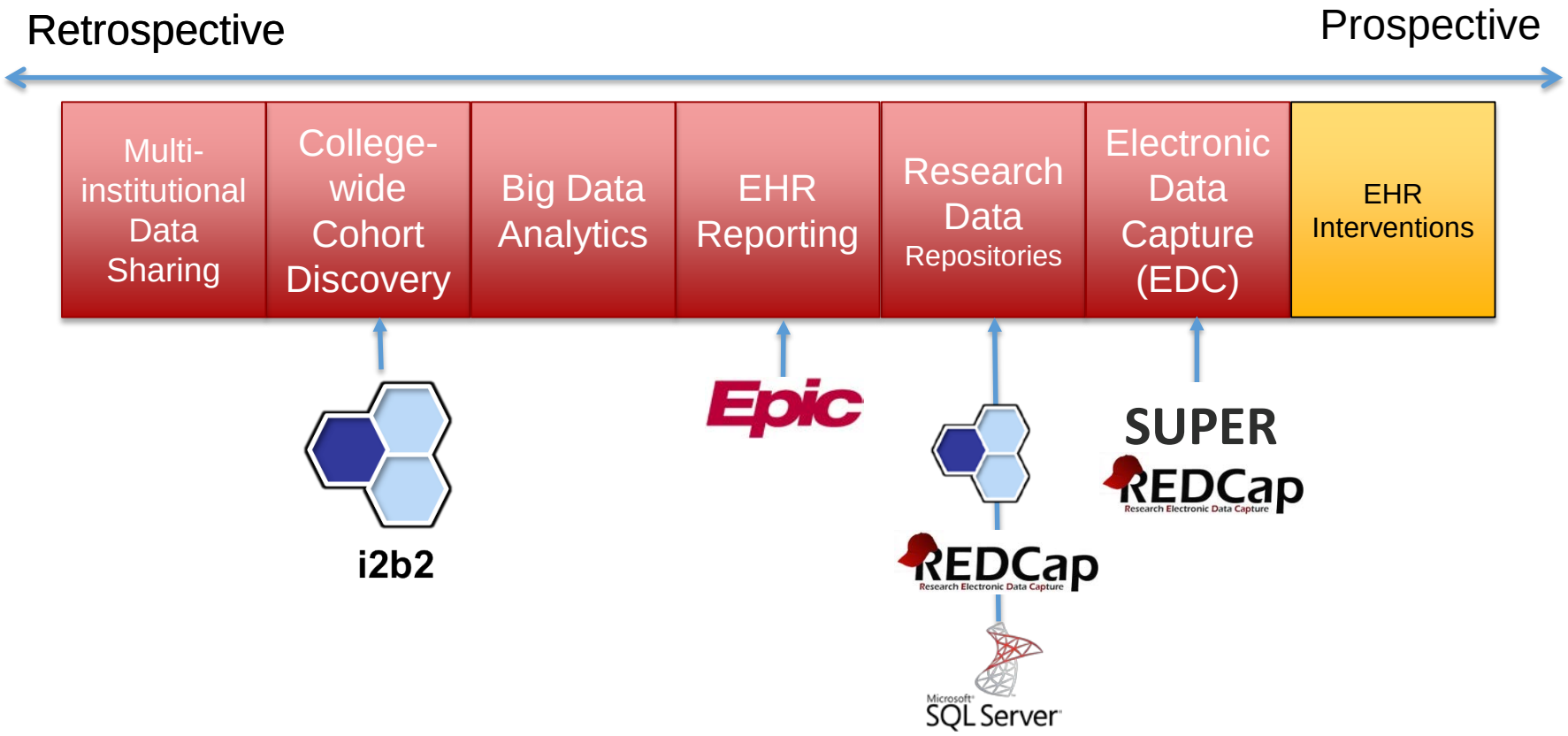

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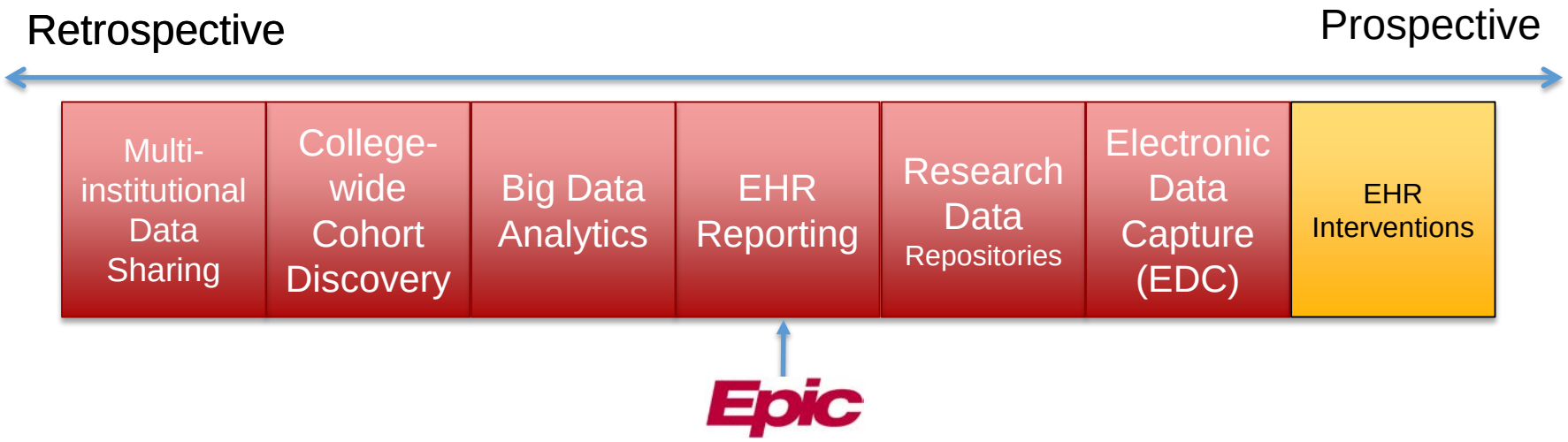

ARCH: EHR Reporting

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

	patient_n...	enc_num	line	dx_id	primary_dx...	comme...	dx_chronic...	dx_unique	dx_ed_yn
828	30147	1644452	3	935415	N	NULL	N	4	N
829	69154	1644417	1	12866	Y	NULL	N	1	N
830	42675	1644384	1	56131	N	NULL	N	2	N
831	42675	1644384	2	135365	N	NULL	N	3	N
832	63397	1644381	1	813625	N	NULL	N	1	N
833	63397	1644381	2	807290	Y	NULL	N	2	N
834	42839	1644380	1	15598	Y	NULL	N	1	N
835	105950	1644350	1	8059885	Y	NULL	N	1	N
836	44243	1644293	1	24458	Y	NULL	N	1	N
837	13016	1644287	1	8028848	Y	NULL	N	1	N
838	32482	1644244	1	1005381	Y	NULL	N	1	N
839	79305	1644243	1	8078416	N	NULL	N	2	N
840	79305	1644243	2	6111	N	NULL	N	3	N
841	79305	1644243	3	8005450	N	NULL	N	4	N
842	79305	1644243	4	9834	N	NULL	N	5	N
843	79305	1644243	5	8059219	N	NULL	N	6	N
844	79305	1644243	6	8082109	N	NULL	N	7	N
845	79305	1644243	7	8091886	N	NULL	N	8	N

ARCH: EHR Reporting

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

	patient_num	enc_num	line	dx_id	enc_icd_code	primary_dx_...	comme...	dx_chronic_yn	dx_uniq...	dx_ed_yn
828	30147	1644452	3	935415	250.60	N	NULL	N	4	N
829	69154	1644417	1	12866	996.82	Y	NULL	N	1	N
830	42675	1644384	1	56131	389.18	N	NULL	N	2	N
831	42675	1644384	2	135365	388.30	N	NULL	N	3	N
832	63397	1644381	1	813625	555.1	N	NULL	N	1	N
833	63397	1644381	2	807290	NULL	Y	NULL	N	2	N
834	42839	1644380	1	15598	239.6	Y	NULL	N	1	N
835	105950	1644350	1	8059885	782.1	Y	NULL	N	1	N
836	44243	1644293	1	24458	281.1	Y	NULL	N	1	N
837	13016	1644287	1	8028848	415.19	Y	NULL	N	1	N
838	32482	1644244	1	1005381	715.96	Y	NULL	N	1	N
839	79305	1644243	1	8078416	185	N	NULL	N	2	N
840	79305	1644243	2	6111	581.9	N	NULL	N	3	N
841	79305	1644243	3	8005450	198.5	N	NULL	N	4	N
842	79305	1644243	4	9834	787.91	N	NULL	N	5	N
843	79305	1644243	5	8059219	780.79	N	NULL	N	6	N
844	79305	1644243	6	8082109	279.00	N	NULL	N	7	N
845	79305	1644243	7	8091886	593.9	N	NULL	N	8	N

ARCH: EHR Reporting

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

	Race	Height	Weight	BMI	Diabetes	Hypertension	Obesity	NSAID	Antidiabetic	Current_Cigarette_Smoker
1	WHITE	5' 4"	2096	22.84	N	N	N	N	N	N
2	OTHER COMBINATIONS NOT DESCRIBED	6' 0"	4704	39.47	Y	Y	Y	N	Y	N
3	WHITE	5' 5"	3168	34.72	N	N	Y	N	N	Y
4	WHITE	5' 4.5"	2352	24.85	N	N	N	N	N	N
5	ASIAN	5' 9"	2656	25.60	N	Y	N	N	N	N
6	DECLINED	6' 0"	3648	30.92	N	N	N	N	N	N
7	DECLINED	5' 6"	1827.2	18.44	N	N	N	N	N	N
8	OTHER COMBINATIONS NOT DESCRIBED	4' 9.5"	1872	25.11	N	N	N	N	N	N
9	OTHER COMBINATIONS NOT DESCRIBED	5' 2"	2448	28.92	N	N	N	N	N	N
10	ASIAN	5' 9"	3072	28.34	N	N	N	N	N	N
11	NULL	5' 0"	3609.6	44.06	N	N	N	N	N	N
12	DECLINED	5' 1.024"	2704	31.95	Y	N	Y	Y	Y	N
13	WHITE	6' 1"	3056	26.08	N	Y	N	Y	N	N
14	NULL	6' 0"	3408	3827.82	Y	Y	N	N	Y	Y
15	NULL	6' 2"	3284.8	25.99	N	N	N	N	N	N
16	DECLINED	5' 8"	2560	26.63	N	N	N	N	N	N
17	DECLINED	5' 8"	2640	25.09	N	N	N	N	N	Y
18	NULL	5' 1"	2769.6	32.72	N	N	Y	N	N	N

ARCH: EHR Reporting

Step 4: repeat process to define additional diagnosis dichotomous variables

	Race	Height	Weight	BMI	Diabetes	Hypertension	Obesity	NSAID	Antidiabetic	Current_Cigarette_Smoker
1	WHITE	5' 4"	2096	22.84	N	N	N	N	N	N
2	OTHER COMBINATIONS NOT DESCRIBED	6' 0"	4704	39.47	Y	Y	Y	N	Y	N
3	WHITE	5' 5"	3168	34.72	N	N	Y	N	N	Y
4	WHITE	5' 4.5"	2352	24.85	N	N	N	N	N	N
5	ASIAN	5' 9"	2656	25.60	N	Y	N	N	N	N
6	DECLINED	6' 0"	3648	30.92	N	N	N	N	N	N
7	DECLINED	5' 6"	1827.2	18.44	N	N	N	N	N	N
8	OTHER COMBINATIONS NOT DESCRIBED	4' 9.5"	1872	25.11	N	N	N	N	N	N
9	OTHER COMBINATIONS NOT DESCRIBED	5' 2"	2448	28.92	N	N	N	N	N	N
10	ASIAN	5' 9"	3072	28.34	N	N	N	N	N	N
11	NULL	5' 0"	3609.6	44.06	N	N	N	N	N	N
12	DECLINED	5' 1.024"	2704	31.95	Y	N	Y	Y	Y	N
13	WHITE	6' 1"	3056	26.08	N	Y	N	Y	N	N
14	NULL	6' 0"	3408	3827.82	Y	Y	N	N	Y	Y
15	NULL	6' 2"	3284.8	25.99	N	N	N	N	N	N
16	DECLINED	5' 8"	2560	26.63	N	N	N	N	N	N
17	DECLINED	5' 8"	2640	25.09	N	N	N	N	N	Y
18	NULL	5' 1"	2769.6	32.72	N	N	Y	N	N	N

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)

	Race	Height	Weight	BMI	Diabetes	Hypertension	Obesity	NSAID	Antidiabetic	Current_Cigarette_Smoker
1	WHITE	5' 4"	2096	22.84	N	N	N	N	N	N
2	OTHER COMBINATIONS NOT DESCRIBED	6' 0"	4704	39.47	Y	Y	Y	N	Y	N
3	WHITE	5' 5"	3168	34.72	N	N	Y	N	N	Y
4	WHITE	5' 4.5"	2352	24.85	N	N	N	N	N	N
5	ASIAN	5' 9"	2656	25.60	N	Y	N	N	N	N
6	DECLINED	6' 0"	3648	30.92	N	N	N	N	N	N
7	DECLINED	5' 6"	1827.2	18.44	N	N	N	N	N	N
8	OTHER COMBINATIONS NOT DESCRIBED	4' 9.5"	1872	25.11	N	N	N	N	N	N
9	OTHER COMBINATIONS NOT DESCRIBED	5' 2"	2448	28.92	N	N	N	N	N	N
10	ASIAN	5' 9"	3072	28.34	N	N	N	N	N	N
11	NULL	5' 0"	3609.6	44.06	N	N	N	N	N	N
12	DECLINED	5' 1.024"	2704	31.95	Y	N	Y	Y	Y	N
13	WHITE	6' 1"	3056	26.08	N	Y	N	Y	N	N
14	NULL	6' 0"	3408	3827.82	Y	Y	N	N	Y	Y
15	NULL	6' 2"	3284.8	25.99	N	N	N	N	N	N
16	DECLINED	5' 8"	2560	26.63	N	N	N	N	N	N
17	DECLINED	5' 8"	2640	25.09	N	N	N	N	N	Y
18	NULL	5' 1"	2769.6	32.72	N	N	Y	N	N	N

Architecture for Research Computing in Health (ARCH)

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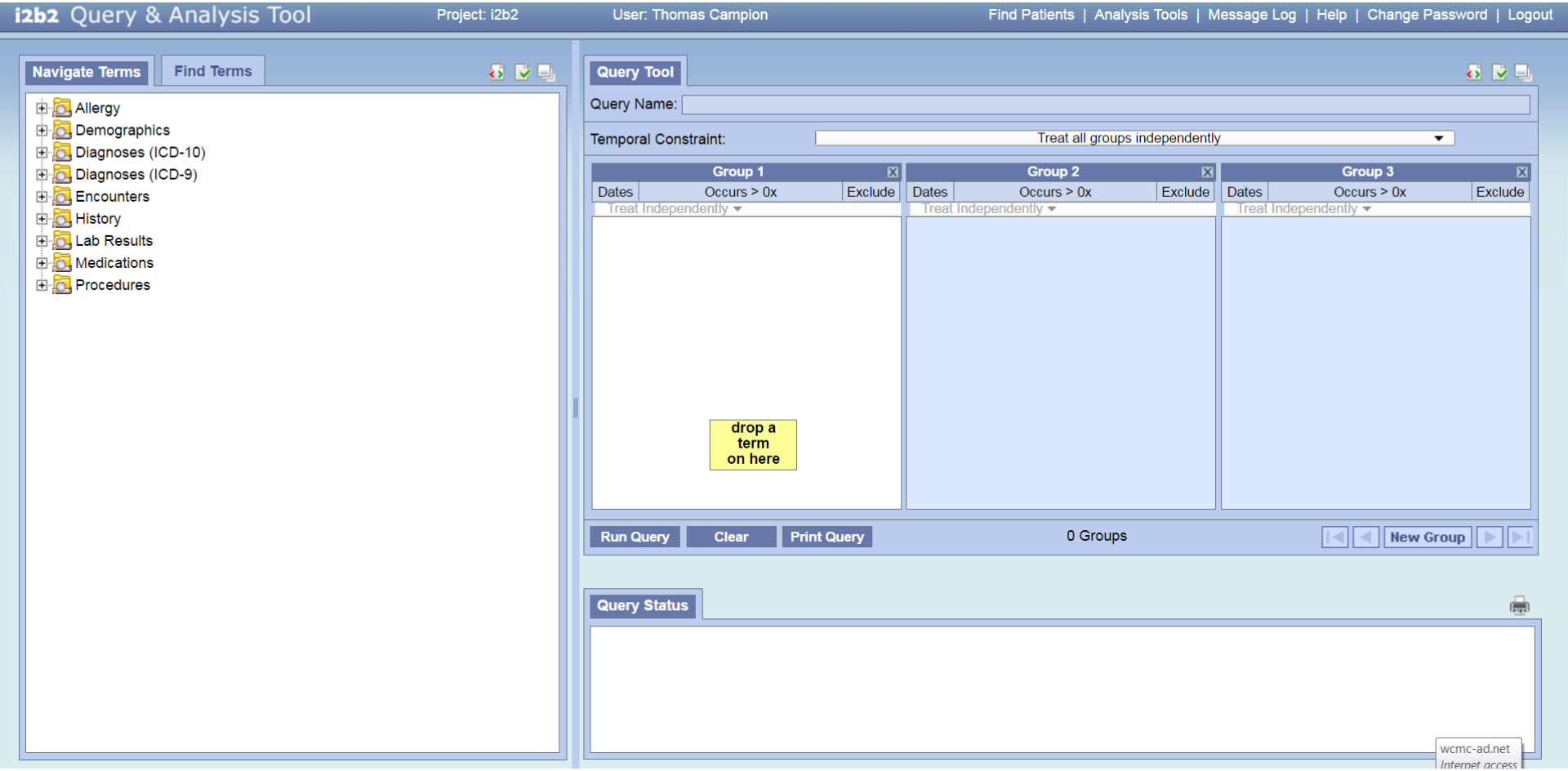
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Find Patients | Analysis Tools | Message Log | Help | Change Password | Logout
Navigate Terms
Find Terms
Allergy
Demographics
Diagnoses (ICD-10)
Diagnoses (ICD-9)
Encounters
History
Lab Results
Medications
Procedures
Query Tool
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Temporal Constraint:
Treat all groups independently
Group 1
Group 2
Group 3
Dates
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Run Query
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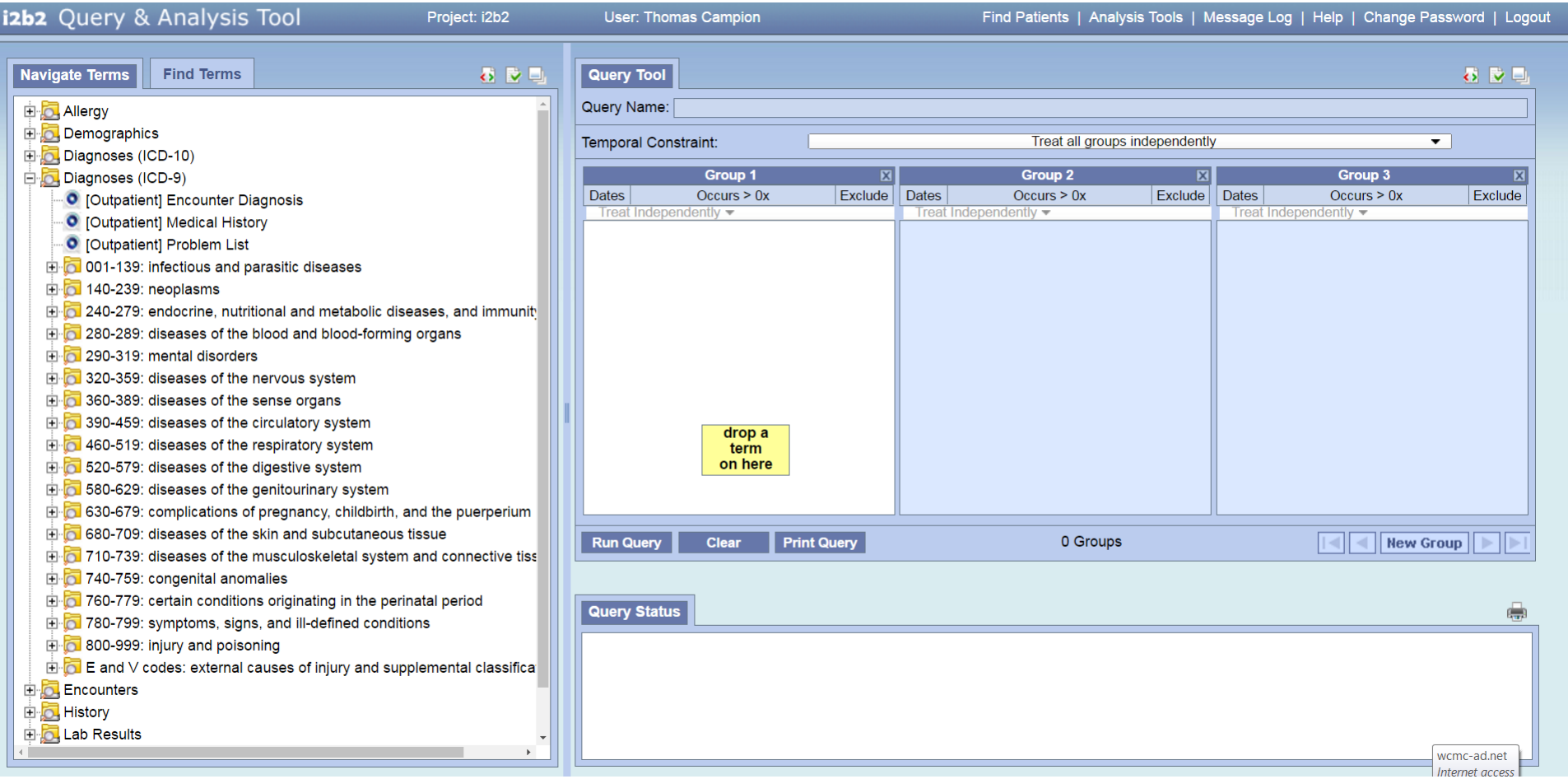
Print Query
0 Groups
New Group
Query Status
wcmc-ad.net
Internet access

ARCH: i2b2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Find Patients | Analysis Tools | Message Log | Help | Change Password | Logout
Navigate Terms
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Allergy
Demographics
Diagnoses (ICD-10)
Diagnoses (ICD-9)
[Outpatient] Encounter Diagnosis
[Outpatient] Medical History
[Outpatient] Problem List
001-139: infectious and parasitic diseases
140-239: neoplasms
240-279: endocrine, nutritional and metabolic diseases, and immunity
280-289: diseases of the blood and blood-forming organs
290-319: mental disorders
320-359: diseases of the nervous system
360-389: diseases of the sense organs
390-459: diseases of the circulatory system
460-519: diseases of the respiratory system
520-579: diseases of the digestive system
580-629: diseases of the genitourinary system
630-679: complications of pregnancy, childbirth, and the puerperium
680-709: diseases of the skin and subcutaneous tissue
710-739: diseases of the musculoskeletal system and connective tiss
740-759: congenital anomalies
760-779: certain conditions originating in the perinatal period
780-799: symptoms, signs, and ill-defined conditions
800-999: injury and poisoning
E and V codes: external causes of injury and supplemental classifica
Encounters
History
Lab Results
Query Tool
Query Name:
Temporal Constraint:
Treat all groups independently
Group 1
Group 2
Group 3
Dates
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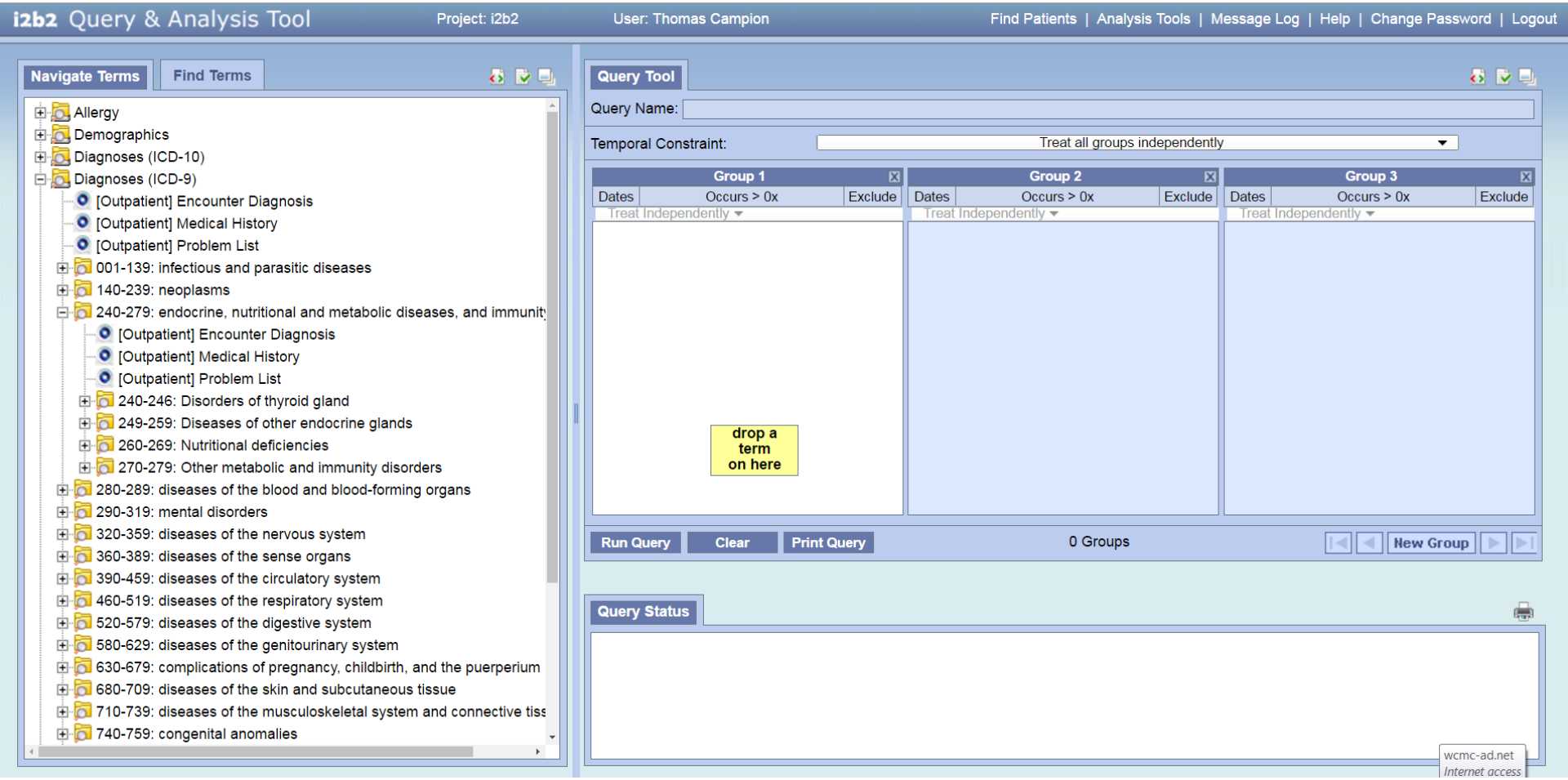
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140-239: neoplasms
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[Outpatient] Medical History
[Outpatient] Problem List
240-246: Disorders of thyroid gland
249-259: Diseases of other endocrine glands
260-269: Nutritional deficiencies
270-279: Other metabolic and immunity disorders
280-289: diseases of the blood and blood-forming organs
290-319: mental disorders
320-359: diseases of the nervous system
360-389: diseases of the sense organs
390-459: diseases of the circulatory system
460-519: diseases of the respiratory system
520-579: diseases of the digestive system
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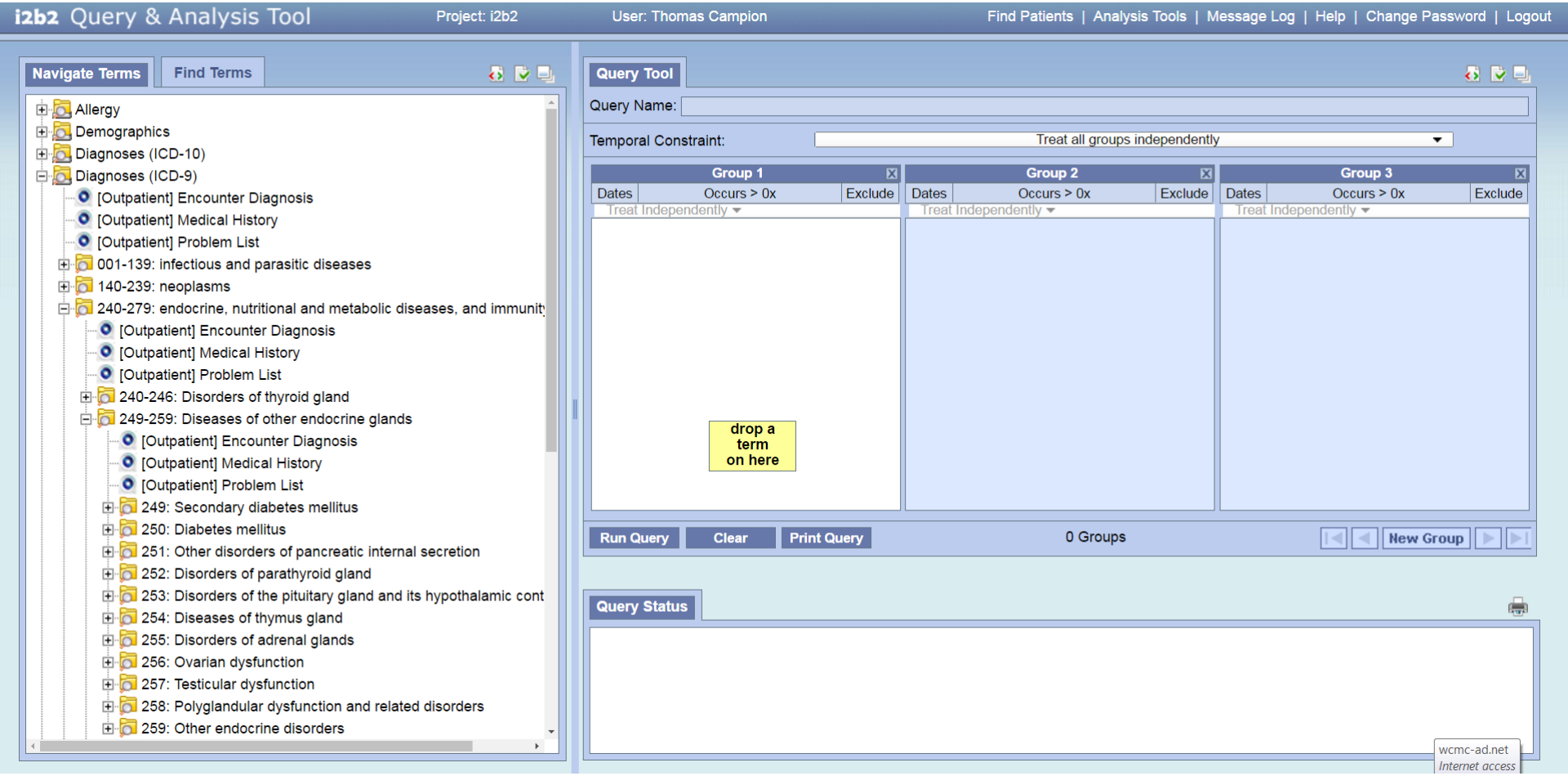
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249-259: Diseases of other endocrine glands
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[Outpatient] Medical History
[Outpatient] Problem List
249: Secondary diabetes mellitus
250: Diabetes mellitus
251: Other disorders of pancreatic internal secretion
252: Disorders of parathyroid gland
253: Disorders of the pituitary gland and its hypothalamic cont
254: Diseases of thymus gland
255: Disorders of adrenal glands
256: Ovarian dysfunction
257: Testicular dysfunction
258: Polyglandular dysfunction and related disorders
259: Other endocrine disorders
Query Tool
Query Name:
Temporal Constraint:
Treat all groups independently
Group 1
Group 2
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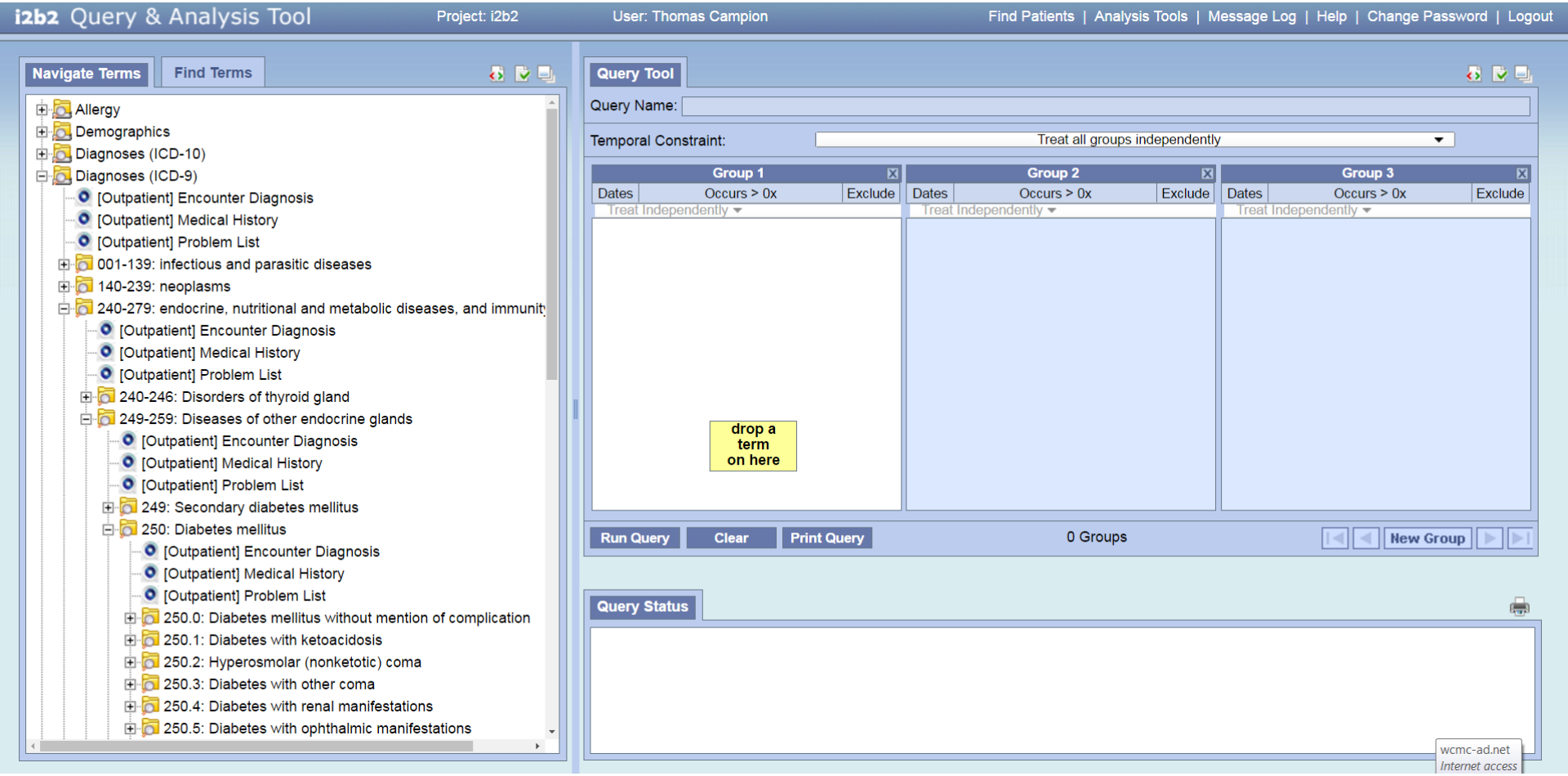
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[Outpatient] Encounter Diagnosis
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[Outpatient] Problem List
249: Secondary diabetes mellitus
250: Diabetes mellitus
[Outpatient] Encounter Diagnosis
[Outpatient] Medical History
[Outpatient] Problem List
250.0: Diabetes mellitus without mention of complication
250.1: Diabetes with ketoacidosis
250.2: Hyperosmolar (nonketotic) coma
250.3: Diabetes with other coma
250.4: Diabetes with renal manifestations
250.5: Diabetes with ophthalmic manifestations
Query Tool
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Temporal Constraint:
Treat all groups independently
Group 1
Group 2
Group 3
Dates
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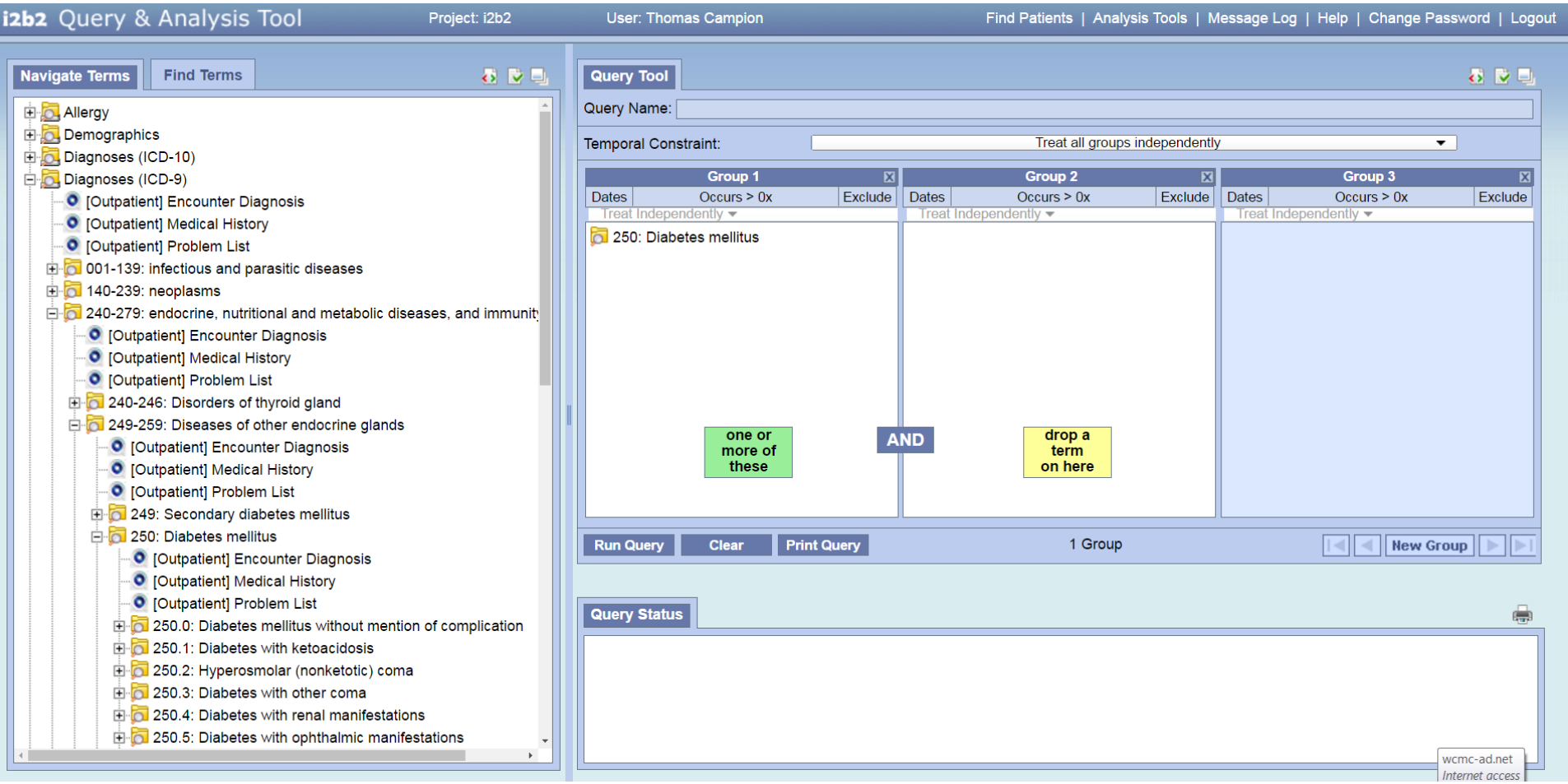
ARCH: i2b2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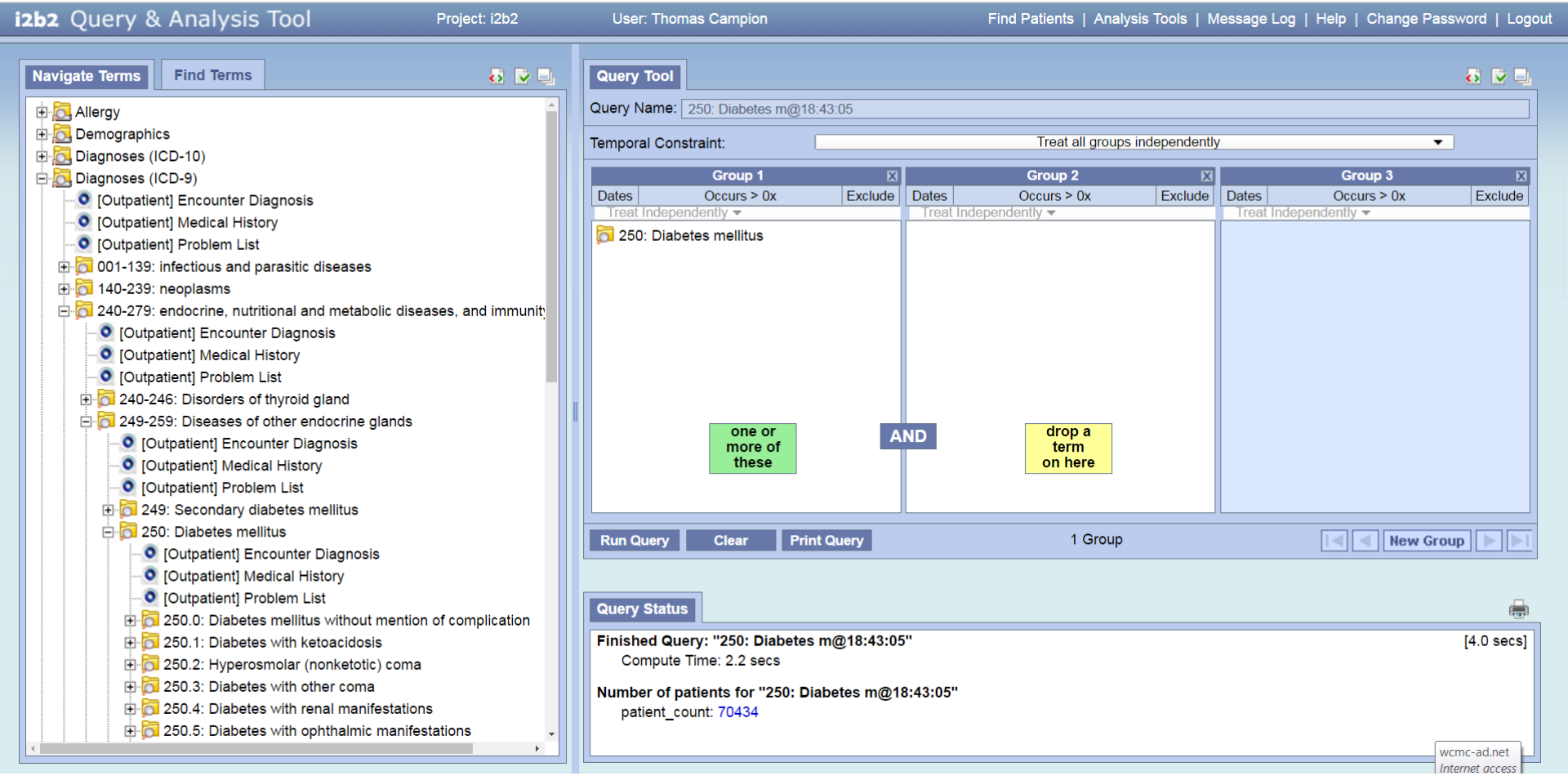
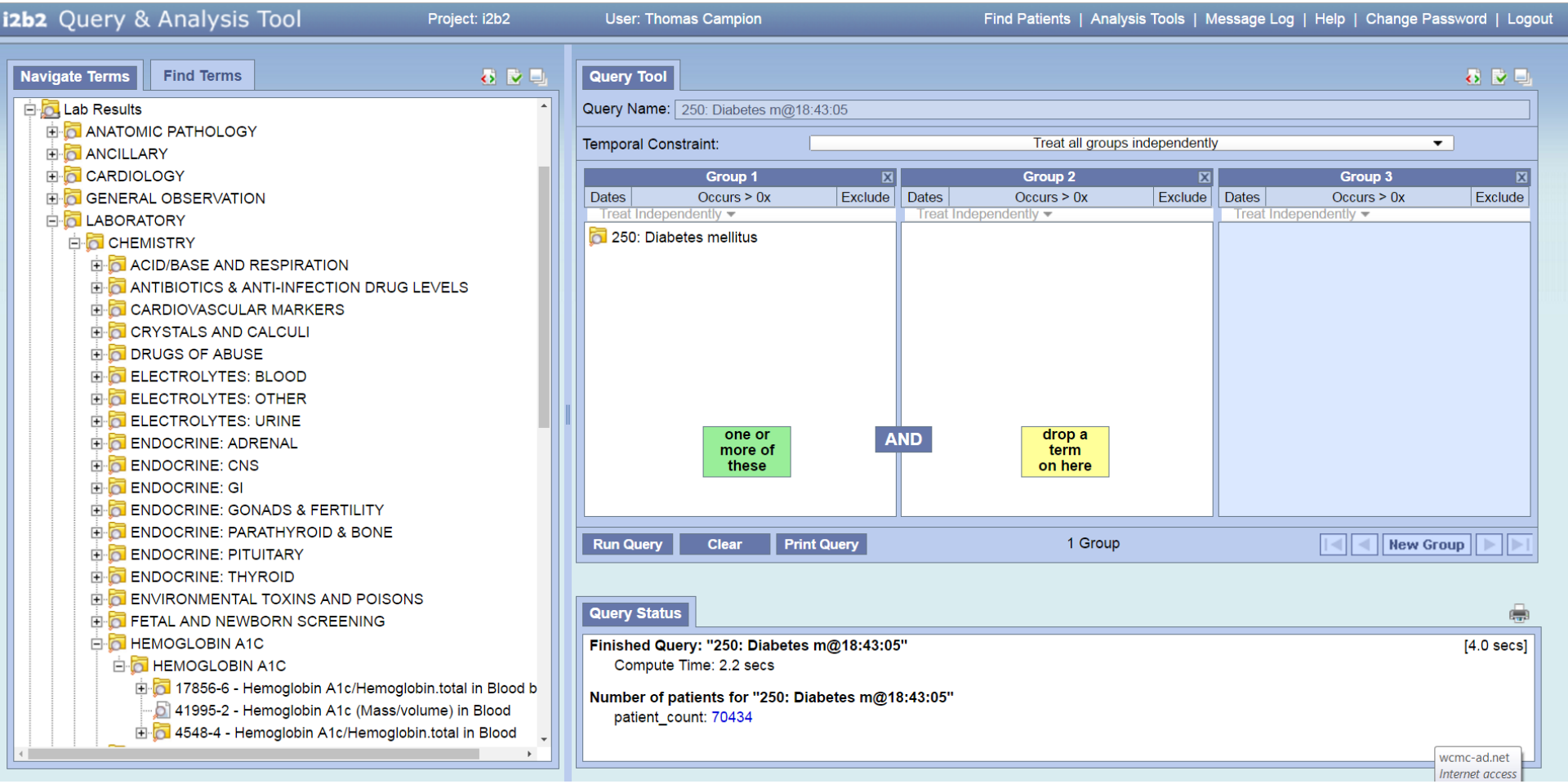
249-259: Diseases of other endocrine glands
[Outpatient] Encounter Diagnosis
[Outpatient] Medical History
[Outpatient] Problem List
249: Secondary diabetes mellitus
250: Diabetes mellitus
[Outpatient] Encounter Diagnosis
[Outpatient] Medical History
[Outpatient] Problem List
250.0: Diabetes mellitus without mention of complication
250.1: Diabetes with ketoacidosis
250.2: Hyperosmolar (nonketotic) coma
250.3: Diabetes with other coma
250.4: Diabetes with renal manifestations
250.5: Diabetes with ophthalmic manifestations
Query Tool
Query Name:
Temporal Constraint:
Treat all groups independently
Group 1
Group 2
Group 3
Dates
Occurs > 0x
Exclude
Treat Independently
250: Diabetes mellitus
one or more of these
AND
drop a term on here
Run Query
Clear
Print Query
1 Group
New Group
Query Status
wcmc-ad.net
Internet access

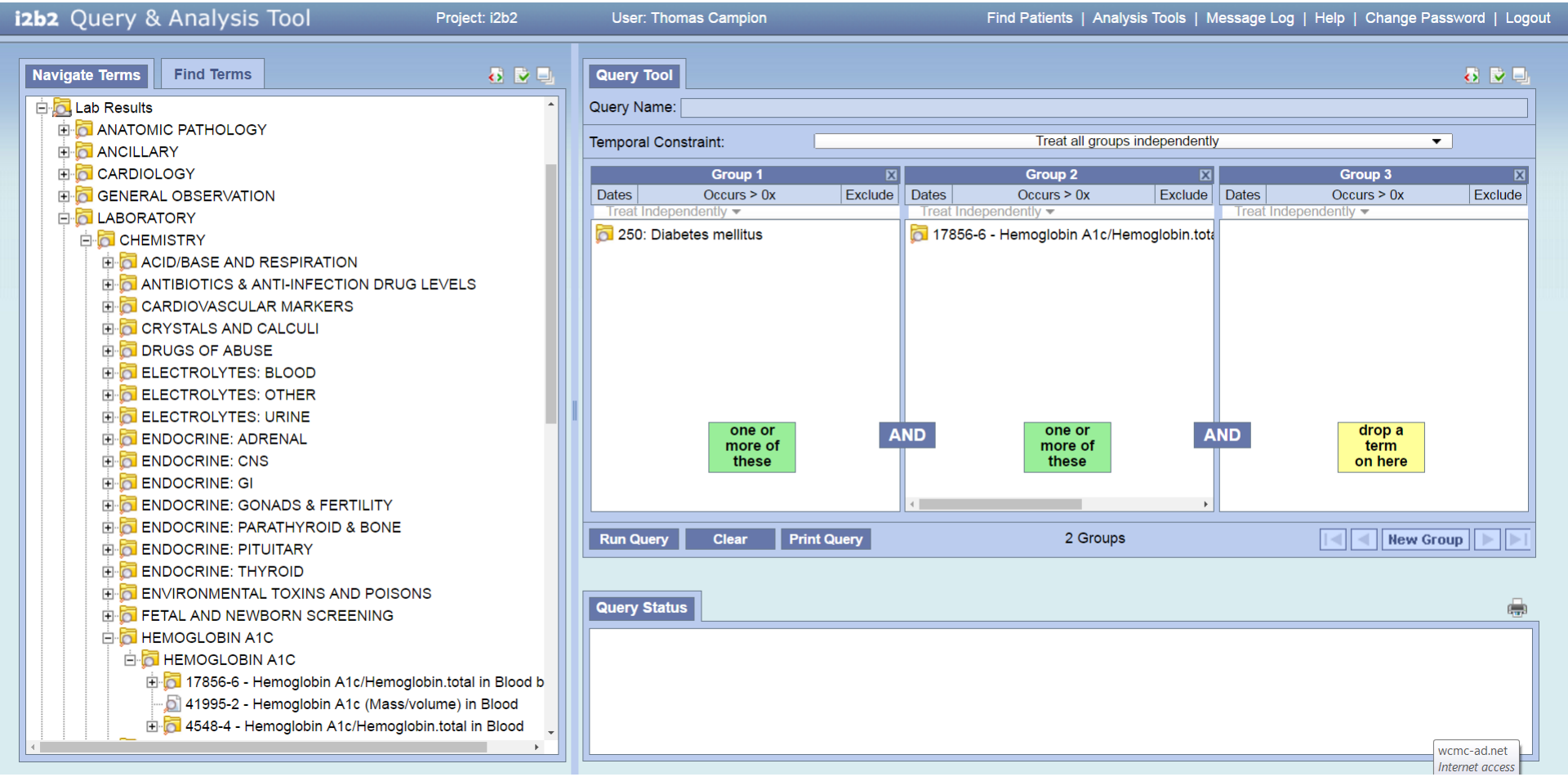
ARCH: i2b2


i2b2 Query & Analysis Tool
Project: i2b2
User: Thomas Campion
Find Patients | Analysis Tools | Message Log | Help | Change Password | Logout
Navigate Terms
Find Terms
Allergy
Demographics
Diagnoses (ICD-10)
Diagnoses (ICD-9)
[Outpatient] Encounter Diagnosis
[Outpatient] Medical History
[Outpatient] Problem List
001-139: infectious and parasitic diseases
140-239: neoplasms
240-279: endocrine, nutritional and metabolic diseases, and immunity
[Outpatient] Encounter Diagnosis
[Outpatient] Medical History
[Outpatient] Problem List
240-246: Disorders of thyroid gland
249-259: Diseases of other endocrine glands
[Outpatient] Encounter Diagnosis
[Outpatient] Medical History
[Outpatient] Problem List
249: Secondary diabetes mellitus
250: Diabetes mellitus
[Outpatient] Encounter Diagnosis
[Outpatient] Medical History
[Outpatient] Problem List
250.0: Diabetes mellitus without mention of complication
250.1: Diabetes with ketoacidosis
250.2: Hyperosmolar (nonketotic) coma
250.3: Diabetes with other coma
250.4: Diabetes with renal manifestations
250.5: Diabetes with ophthalmic manifestations
Query Tool
Query Name: 250: Diabetes m@18:43:05
Temporal Constraint: Treat all groups independently
Group 1
Group 2
Group 3
Dates
Occurs > 0x
Exclude
Treat Independently
250: Diabetes mellitus
one or more of these
AND
drop a term on here
Run Query
Clear
Print Query
1 Group
New Group
Query Status
Finished Query: "250: Diabetes m@18:43:05"
[4.0 secs]
Compute Time: 2.2 secs
Number of patients for "250: Diabetes m@18:43:05"
patient_count: 70434
wcmc-ad.net
Internet access

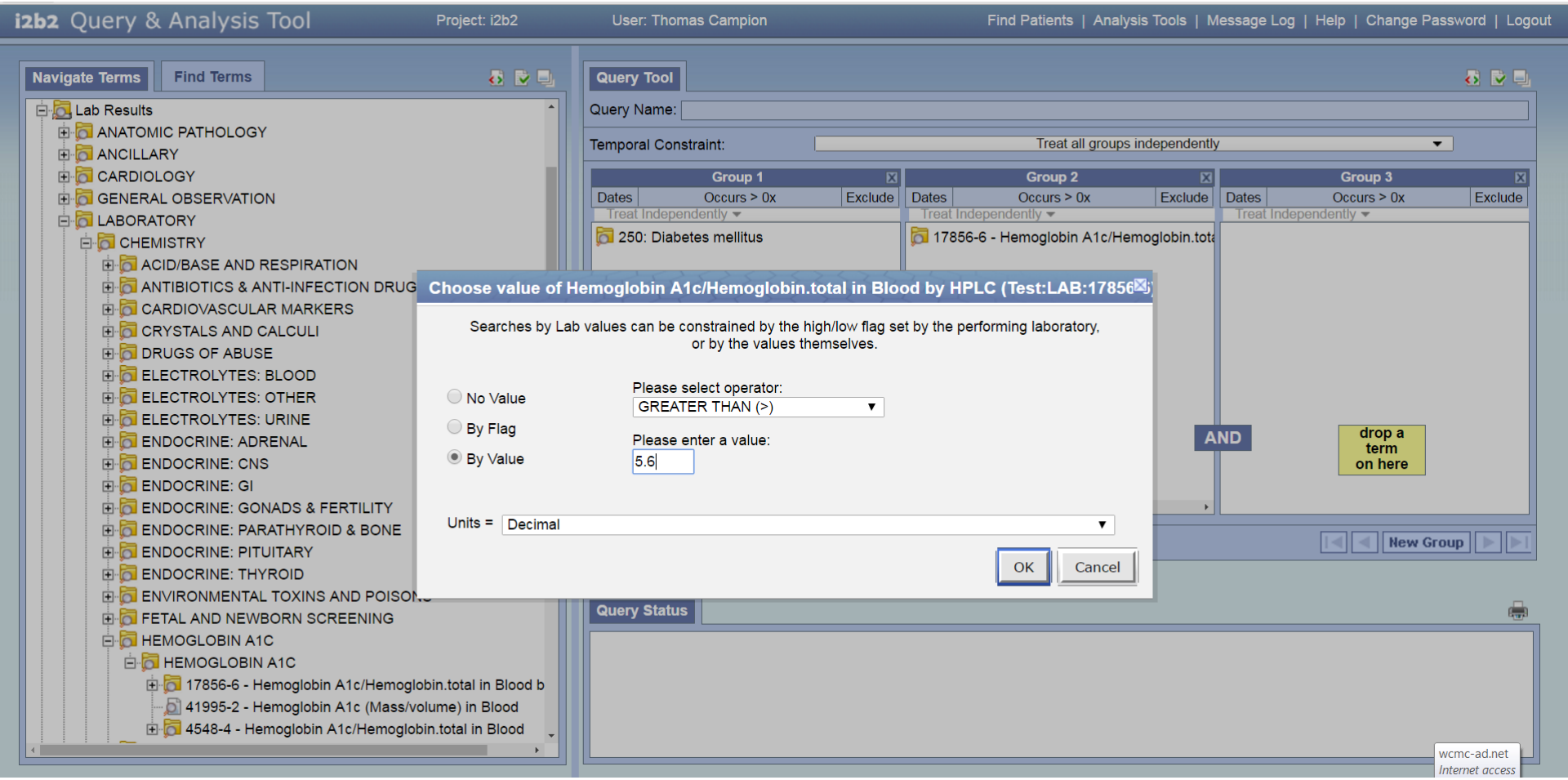
ARCH: i2b2


i2b2 Query & Analysis Tool
Project: i2b2
User: Thomas Campion
Find Patients | Analysis Tools | Message Log | Help | Change Password | Logout
Navigate Terms
Find Terms
Lab Results
ANATOMIC PATHOLOGY
ANCILLARY
CARDIOLOGY
GENERAL OBSERVATION
LABORATORY
CHEMISTRY
ACID/BASE AND RESPIRATION
ANTIBIOTICS & ANTI-INFECTION DRUG LEVELS
CARDIOVASCULAR MARKERS
CRYSTALS AND CALCULI
DRUGS OF ABUSE
ELECTROLYTES: BLOOD
ELECTROLYTES: OTHER
ELECTROLYTES: URINE
ENDOCRINE: ADRENAL
ENDOCRINE: CNS
ENDOCRINE: GI
ENDOCRINE: GONADS & FERTILITY
ENDOCRINE: PARATHYROID & BONE
ENDOCRINE: PITUITARY
ENDOCRINE: THYROID
ENVIRONMENTAL TOXINS AND POISONS
FETAL AND NEWBORN SCREENING
HEMOGLOBIN A1C
HEMOGLOBIN A1C
17856-6 - Hemoglobin A1c/Hemoglobin.total in Blood b
41995-2 - Hemoglobin A1c (Mass/volume) in Blood
4548-4 - Hemoglobin A1c/Hemoglobin.total in Blood
Query Tool
Query Name: 250: Diabetes m@18:43:05
Temporal Constraint: Treat all groups independently
Group 1
Group 2
Group 3
Dates
Occurs > 0x
Exclude
Treat Independently
250: Diabetes mellitus
one or more of these
AND
drop a term on here
Run Query
Clear
Print Query
1 Group
New Group
Query Status
Finished Query: "250: Diabetes m@18:43:05"
[4.0 secs]
Compute Time: 2.2 secs
Number of patients for "250: Diabetes m@18:43:05"
patient_count: 70434
wcmc-ad.net
Internet access

ARCH: i2b2


i2b2 Query & Analysis Tool
Project: i2b2
User: Thomas Campion
Find Patients | Analysis Tools | Message Log | Help | Change Password | Logout
Navigate Terms
Find Terms
Lab Results
ANATOMIC PATHOLOGY
ANCILLARY
CARDIOLOGY
GENERAL OBSERVATION
LABORATORY
CHEMISTRY
ACID/BASE AND RESPIRATION
ANTIBIOTICS & ANTI-INFECTION DRUG LEVELS
CARDIOVASCULAR MARKERS
CRYSTALS AND CALCULI
DRUGS OF ABUSE
ELECTROLYTES: BLOOD
ELECTROLYTES: OTHER
ELECTROLYTES: URINE
ENDOCRINE: ADRENAL
ENDOCRINE: CNS
ENDOCRINE: GI
ENDOCRINE: GONADS & FERTILITY
ENDOCRINE: PARATHYROID & BONE
ENDOCRINE: PITUITARY
ENDOCRINE: THYROID
ENVIRONMENTAL TOXINS AND POISONS
FETAL AND NEWBORN SCREENING
HEMOGLOBIN A1C
HEMOGLOBIN A1C
17856-6 - Hemoglobin A1c/Hemoglobin.total in Blood b
41995-2 - Hemoglobin A1c (Mass/volume) in Blood
4548-4 - Hemoglobin A1c/Hemoglobin.total in Blood
Query Tool
Query Name:
Temporal Constraint:
Treat all groups independently
Group 1
Group 2
Group 3
Dates
Occurs > 0x
Exclude
Treat Independently
250: Diabetes mellitus
17856-6 - Hemoglobin A1c/Hemoglobin.tota
one or more of these
AND
one or more of these
AND
drop a term on here
Run Query
Clear
Print Query
2 Groups
New Group
Query Status
wcmc-ad.net
Internet access

ARCH: i2b2


i2b2 Query & Analysis Tool
Project: i2b2
User: Thomas Campion
Find Patients | Analysis Tools | Message Log | Help | Change Password | Logout
Navigate Terms
Find Terms
Lab Results
ANATOMIC PATHOLOGY
ANCILLARY
CARDIOLOGY
GENERAL OBSERVATION
LABORATORY
CHEMISTRY
ACID/BASE AND RESPIRATION
ANTIBIOTICS & ANTI-INFECTION DRUG
CARDIOVASCULAR MARKERS
CRYSTALS AND CALCULI
DRUGS OF ABUSE
ELECTROLYTES: BLOOD
ELECTROLYTES: OTHER
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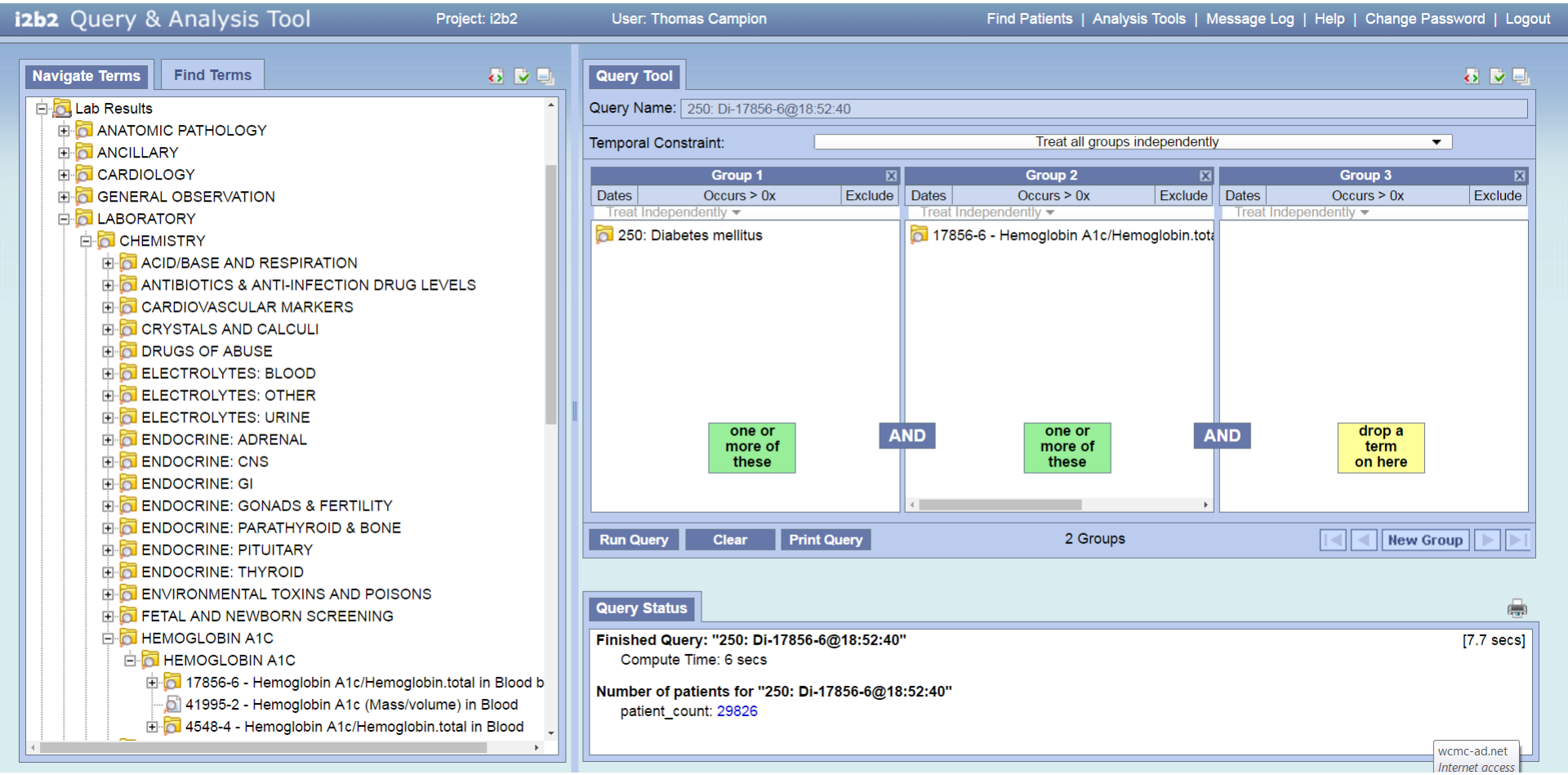
ENDOCRINE: GI
ENDOCRINE: GONADS & FERTILITY
ENDOCRINE: PARATHYROID & BONE
ENDOCRINE: PITUITARY
ENDOCRINE: THYROID
ENVIRONMENTAL TOXINS AND POISON
FETAL AND NEWBORN SCREENING
HEMOGLOBIN A1C
HEMOGLOBIN A1C
17856-6 - Hemoglobin A1c/Hemoglobin.total in Blood b
41995-2 - Hemoglobin A1c (Mass/volume) in Blood
4548-4 - Hemoglobin A1c/Hemoglobin.total in Blood
Query Tool
Query Name:
Temporal Constraint:
Treat all groups independently
Group 1
Group 2
Group 3
Dates
Occurs > 0x
Exclude
Treat Independently
250: Diabetes mellitus
17856-6 - Hemoglobin A1c/Hemoglobin.tota
AND
drop a term on here
New Group
Choose value of Hemoglobin A1c/Hemoglobin.total in Blood by HPLC (Test:LAB:17856
Searches by Lab values can be constrained by the high/low flag set by the performing laboratory, or by the values themselves.
No Value
By Flag
By Value
Please select operator:
GREATER THAN (>)
Please enter a value:
5.6
Units =
Decimal
OK
Cancel
Query Status
wcmc-ad.net
Internet access

ARCH: i2b2


i2b2 Query & Analysis Tool
Project: i2b2
User: Thomas Campion
Find Patients | Analysis Tools | Message Log | Help | Change Password | Logout
Navigate Terms
Find Terms
Lab Results
ANATOMIC PATHOLOGY
ANCILLARY
CARDIOLOGY
GENERAL OBSERVATION
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CHEMISTRY
ACID/BASE AND RESPIRATION
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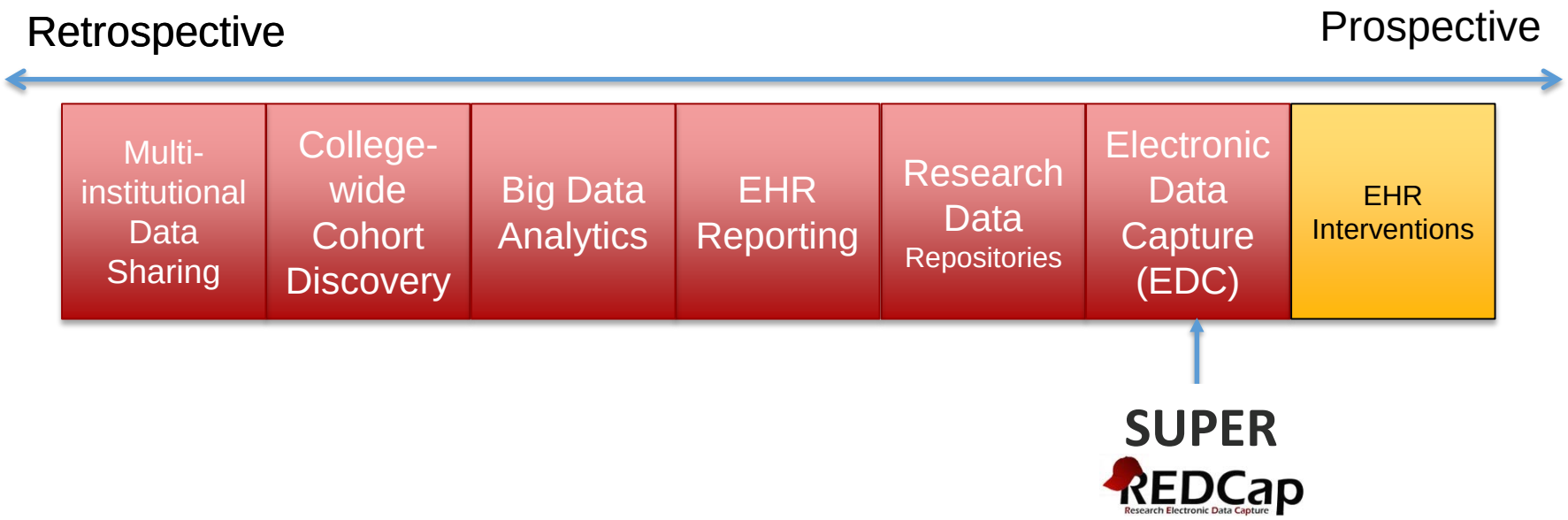
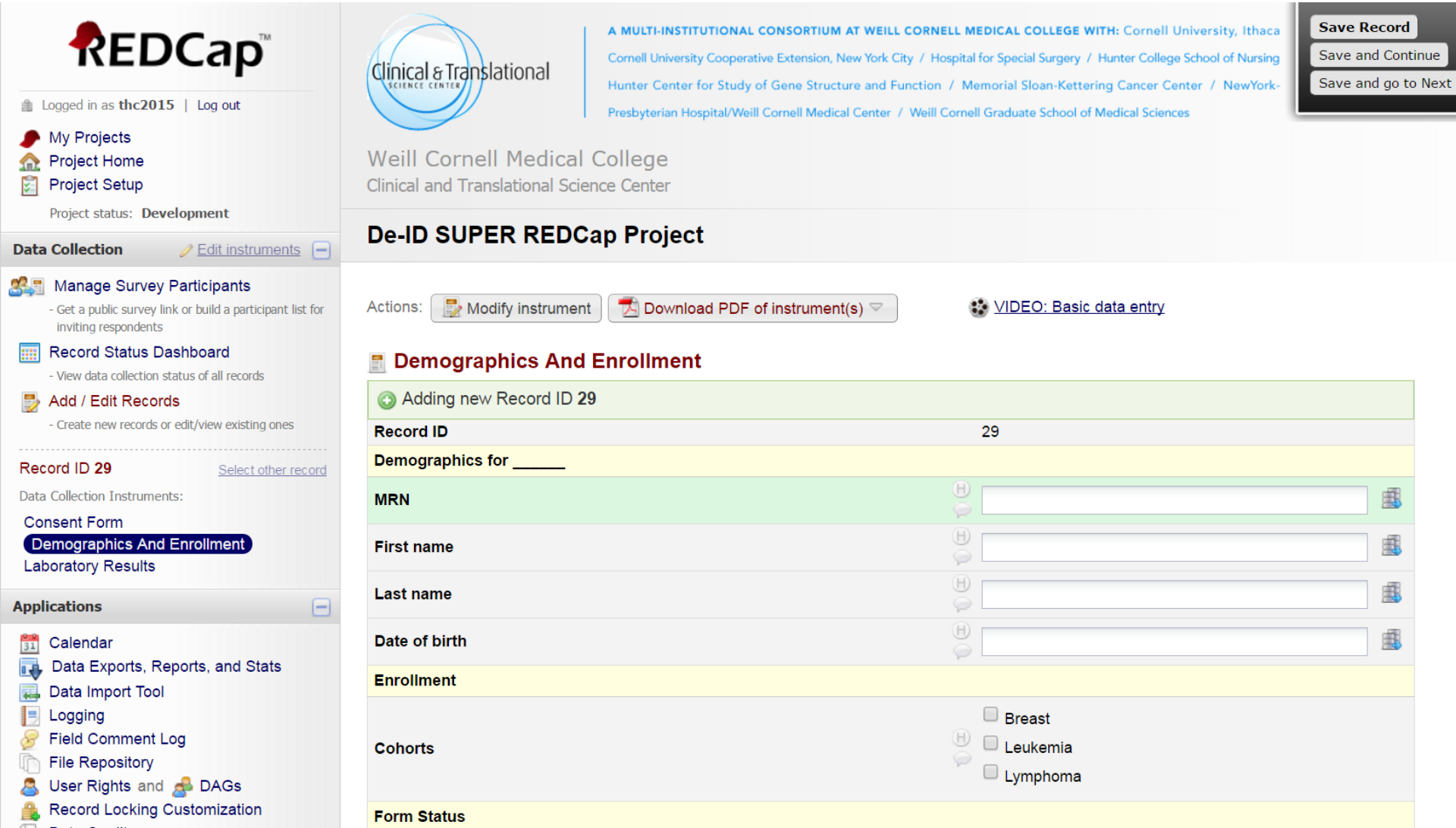
HEMOGLOBIN A1C
HEMOGLOBIN A1C
17856-6 - Hemoglobin A1c/Hemoglobin.total in Blood b
41995-2 - Hemoglobin A1c (Mass/volume) in Blood
4548-4 - Hemoglobin A1c/Hemoglobin.total in Blood
Query Tool
Query Name: 250: Di-17856-6@18:52:40
Temporal Constraint:
Treat all groups independently
Group 1
Group 2
Group 3
Dates
Occurs > 0x
Exclude
Treat Independently
250: Diabetes mellitus
17856-6 - Hemoglobin A1c/Hemoglobin.tota
one or more of these
AND
one or more of these
AND
drop a term on here
Run Query
Clear
Print Query
2 Groups
New Group
Query Status
Finished Query: "250: Di-17856-6@18:52:40"
[7.7 secs]
Compute Time: 6 secs
Number of patients for "250: Di-17856-6@18:52:40"
patient_count: 29826
wcmc-ad.net
Internet access

Architecture for Research Computing in Health (ARCH)

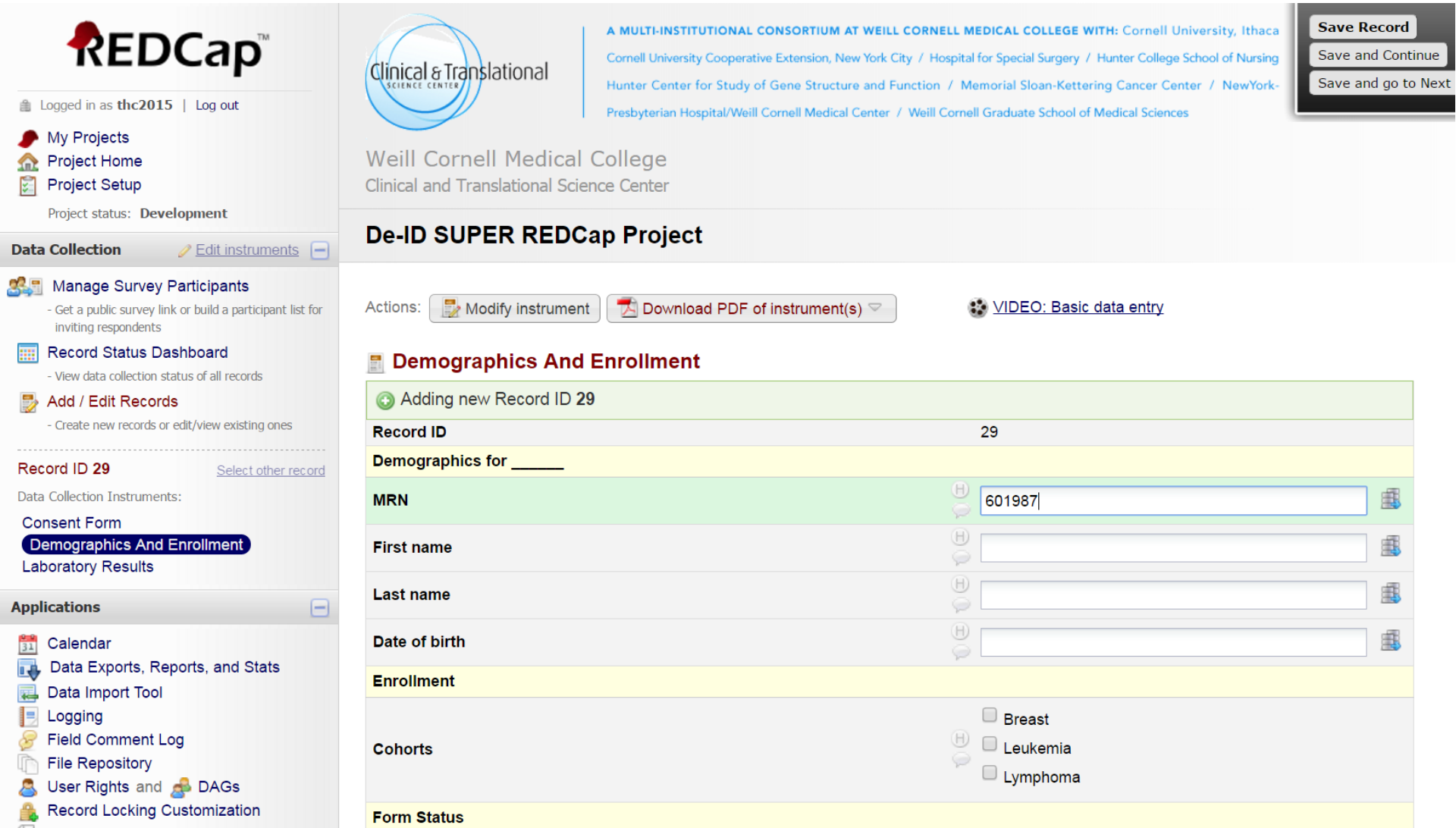


ARCH: SUPER REDCap



Weill Cornell Medicine

ARCH: SUPER REDCap



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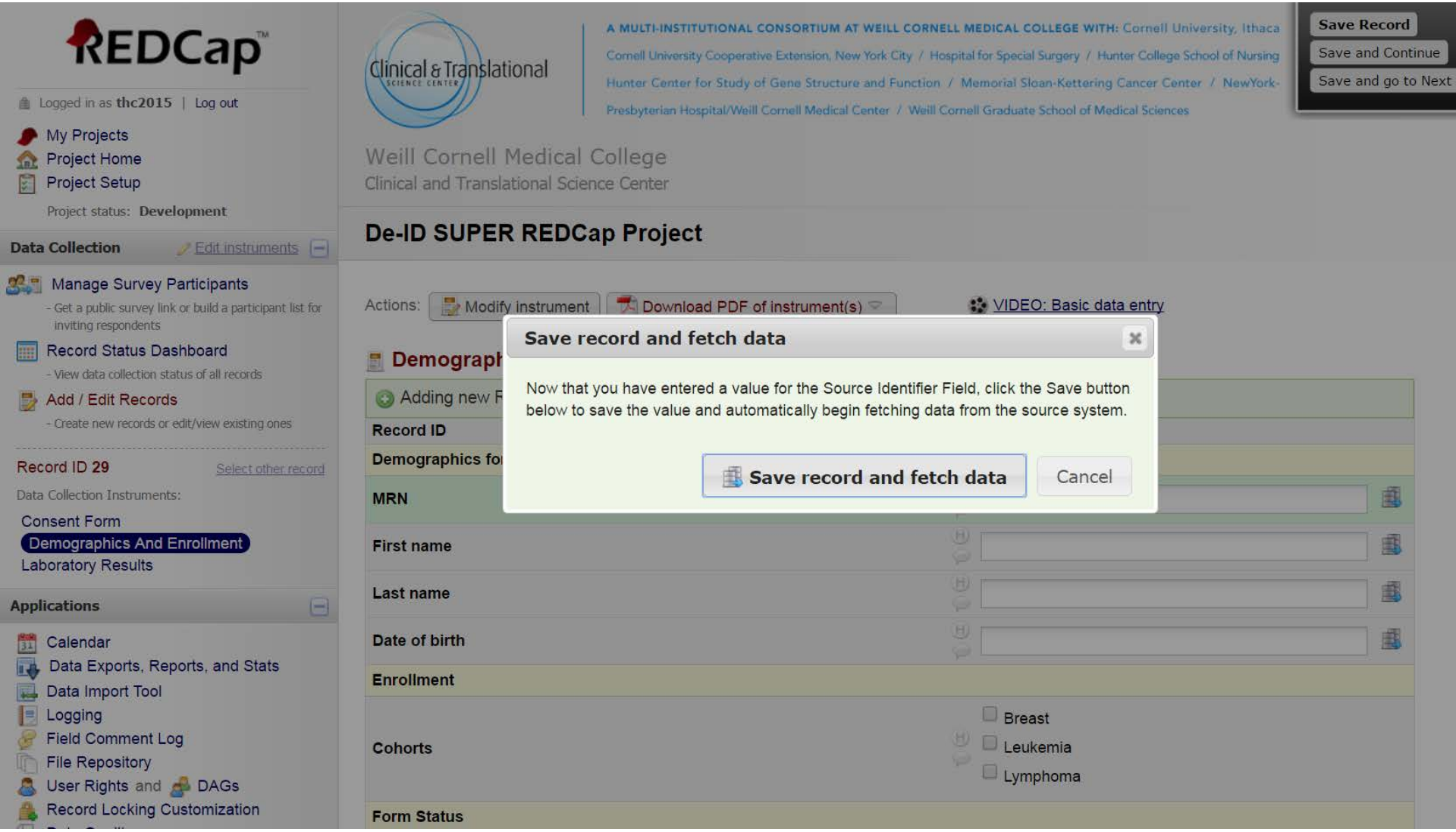

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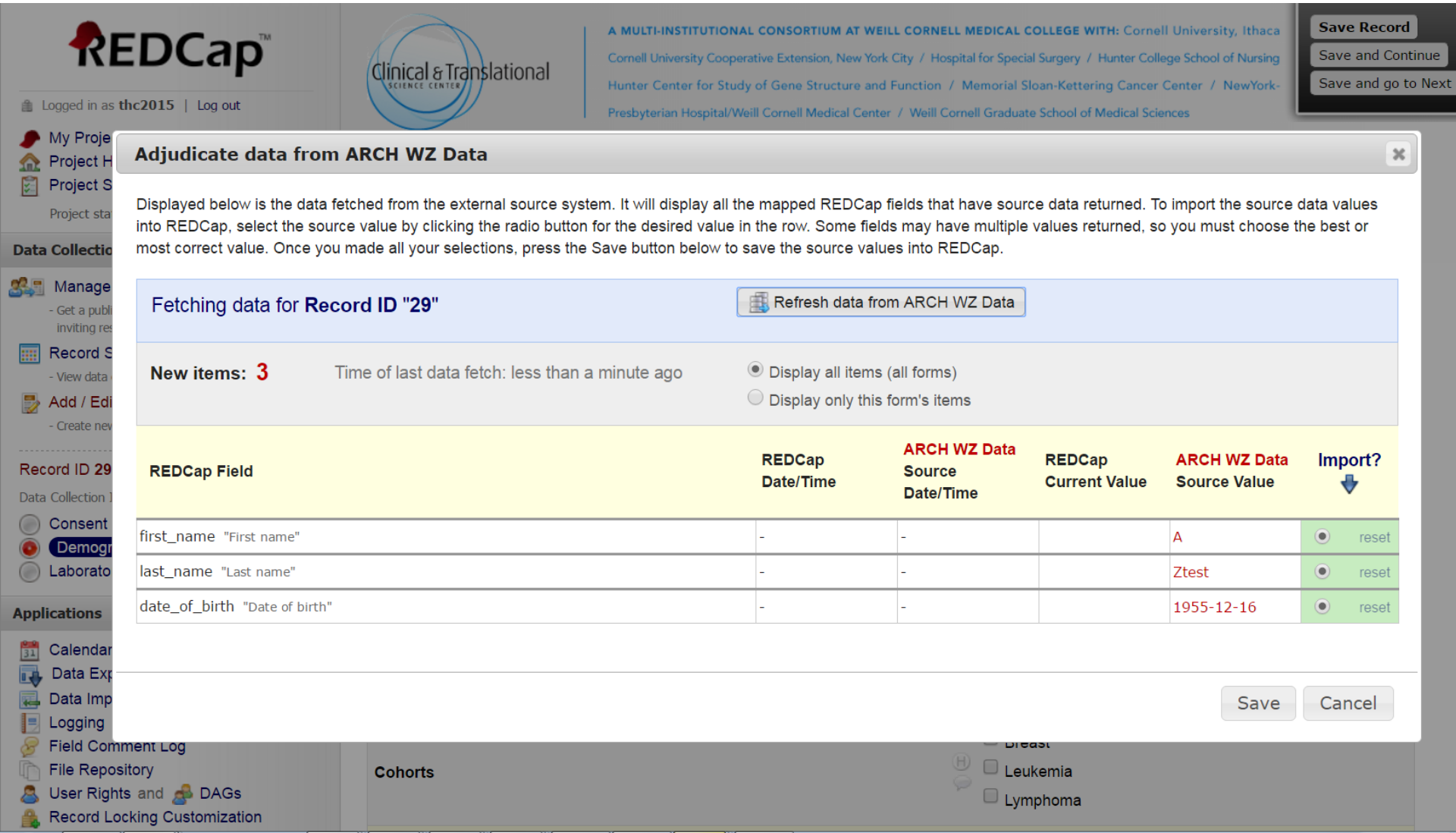
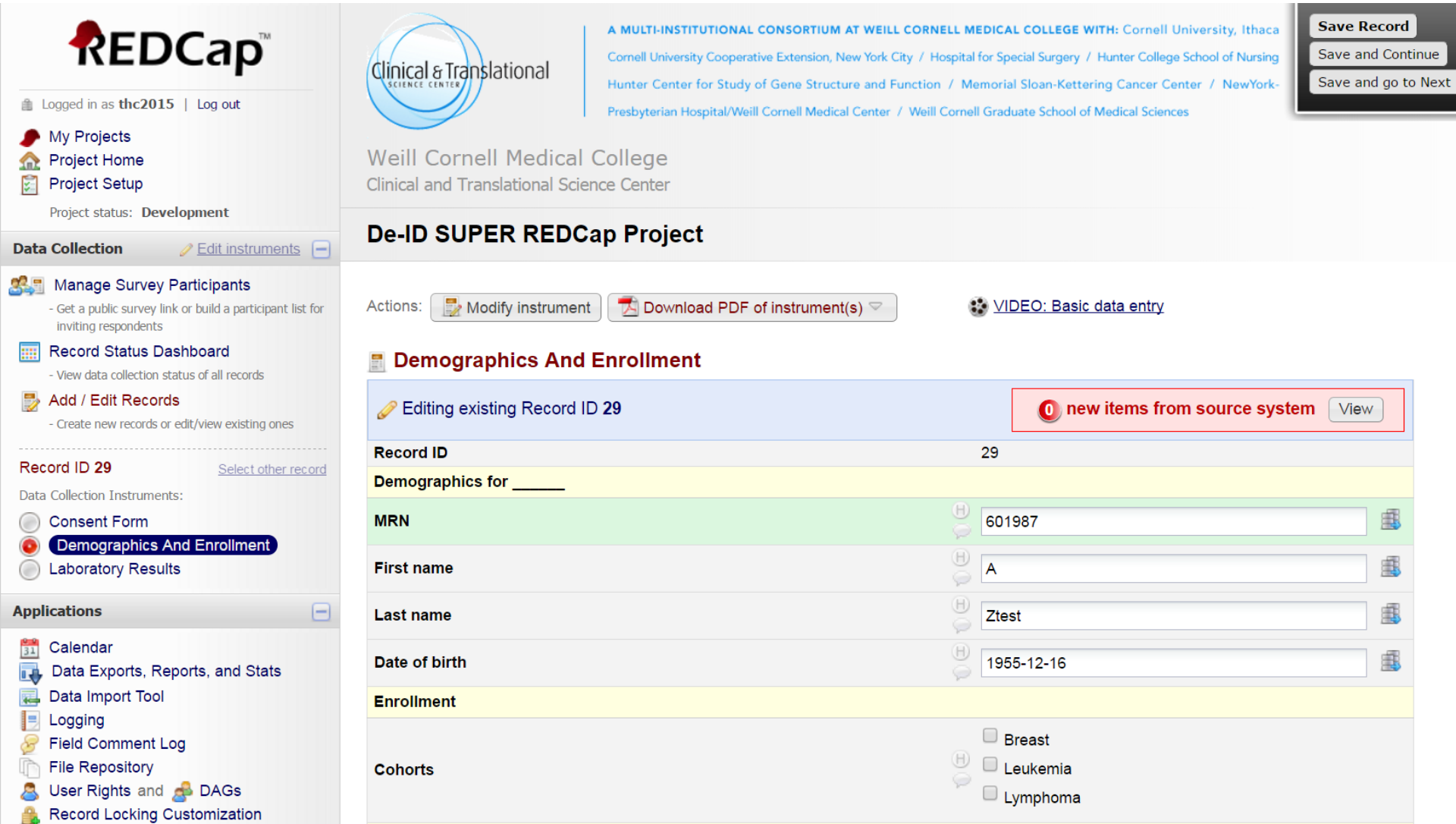
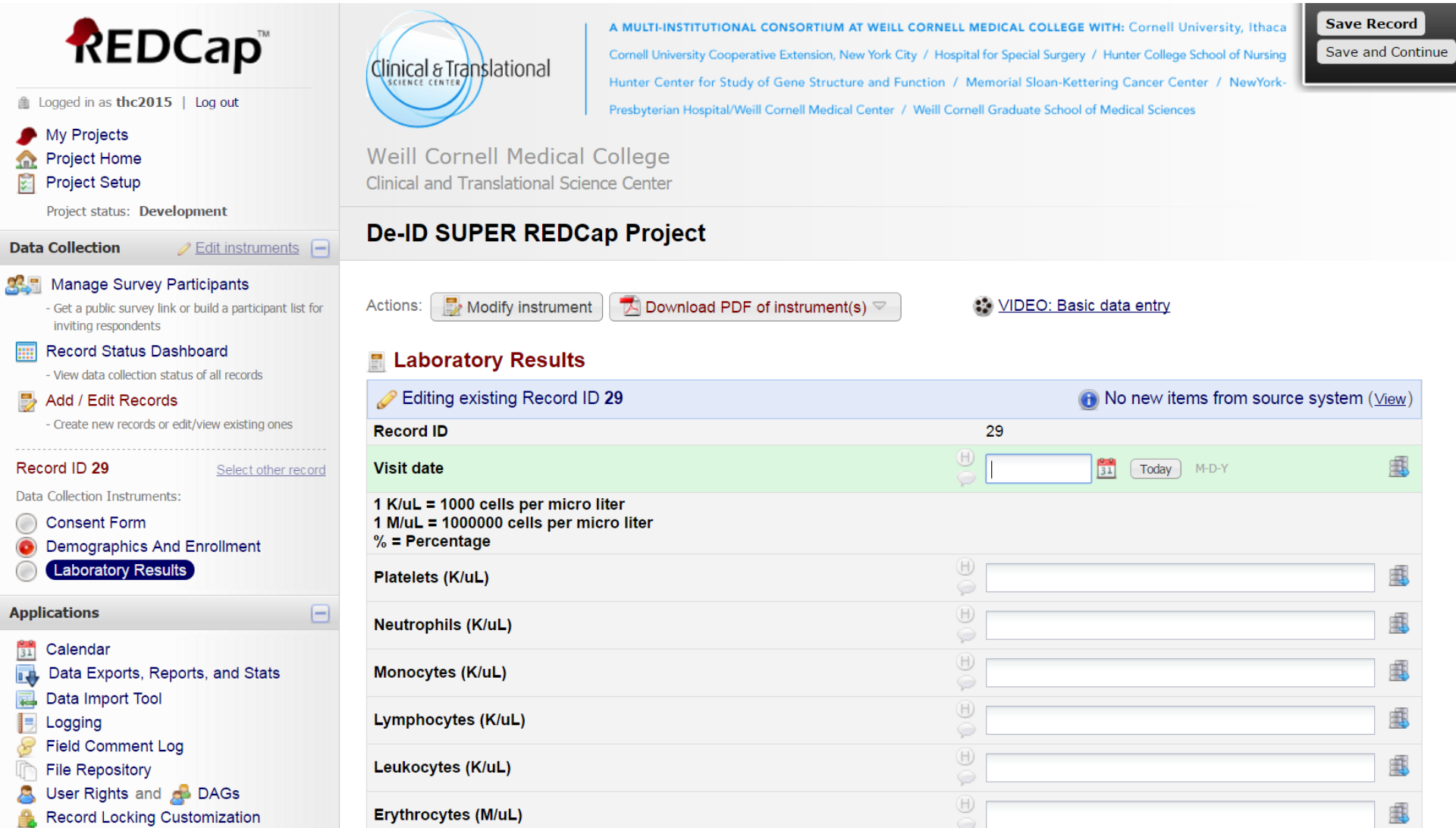


ARCH: SUPER REDCap



Weill Cornell Medicine

ARCH: SUPER REDCap



Weill Cornell Medicine

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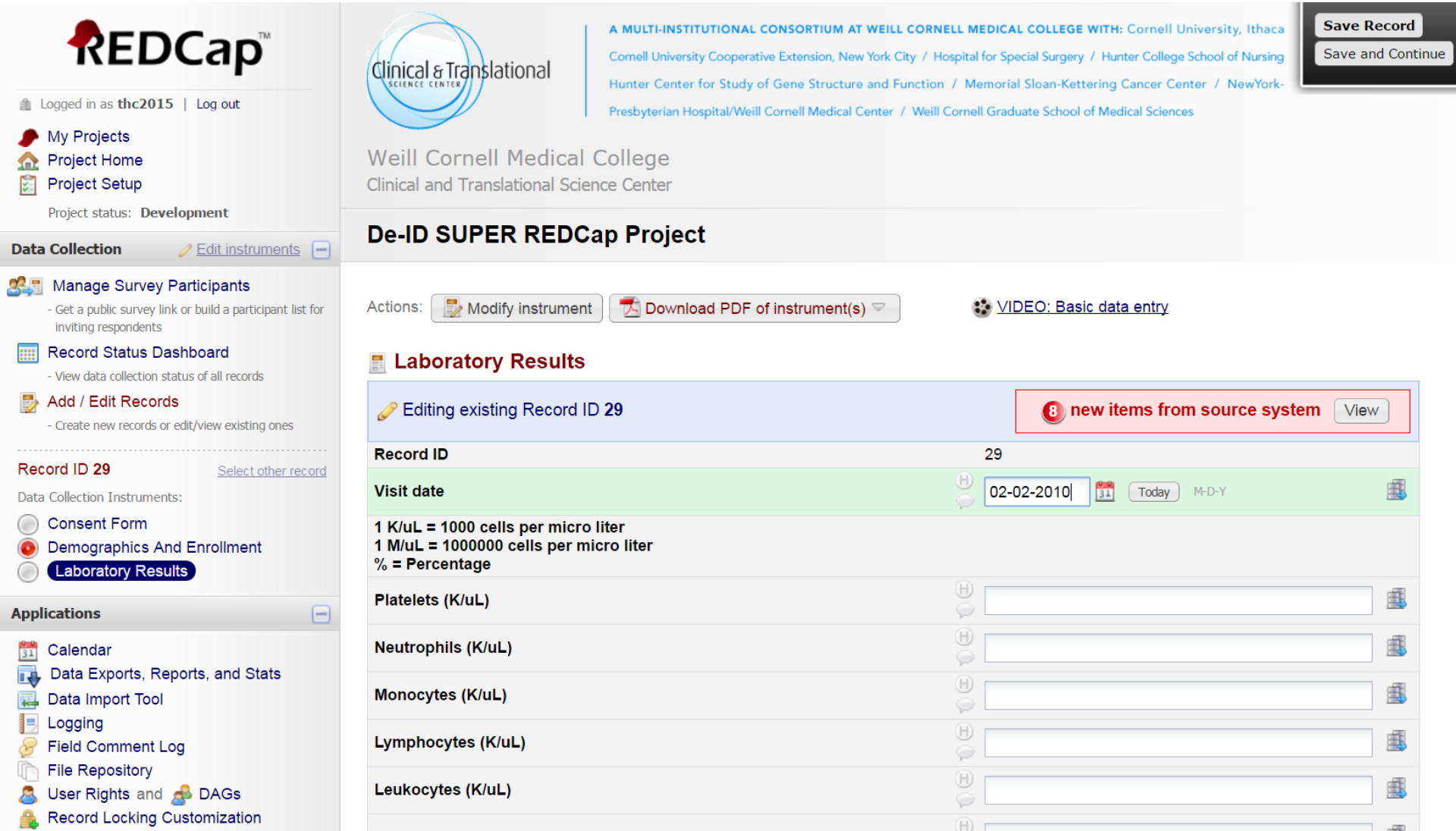

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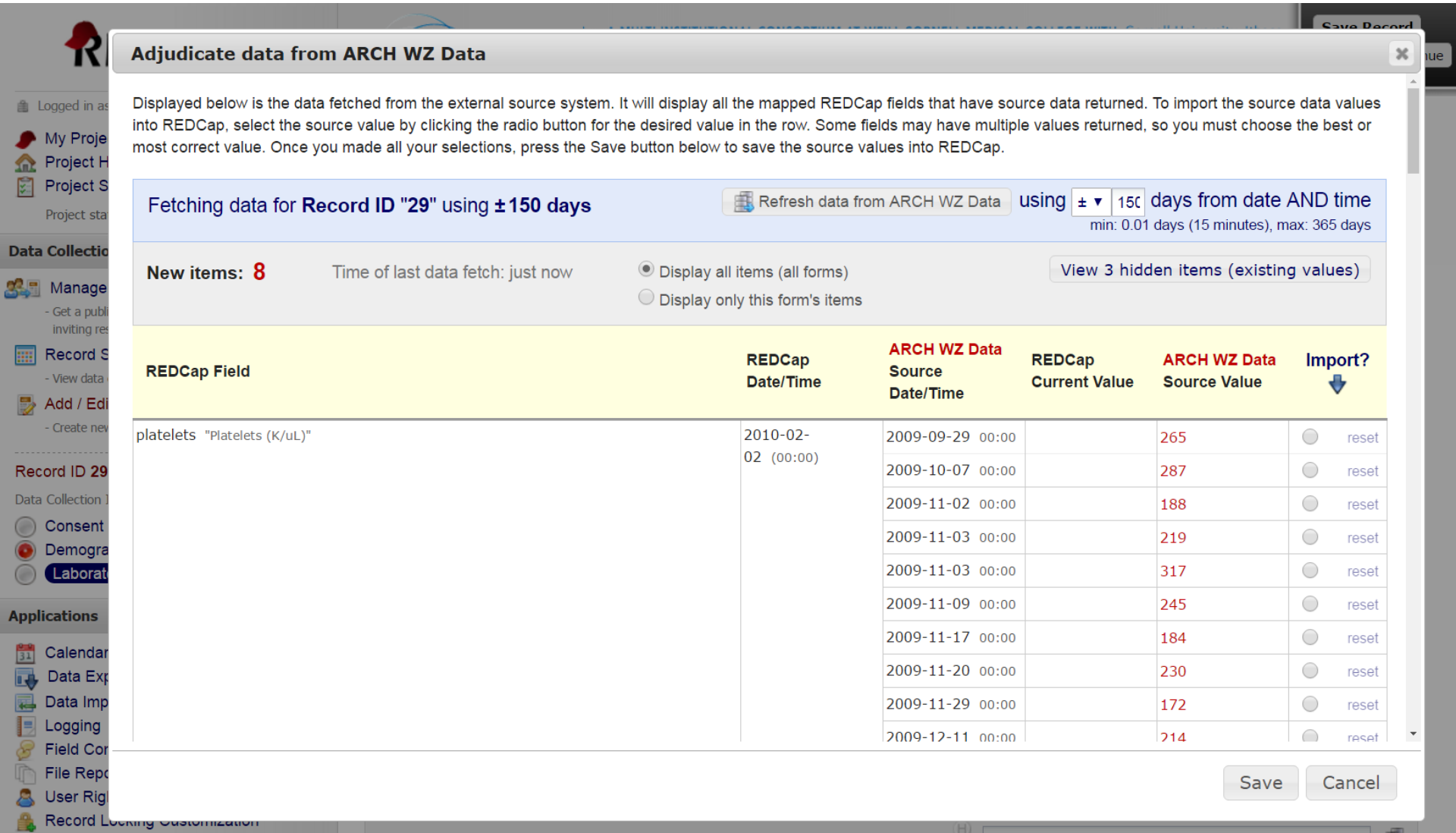

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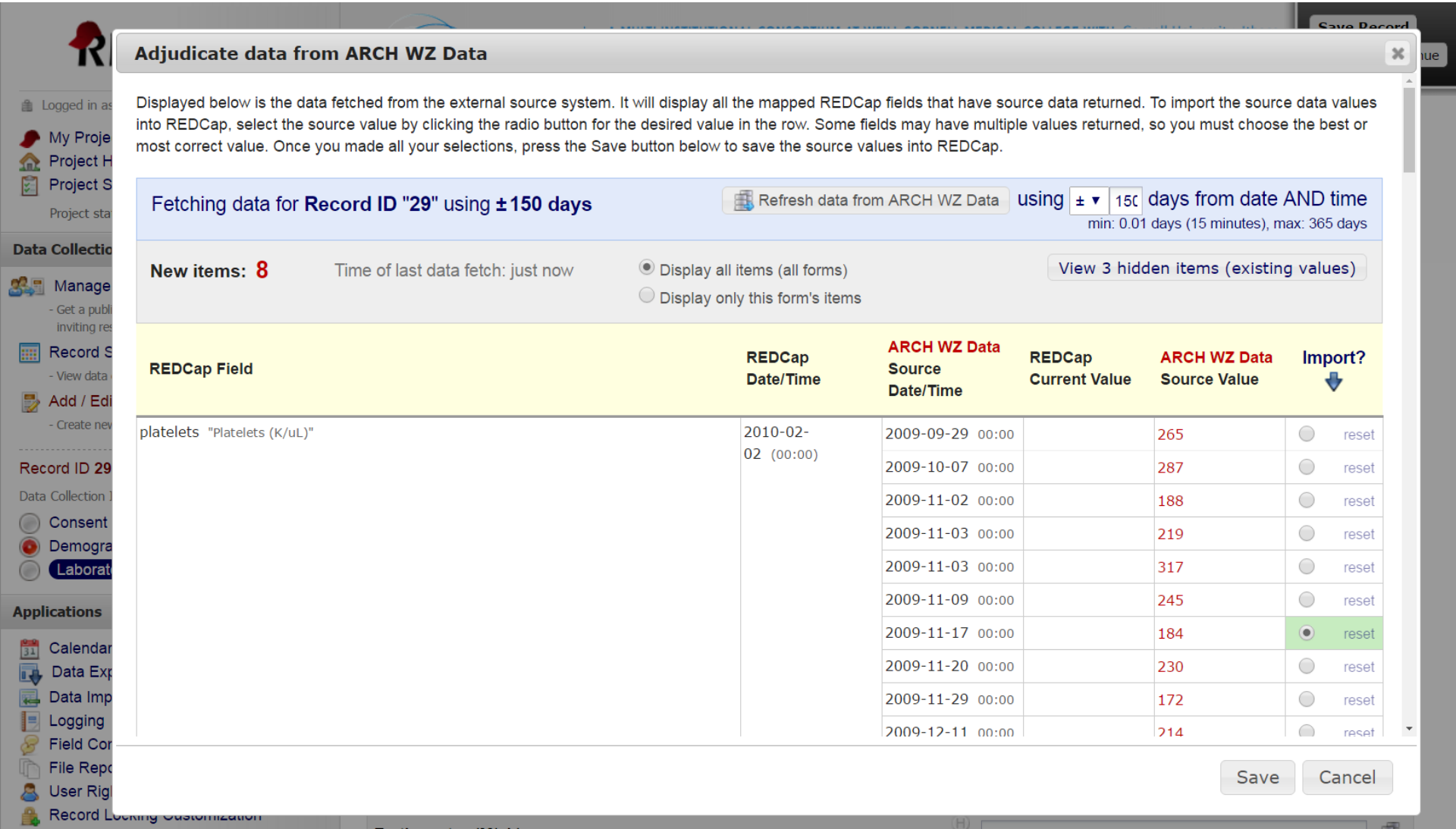
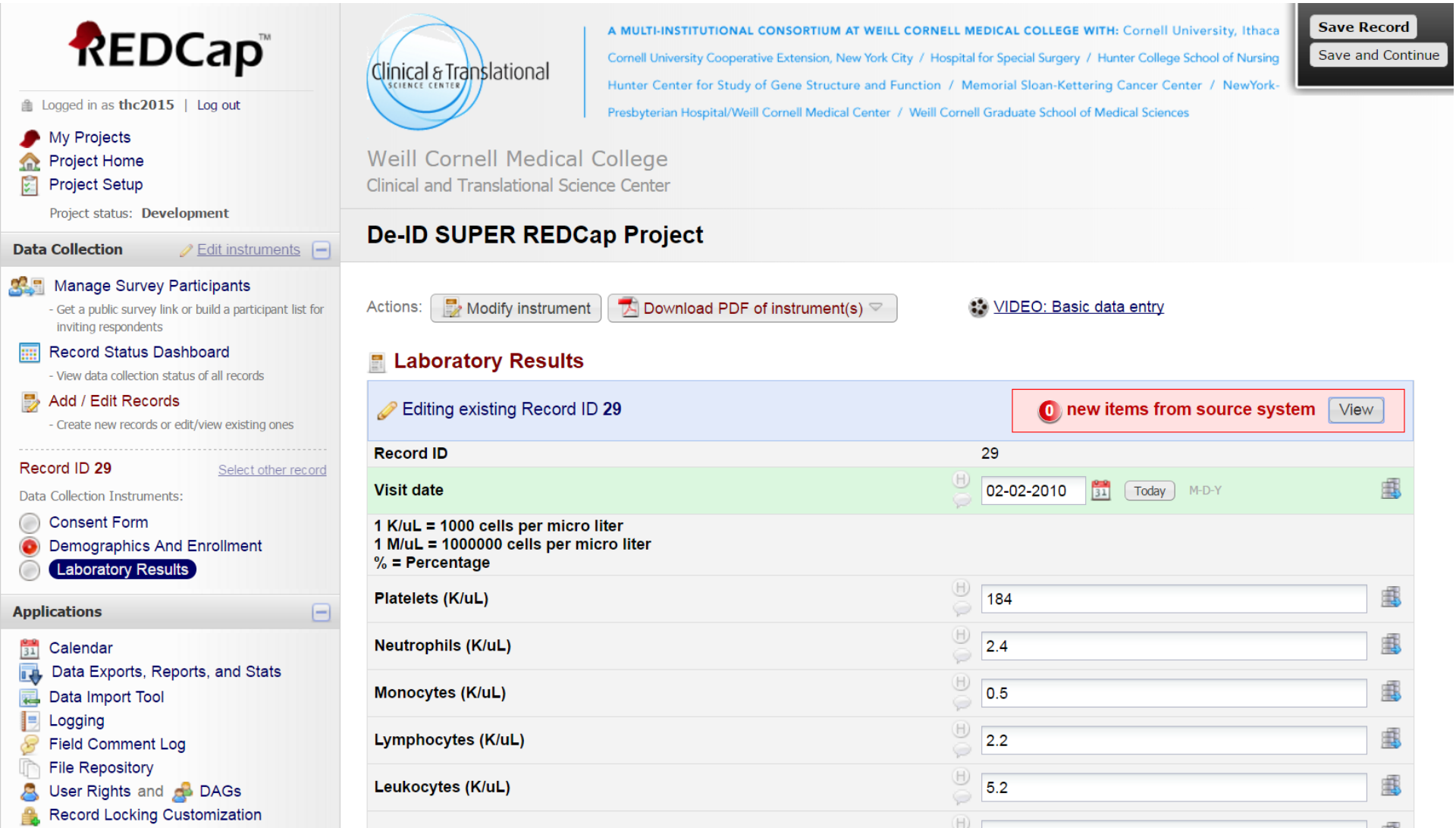
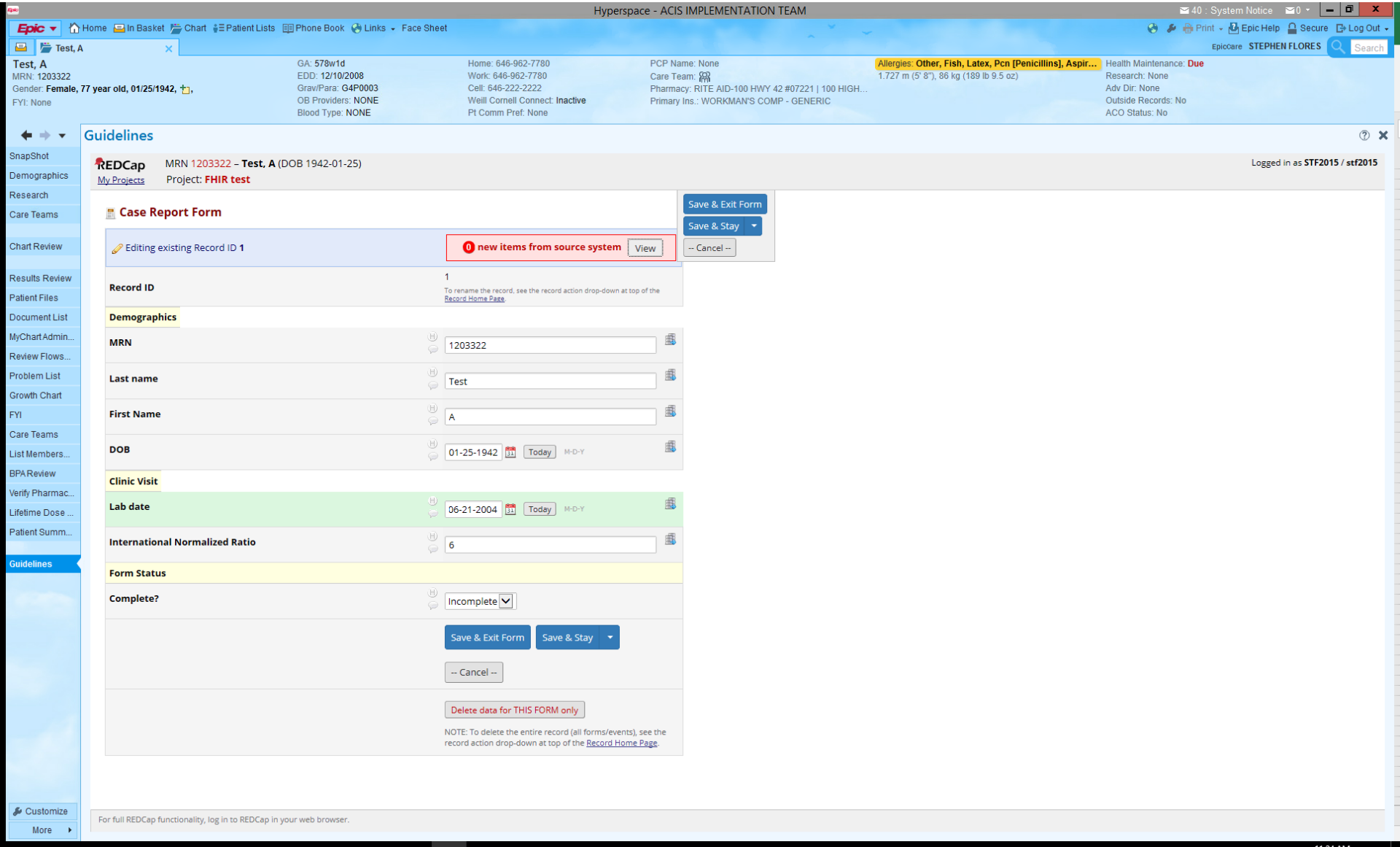


ARCH: SUPER REDCap



Weill Cornell Medicine

ARCH: SUPER REDCap on FHIR



ARCH: Architecture for Research Computing in Health

Retrospective ⟷ Prospective

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

REDCap
Research Electronic Data Capture

ARCH: Architecture for Research Computing in Health

Retrospective ⟷ Prospective

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

Epic

REDCap
Research Electronic Data Capture

ARCH: Architecture for Research Computing in Health

Retrospective ⟷ Prospective

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

Epic

Allscripts™

REDCap
Research Electronic Data Capture

ARCH: Architecture for Research Computing in Health

Retrospective ⟷ Prospective

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

Epic

Allscripts™

CompuRecord

REDCap
Research Electronic Data Capture

ARCH: Architecture for Research Computing in Health

Retrospective ⟷ Prospective

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

Epic

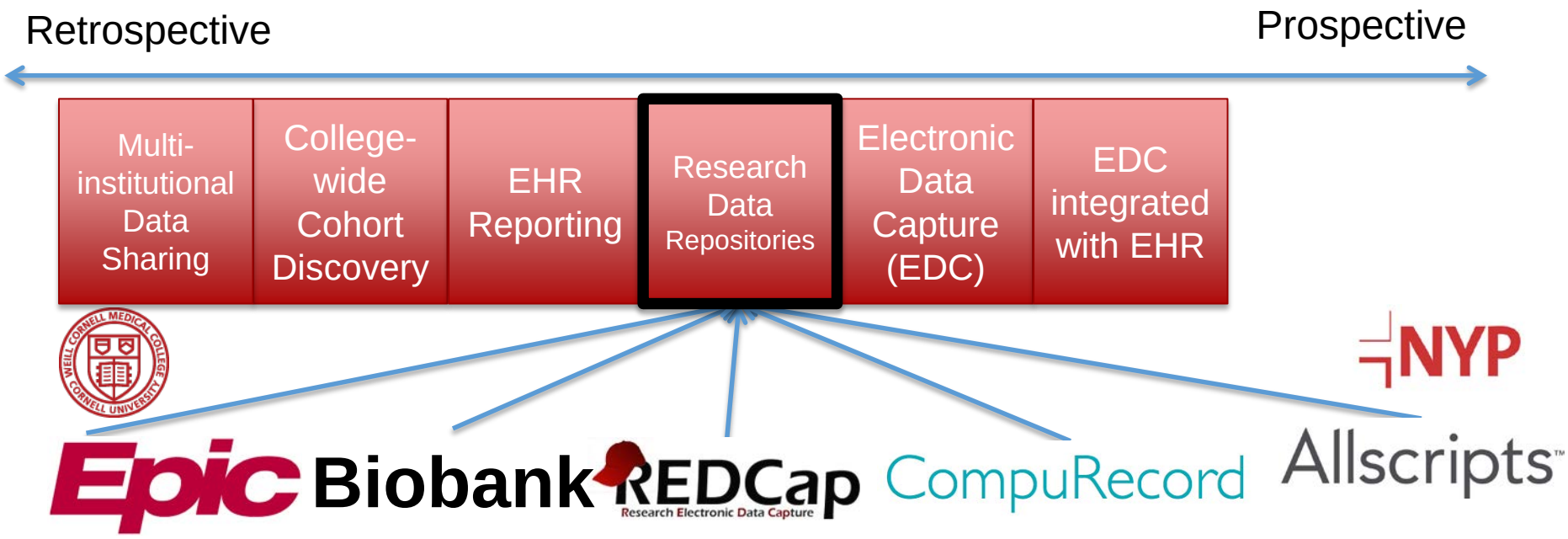
Allscripts™

REDCap
Research Electronic Data Capture

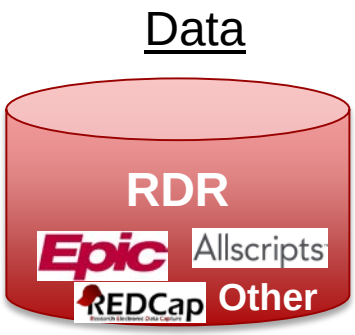
CompuRecord

Biobank

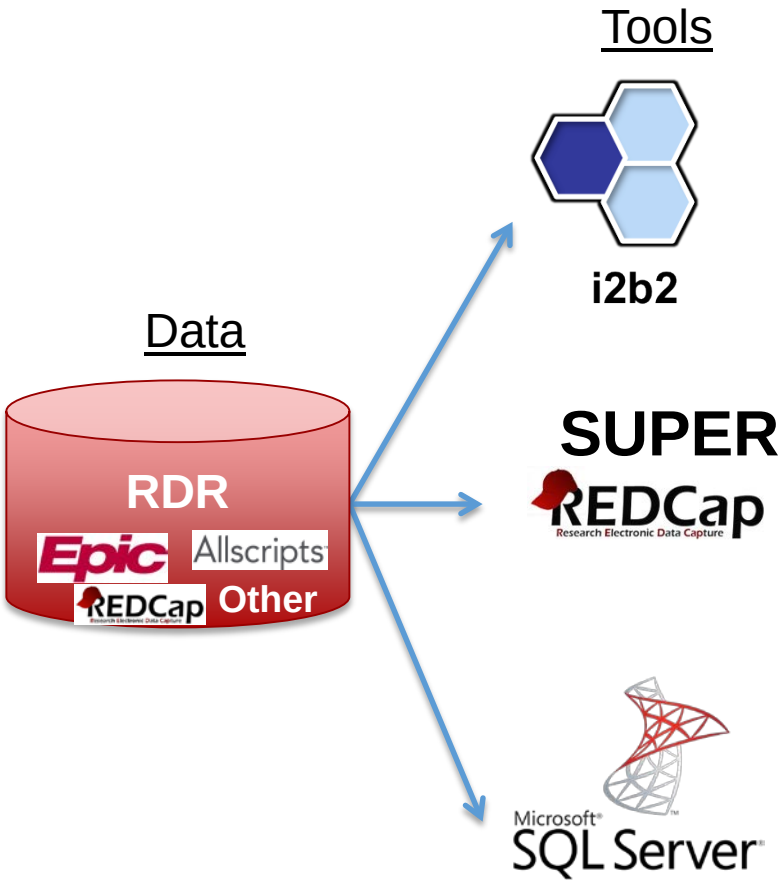
ARCH: Architecture for Research Computing in Health



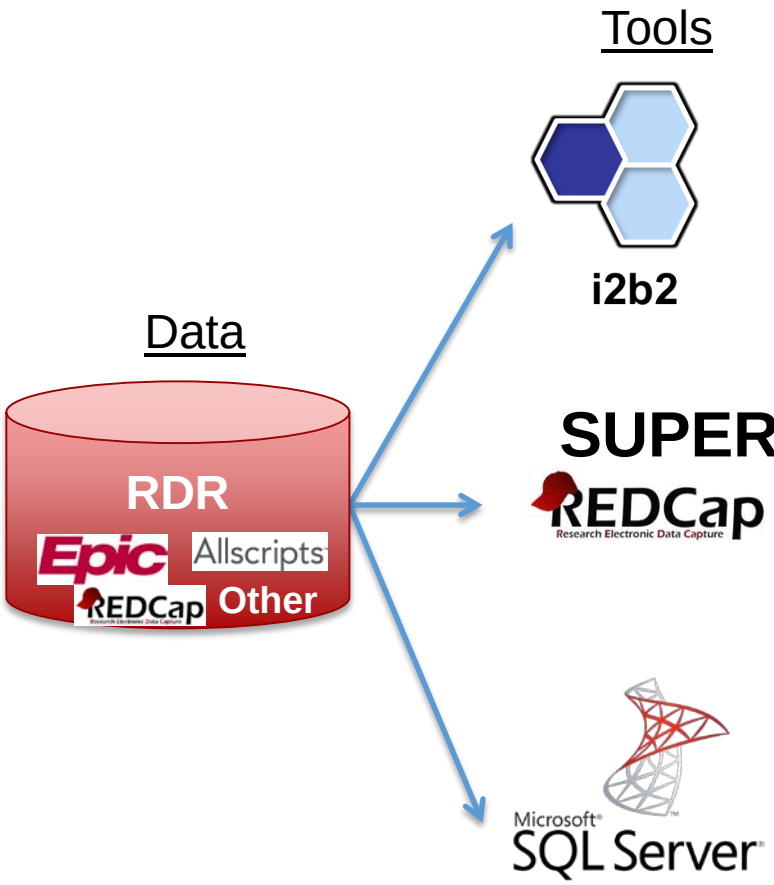
ARCH: Research Data Repository



ARCH: Research Data Repository



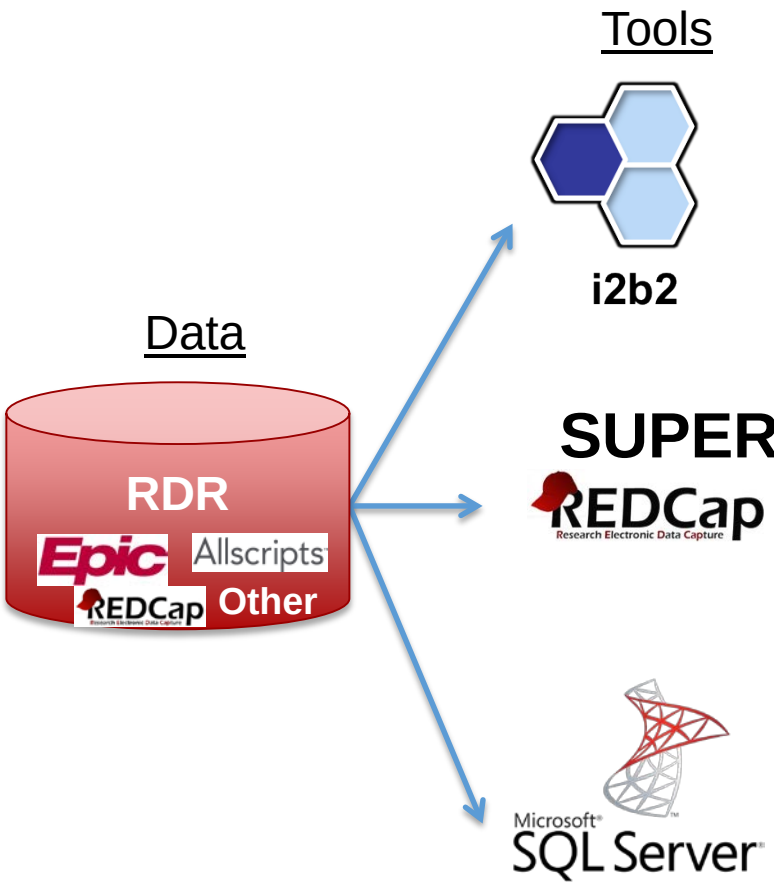
ARCH: Research Data Repository



Workflows

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

ARCH: Research Data Repository



Workflows

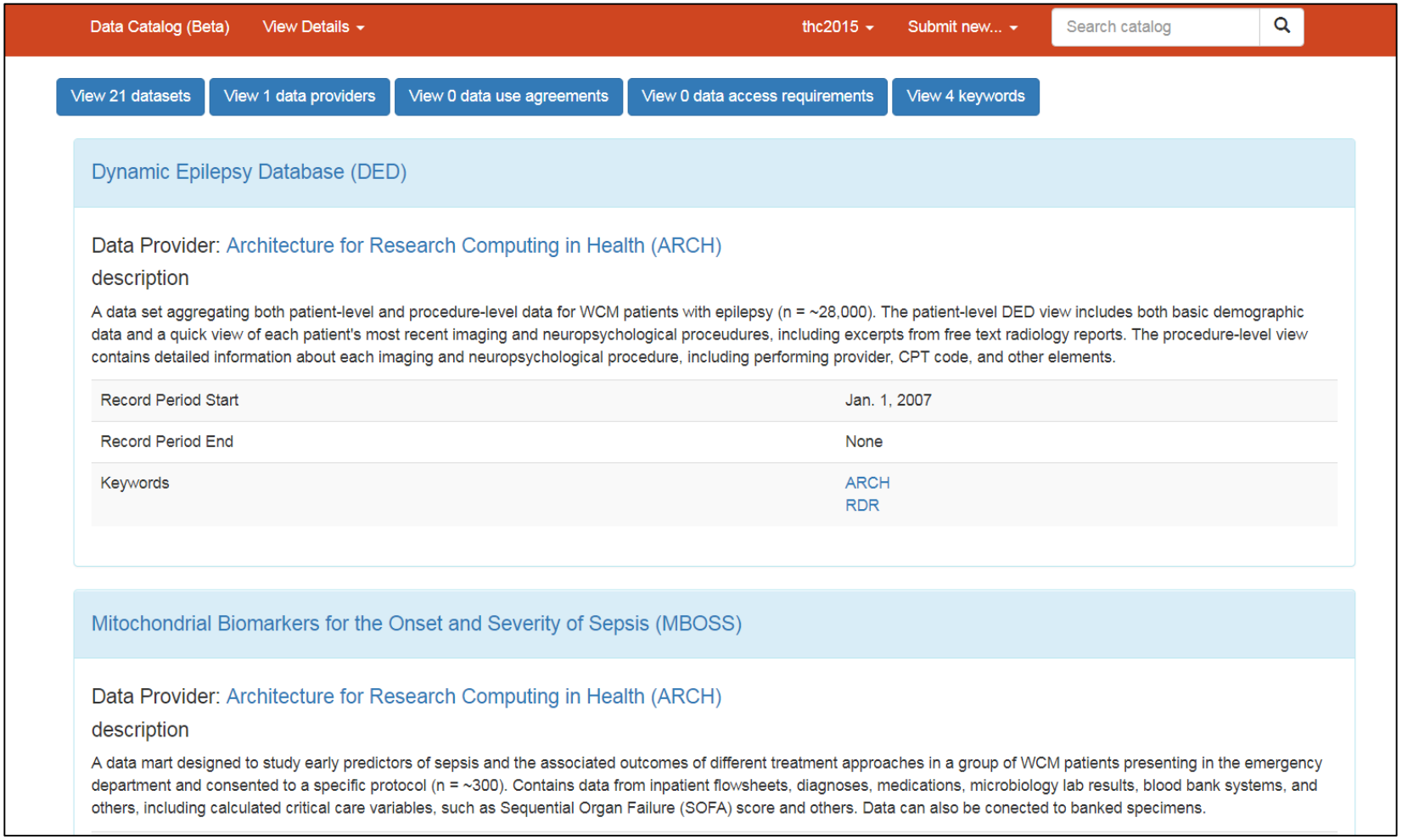
- Discovery
  - Hypothesis generation
  - Patient counts
- Collection
  - Capture of novel measures
  - Annotation of existing data
- Analysis
  - Scientific variable definition
  - Hypothesis testing

Study 1
Study 2
Study n: future

ARCH: Research Data Repositories

- 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)

ARCH RDRs: Data Catalog



http://datacatalog.weill.cornell.edu

Discussion

- Research Informatics can help investigators
  - Obtain EHR data
  - Collect novel research data
  - Integrate data
- 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
- Mark Weiner, MD

ITS Research Informatics

- Sajjad Abedian
- Prakash Adekkanattu
- Marcos Davila
- Xiaobo Fuld
- David Kraemer
- Steven Flores
- Joseph Kabariti
- Ryan McGregor
- Sean Pompea
- Julian Schwartz
- 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
  - TRAC: https://webapps.nyp.org/trac
  - Data Catalog: http://datacatalog.weill.cornell.edu
- Tom Campion
  - thc2015@med.cornell.edu
  - 646-962-2345
  - http://vivo.med.cornell.edu/display/cwid-thc2015