Biomedical Informatics at the University of Chicago: A Multidisciplinary Approach

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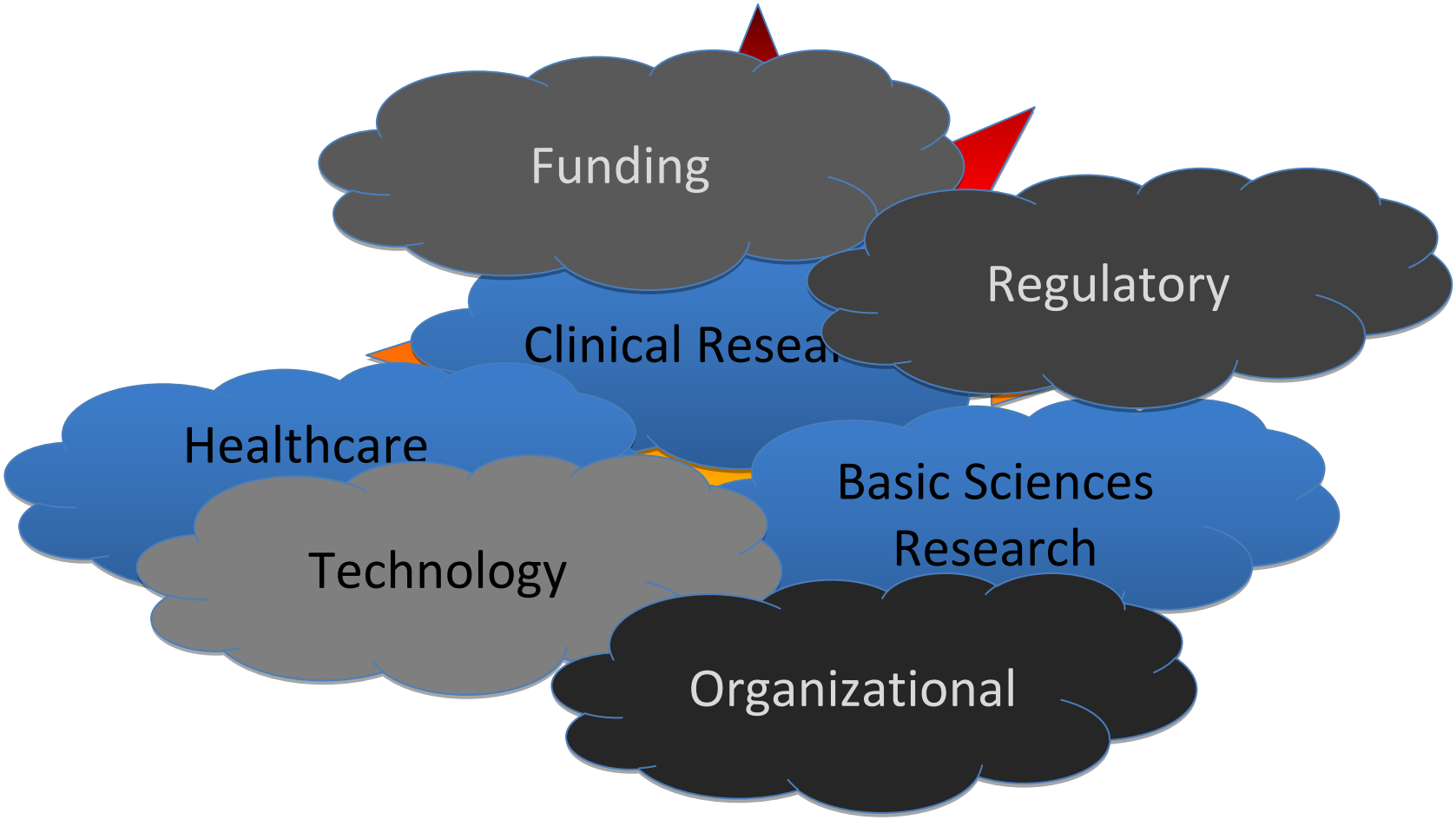
Assistant-Dean for Academic and Research Informatics

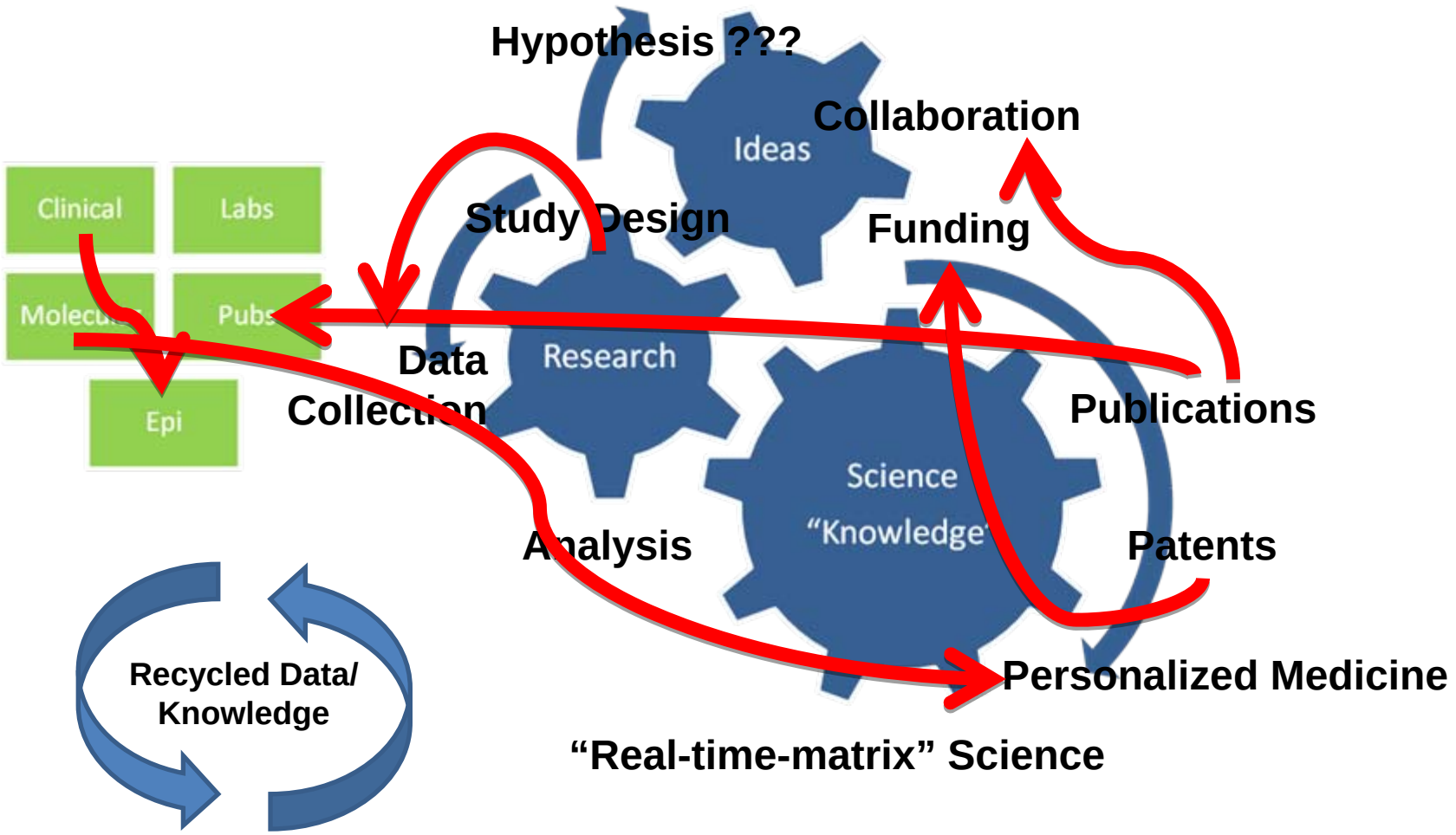
Research Associate - Associate Professor

THE UNIVERSITY OF CHICAGO
CANCER RESEARCH CENTER

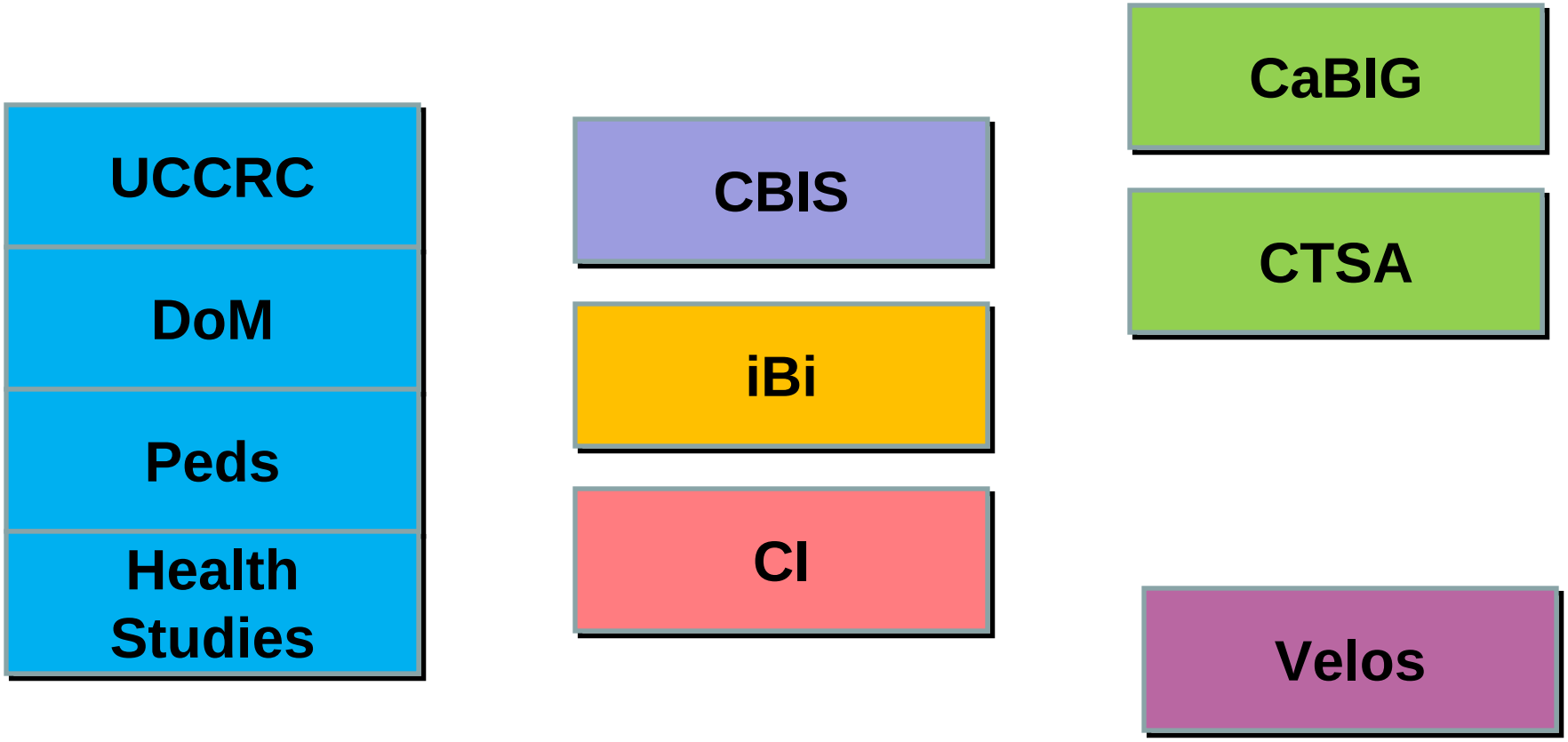
The Biomedical Research “Cloudscape”



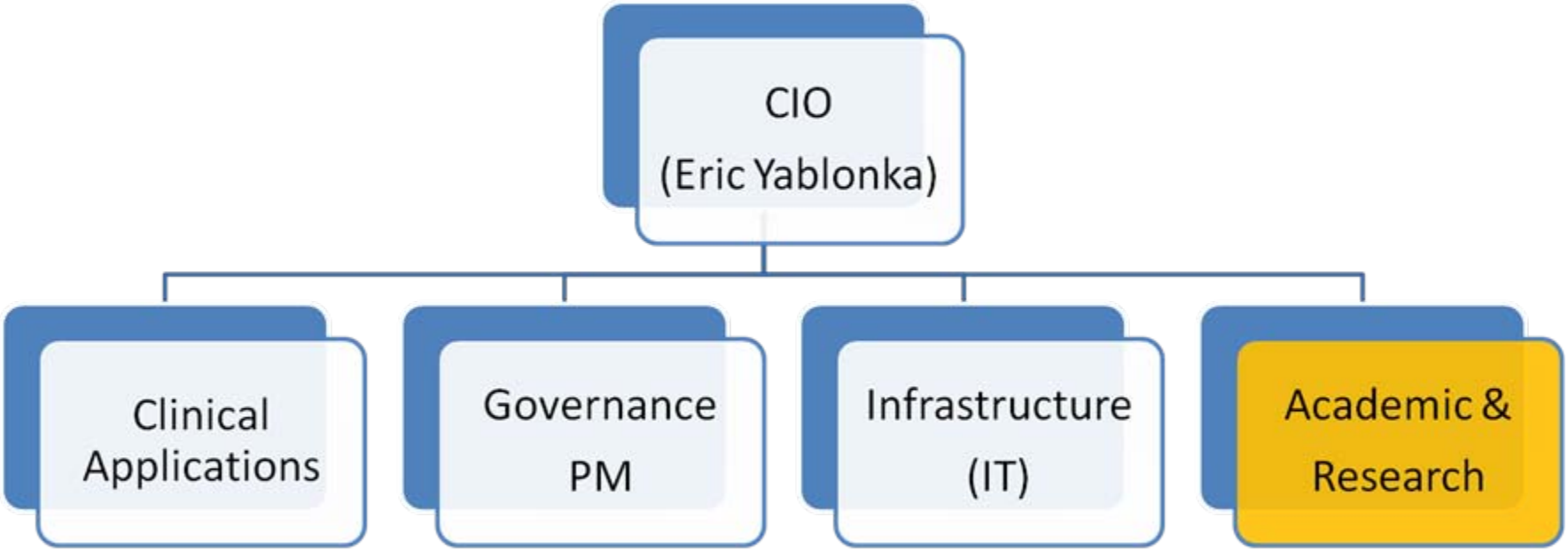
The science machine



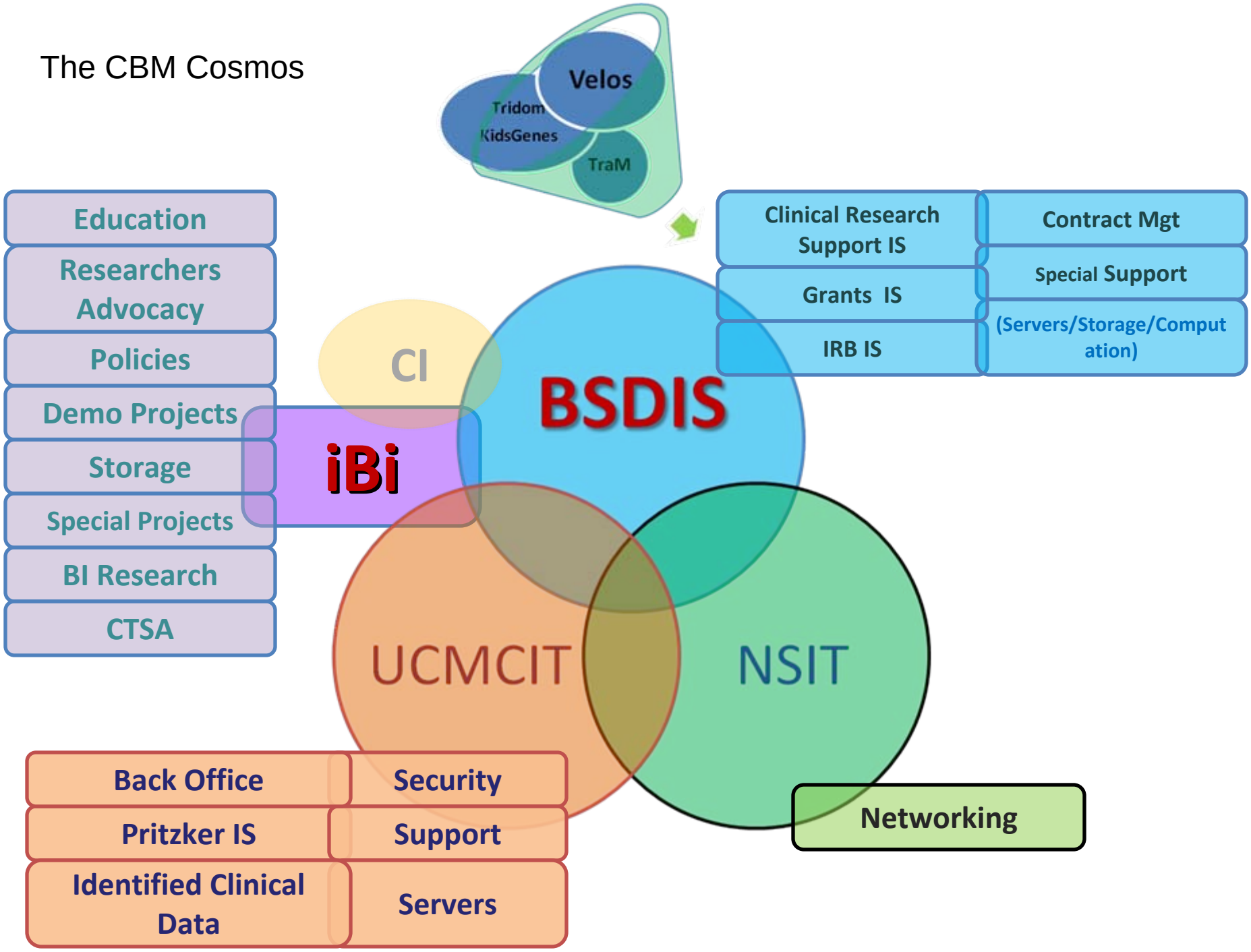
UC Research IS structures



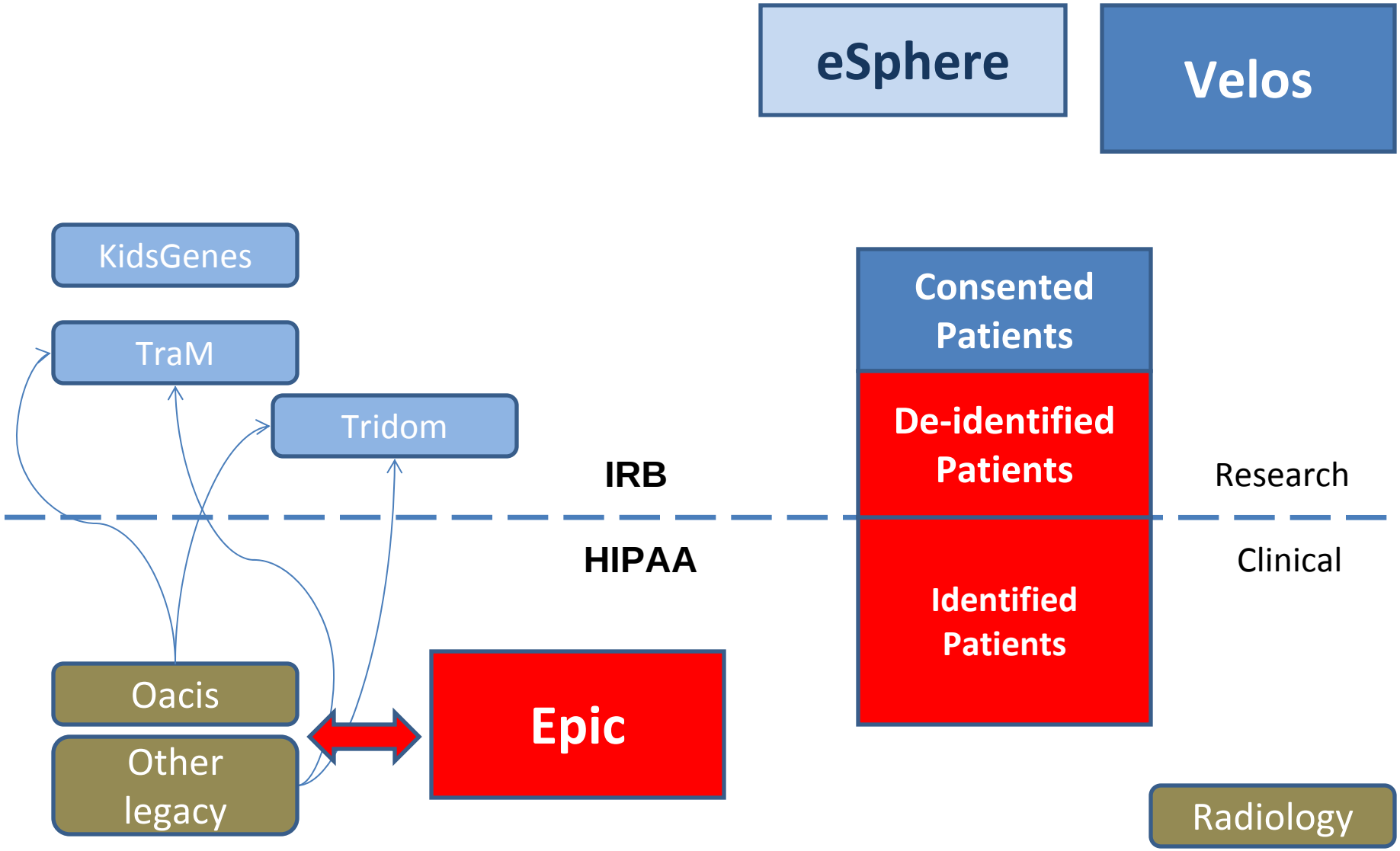
The CBIS Academic and Research Applications Group

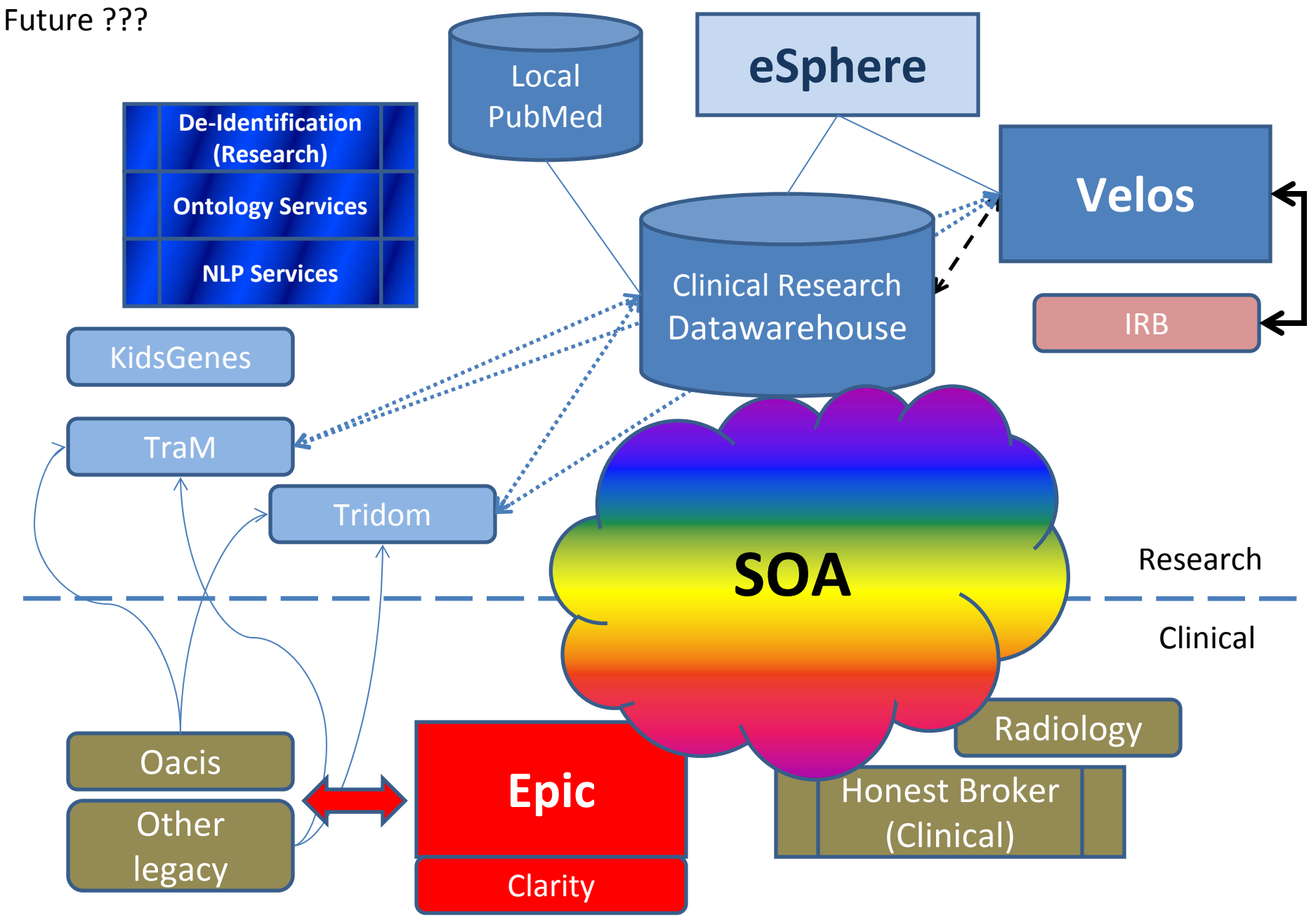


The CBM Cosmos

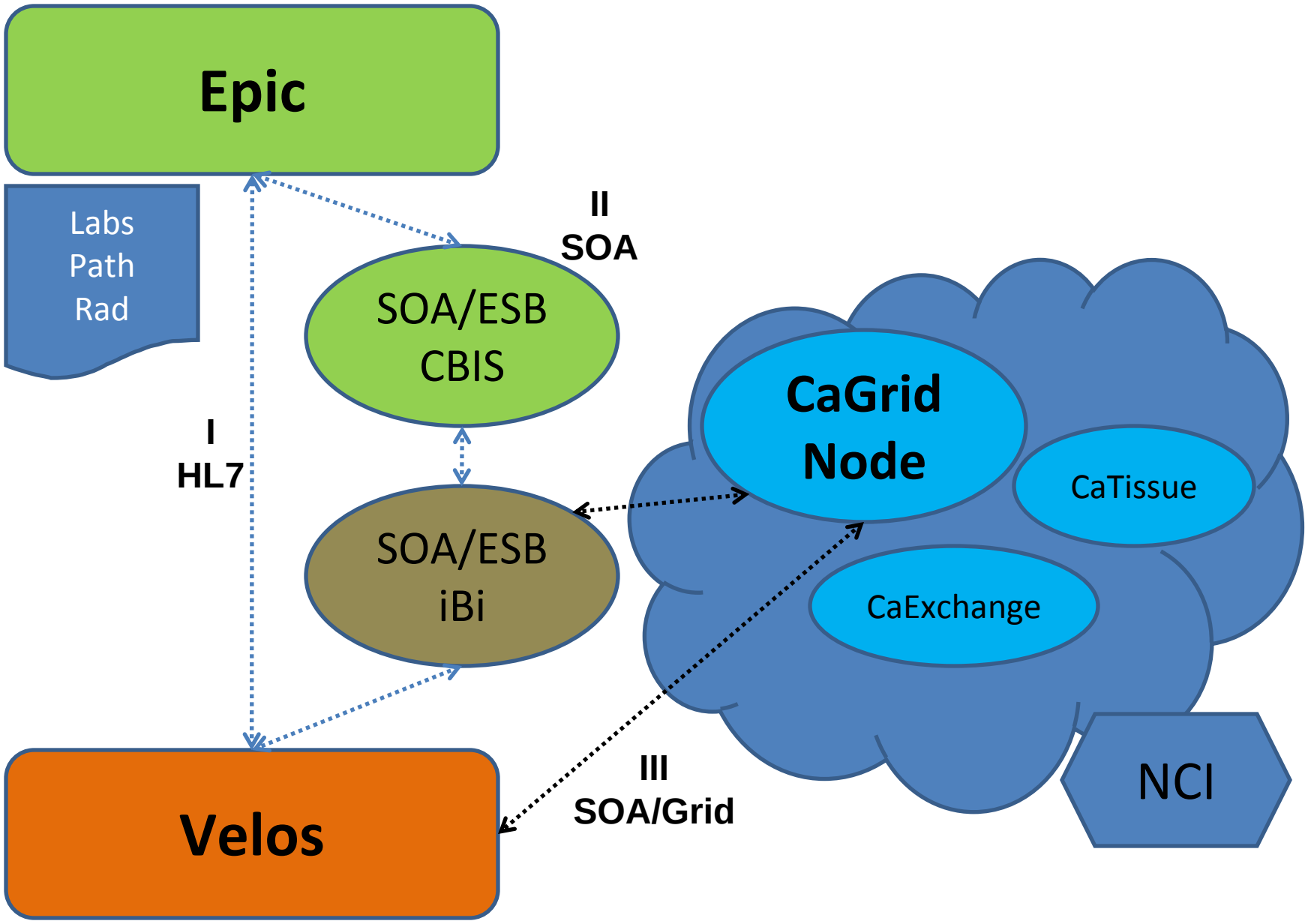


Current Situation

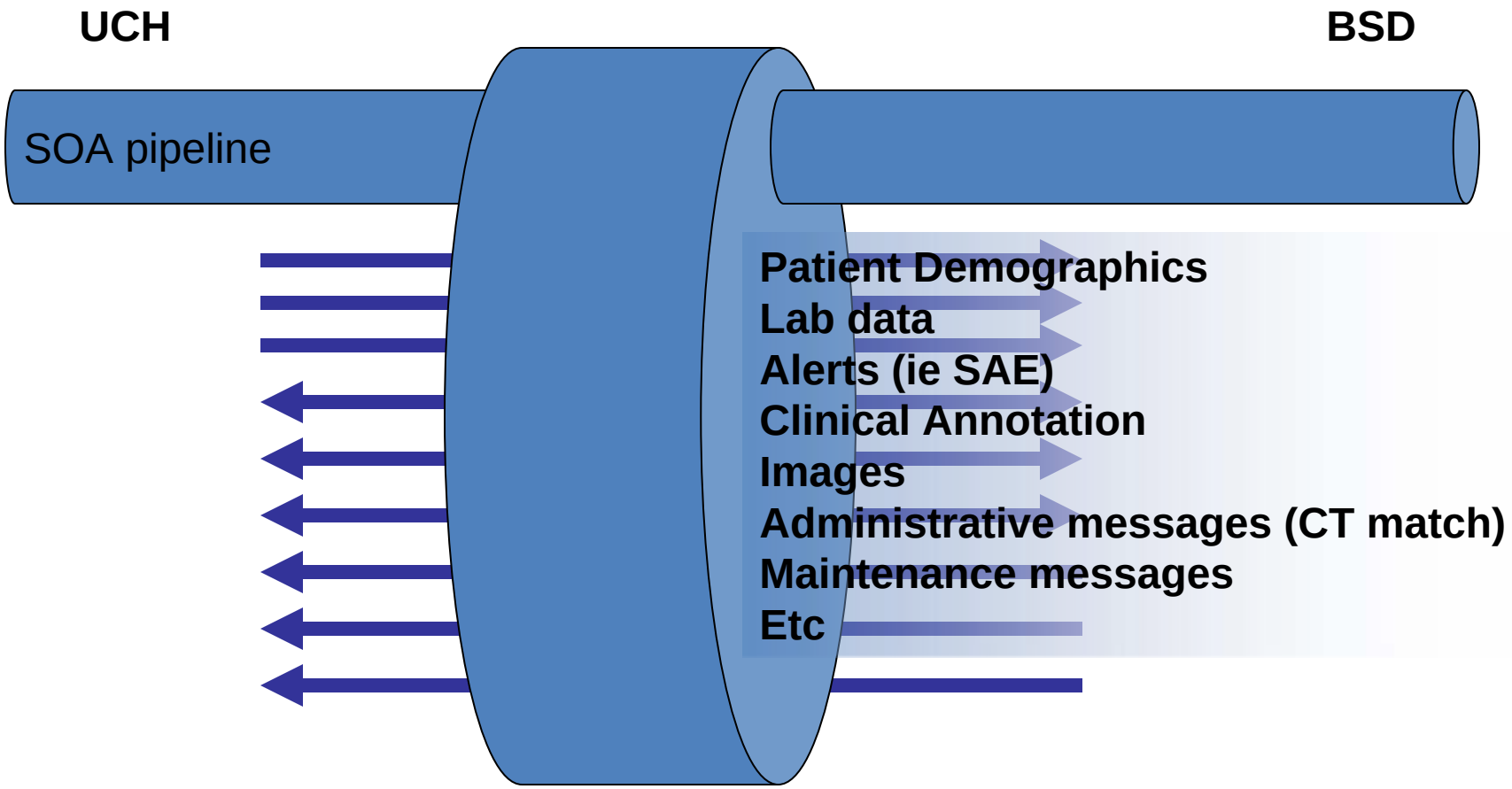



Future ???
Local PubMed
eSphere
De-Identification (Research)
Ontology Services
NLP Services
Velos
Clinical Research Datawarehouse
IRB
KidsGenes
TraM
Tridom
SOA
Research
Clinical
Radiology
Oacis
Other legacy
Epic
Clarity
Honest Broker (Clinical)

Clinical Research Data Integration

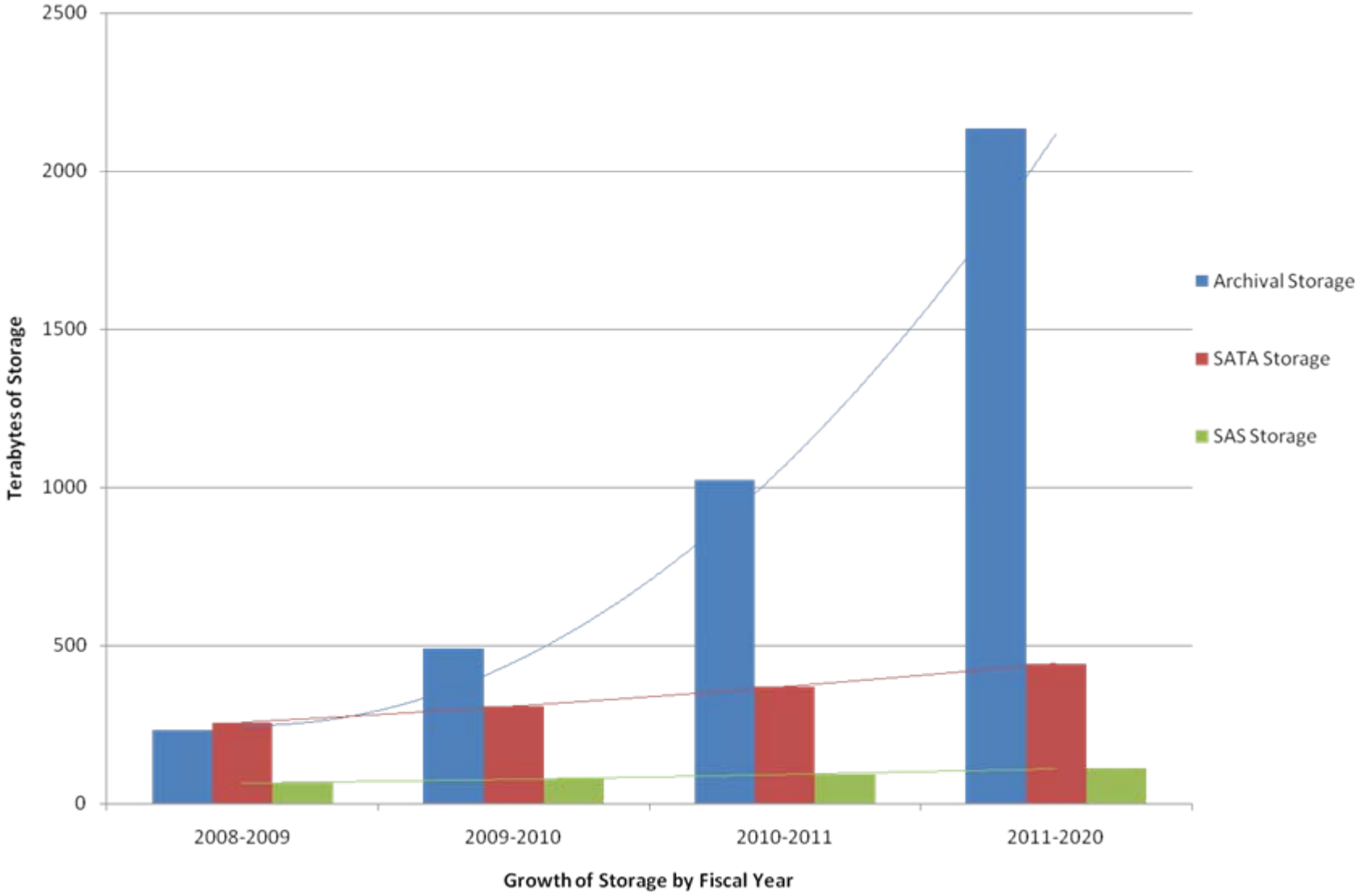


The BSD/BRI Initiative
Data exchange architecture



Infra-Structure demands

- Storage
- Networking


2500
2000
1500
1000
500
0
Terabytes of Storage
2008-2009
2009-2010
2010-2011
2011-2020
Growth of Storage by Fiscal Year
Archival Storage
SATA Storage
SAS Storage

Integrated Solution Workflow

Data Acquisition: User entered, LIMS, Collected by Instrumentation, etc.

Researcher

Application Server

PACs | Proteomic | Clinical | Ontology | eVelos | LIMS | Microarray | Sequencing | NLP Data | Nth

Database

Code Mapping

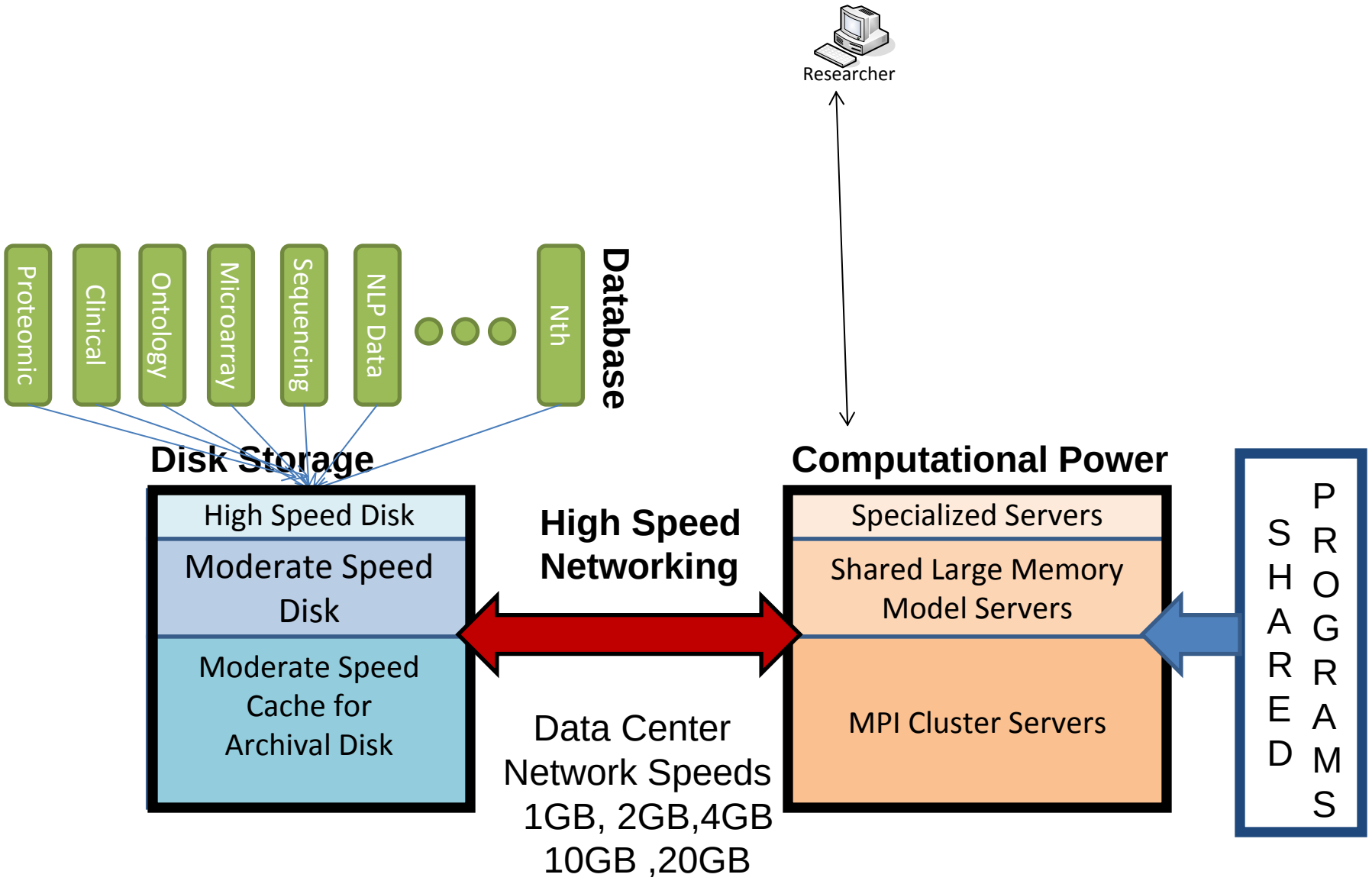
Microarray DB

Images

Disk Storage

- High Speed Disk (SAS)
- Moderate Speed Disk (SATA)
- Moderate Speed Cache for Archival Disk (BluRay & Worm Tape)

Integrated Solution Workflow



Integrated Solution for Modern Biomedical Research

1+ Years

Researcher

Data Acquisition: User entered, LIMS, Collected by Instrumentation, etc.

Researcher

Application Servers (100s)

Application Server < 100

PACS

Proteomic

Clinical

Ontology

Velos

LIMS

Microarray

Sequencing

NLP Data

Nth

Databases

SOA ESB (SOAP/Web Services)

GRID Service

External Collaboration

Ontology Services

Trusted Broker

NLP Services

Security Broker

Velos Usage

The University of Chicago is currently using Velos in many of their operational processes.

Daily Use	Database	Reports
Clinical Trials Regulatory Management	Clinical Trials Review Committee	Clinical Data Upload System (CDUS)
Clinical Trials Data Management	Scientific and Accrual Monitoring Committee	Grant Reporting
Listing of Open Protocols on the Intranet	Regulatory Manager Dashboard	Study IRB Expiration Report
Consent Assess For Clinics	Supervisory Dashboard	NCI Summary 4 Report

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Velos Current Stats

- Patients ~ 26,000
- Active Studies (2,849)
  - Surgery 213; Neurology 31; Medicine 930; Pediatrics 15; Hem/Onc 1670 (1280 - open to accrual, 390 -closed to accrual)
- Users ~ 270
  - Suregery 21, Neurology 7, Medicine 65, Hem/Onc 143, Biostats 4, Investigational Pharmacy 3, OCR 5, CBIS 2

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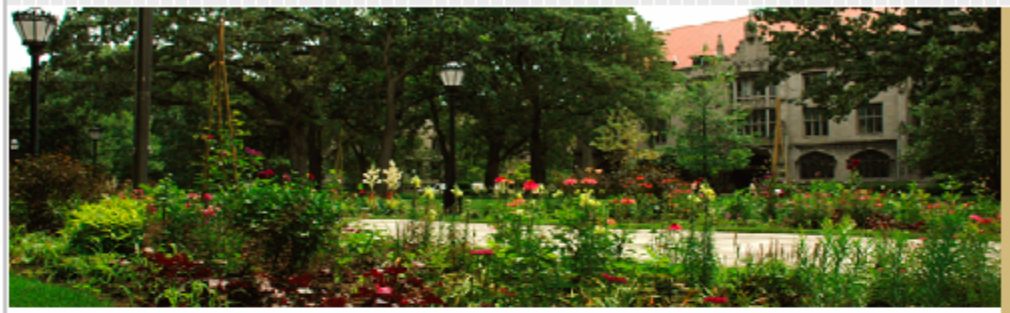
CANCER RESEARCH CENTER

Current use of Velos at UofC

Departments
Health Studies
CBIS
Cancer Research Center
General Clinical Research
Gynecology/Oncology
Hematology/Oncology
Pulmonary/Critical Care
Medicine/Oncology
Office of Shared Research Facilities
Clinical Research Support Office
Neurology
Gynecology/Obstetric
Office of Clinical Research
Psychology
Pediatrics
Pediatrics Oncology
Radiology
Radiology/Oncology
Surgery
Surgery/Oncology
University of Chicago Pharmacy
Medicine
Neurology/Oncology
Cancer Clinical Trials Office

THE UNIVERSITY OF CHICAGO
THE OFFICE OF CLINICAL RESEARCH



Quick Links

- University of Chicago
- Institutional Review Board (IRB)
- Institute of Translational Medicine (ITM)
- University Research Administration (URA)
- Office of Medical Center Compliance (OMCC)
- General Clinical Research Centers (GCRC)
- Food and Drug Administration (FDA)
- National Institutes of Health (NIH)
- Investigational Drug Service

Velos eResearch

Velos Access Request Form and Contacts
Velos Communication
Velos How-To
Velos Help
Velos Training Schedule

Velos eResearch is a highly-regarded clinical research information system chosen by The University of Chicago to manage clinical trials.

Velos eResearch supports patient recruitment, patient scheduling, IRB and study monitoring, project planning, study design, protocol compliance, budget, invoicing, and milestone management; data safety monitoring, adverse event reporting, system integration and study execution.
Velos was designed from the ground up to support both study administration and clinical data management in a single, integrated environment. This integral design is central to Velos' noted ability to easily and elegant solve customers' research, information and coordination challenges. Key features in the two areas are:

Quick Links for Faculty and Staff

- Best Practices
- Clinical Research Toolkit
- Investigator Initiated Resources
- Presentations
- Policies and Guidance
- Recruitment
- Research Finance
- Resources
- Source Documents
- Templates & Tools
- Training and Education
- Velos eResearch
- Administrative Resources

THE UNIVERSITY OF CHICAGO
THE OFFICE OF CLINICAL RESEARCH

Quick Links

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Velos eResearch

Communication

- Velos Upgrade to version 8
- Velos - general overview - presentation - OCR workshop 11-02-2007 (PDF)
- Velos - minimum required fields for entering data (PDF)
- Velos FAQs (PDF)
- Velos for Principal Investigator-initiated studies - presentation (PDF)

For any questions regarding Velos eResearch please send an email to veloshelpbsd@bsd.uchicago.edu

Links

Velos at The University of Chicago - link
Velos Access Request Form and Contact Information
Velos Help
Velos Communication

Quick Links for Faculty and Staff

- Best Practices
- Clinical Research Toolkit
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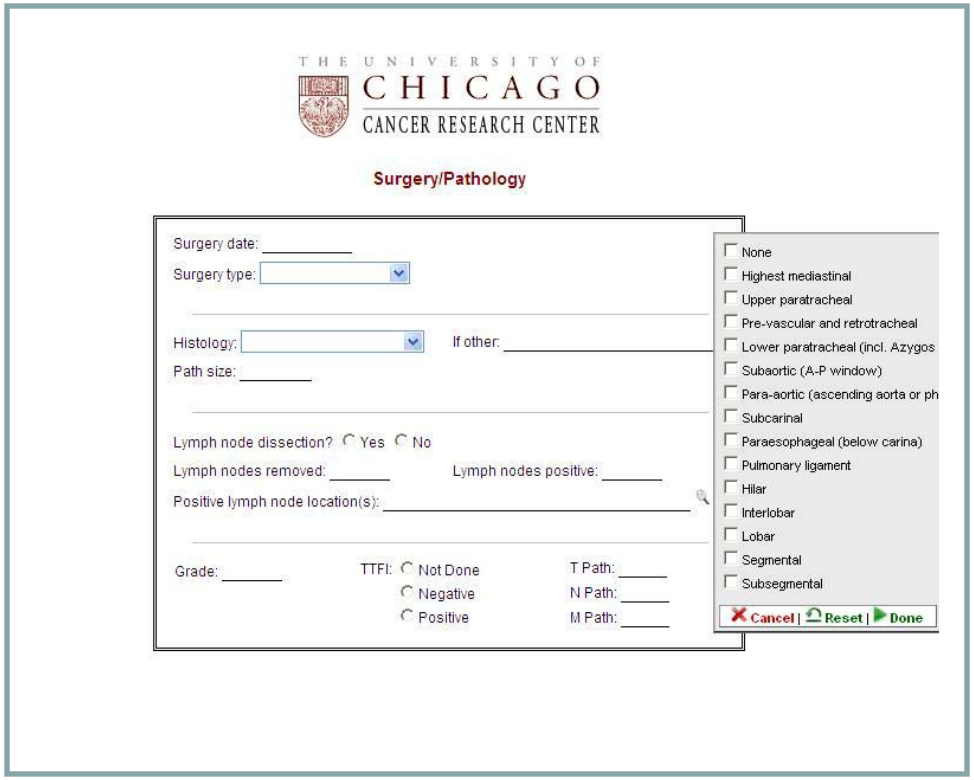
- Recruitment
- Research Finance
- Resources
- Source Documents
- Templates & Tools
- Training and Education
- Velos eResearch
- Administrative Resources

Forms Samples



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Surgery/Pathology

Surgery date: _____
Surgery type: [ ]

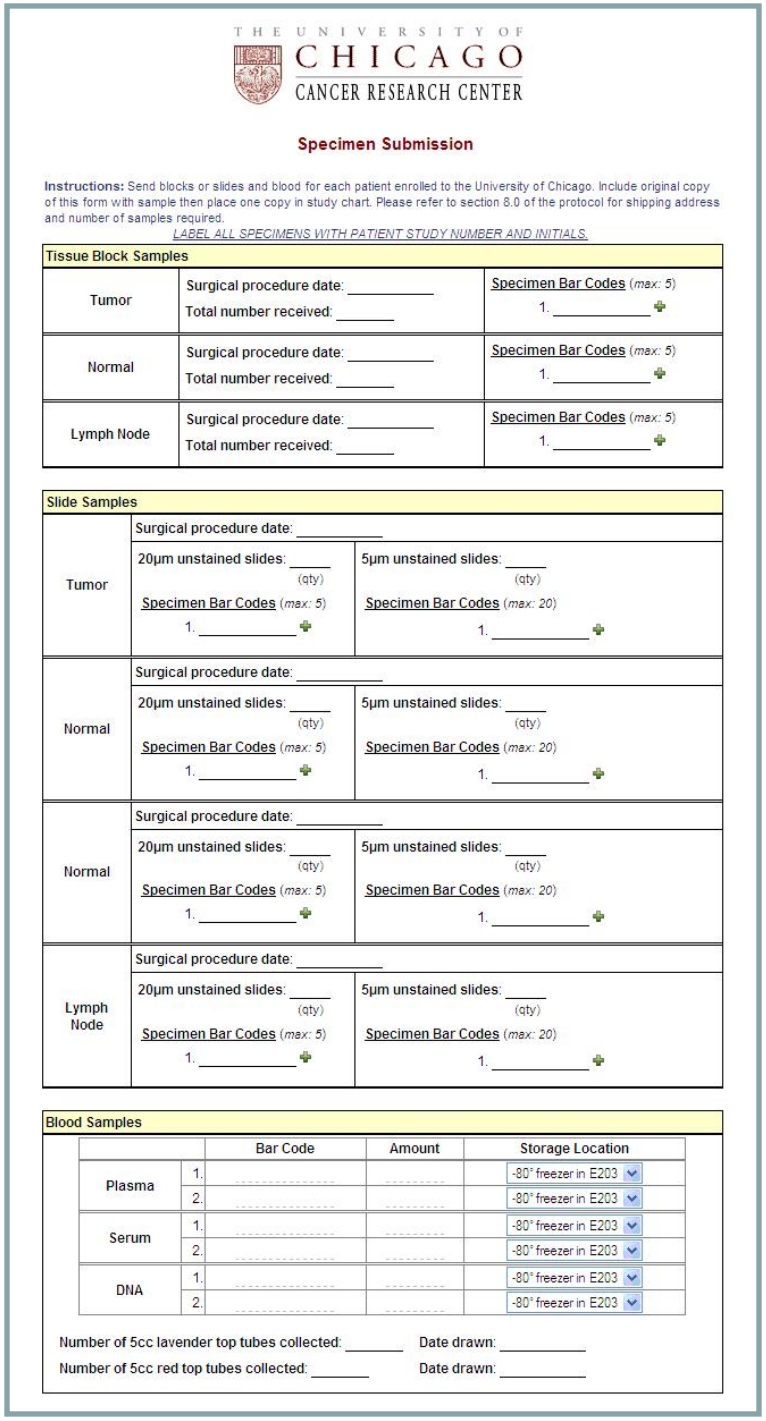
Histology: [ ] If other: _____
Path size: _____

Lymph node dissection? ○ Yes ○ No
Lymph nodes removed: _____ Lymph nodes positive: _____
Positive lymph node location(s): _____

Grade: _____ TTFI: ○ Not Done ○ Negative ○ Positive
T Path: _____
N Path: _____
M Path: _____

- ☐ None
- ☐ Highest mediastinal
- ☐ Upper paratracheal
- ☐ Pre-vascular and retrotracheal
- ☐ Lower paratracheal (incl. Azygos
- ☐ Subaortic (A-P window)
- ☐ Para-aortic (ascending aorta or ph
- ☐ Subcarinal
- ☐ Paraesophageal (below carina)
- ☐ Pulmonary ligament
- ☐ Hilar
- ☐ Interlobar
- ☐ Lobar
- ☐ Segmental
- ☐ Subsegmental

Cancel | Reset | Done



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Specimen Submission

Instructions: Send blocks or slides and blood for each patient enrolled to the University of Chicago. Include original copy of this form with sample then place one copy in study chart. Please refer to section 8.0 of the protocol for shipping address and number of samples required.

LABEL ALL SPECIMENS WITH PATIENT STUDY NUMBER AND INITIALS.

Tissue Block Samples

Tumor	Surgical procedure date: _____ Total number received: _____	Specimen Bar Codes (*max: 5*) 1. _____
Normal	Surgical procedure date: _____ Total number received: _____	Specimen Bar Codes (*max: 5*) 1. _____
Lymph Node	Surgical procedure date: _____ Total number received: _____	Specimen Bar Codes (*max: 5*) 1. _____

Slide Samples

Tumor	Surgical procedure date: _____	
	20µm unstained slides: _____ (qty) Specimen Bar Codes (*max: 5*) 1. _____	5µm unstained slides: _____ (qty) Specimen Bar Codes (*max: 20*) 1. _____
Normal	Surgical procedure date: _____	
	20µm unstained slides: _____ (qty) Specimen Bar Codes (*max: 5*) 1. _____	5µm unstained slides: _____ (qty) Specimen Bar Codes (*max: 20*) 1. _____
Normal	Surgical procedure date: _____	
	20µm unstained slides: _____ (qty) Specimen Bar Codes (*max: 5*) 1. _____	5µm unstained slides: _____ (qty) Specimen Bar Codes (*max: 20*) 1. _____
Lymph Node	Surgical procedure date: _____	
	20µm unstained slides: _____ (qty) Specimen Bar Codes (*max: 5*) 1. _____	5µm unstained slides: _____ (qty) Specimen Bar Codes (*max: 20*) 1. _____

Blood Samples

		Bar Code	Amount	Storage Location
Plasma	1.			-80° freezer in E203
	2.			-80° freezer in E203
Serum	1.			-80° freezer in E203
	2.			-80° freezer in E203
DNA	1.			-80° freezer in E203
	2.			-80° freezer in E203

Number of 5cc lavender top tubes collected: _____ Date drawn: _____
Number of 5cc red top tubes collected: _____ Date drawn: _____

Examples of Forms

Adverse Events

Form Name: Internal AE - Serious and Unexpected

INSTITUTIONAL REVIEW BOARD
OFFICE OF RESEARCH SERVICES
McGiffert Hall, 2nd Floor
5751 S. Woodlawn Ave., Chicago, Illinois 60637
Phone: / Fax: 773-834-0659

INTERNAL ADVERSE EVENT FORM: SERIOUS AND UNEXPECTED EVENTS

For adverse events occuring at the U of C Hospitals or a hospital affiliated with the University of Chicago

An adverse event is an undesirable and unintended, although not necessarily unexpected, result of therapy or other intervention.

Serious adverse events include: death, a threat to life, hospitalization, prolongation of existing hospitalization, persistent or significant anomaly or birth defect, causes cancer, is an overdose, any medical event which requires treatment to prevent one of the medical outcomes listed. (Please note: Do not report death or life-threatening events on this form.)

Unexpected adverse events include: those for which the specificity or severity is not consistent with any of the following: the investigator brochure, protocol, risk information in the consent form, the reasonably expected natural history and progression of the underlying disease or condition.

For drug/biologic studies - Any adverse event that occurs that is **both** serious and unexpected must be reported to the IRB. In addition, adverse events occur that are moderate in severity and are not necessarily serious and unexpected, but in the investigator's opinion, should be considered by the IRB due to a possible relationship with the drug/biologic being studied. In both of these cases the adverse event should be reported to the IRB within 10 working days of the investigator's knowledge of the adverse event.

For device trials, any unexpected adverse events must be reported to the IRB within 10 days of the investigator's knowledge of the event.

A. GENERAL INFORMATION

Protocol Number:* Find Number/Title

Principal Investigator Name:* Find PI

Principal Investigator Email:*

Treating Physician Name:* Find Physician

Treating Physician Email:*

Quality Assurance Coordinator:* Find Coordinator

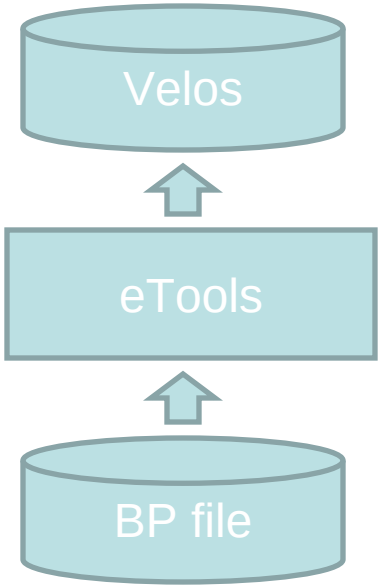
Quality Assurance Coordinator Email:*

Protocol Title:

B. EVENT INFORMATION

Examples of Forms

BP Form



Preview

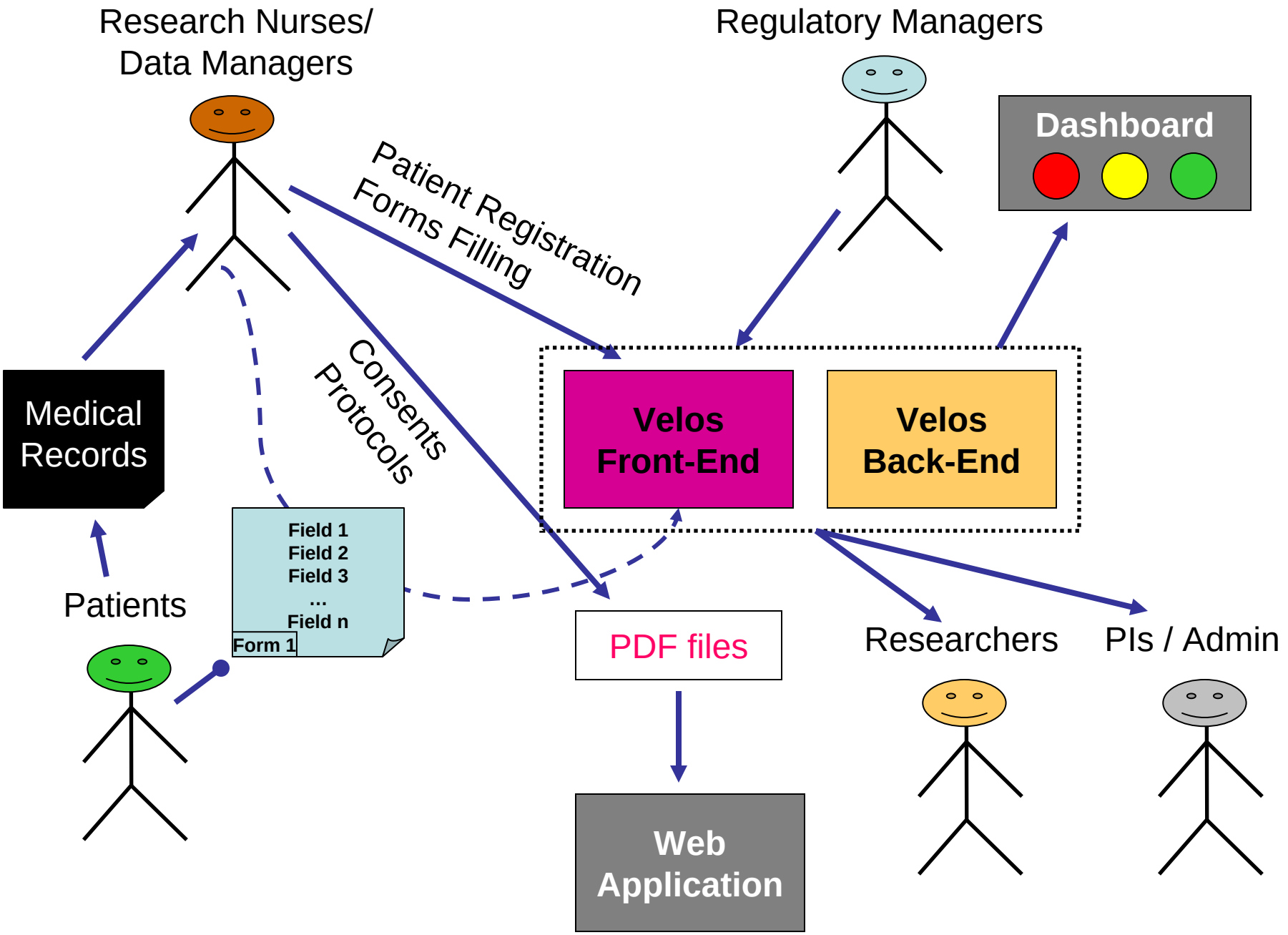
Form Name: 12-Hour Blood Pressure Collection

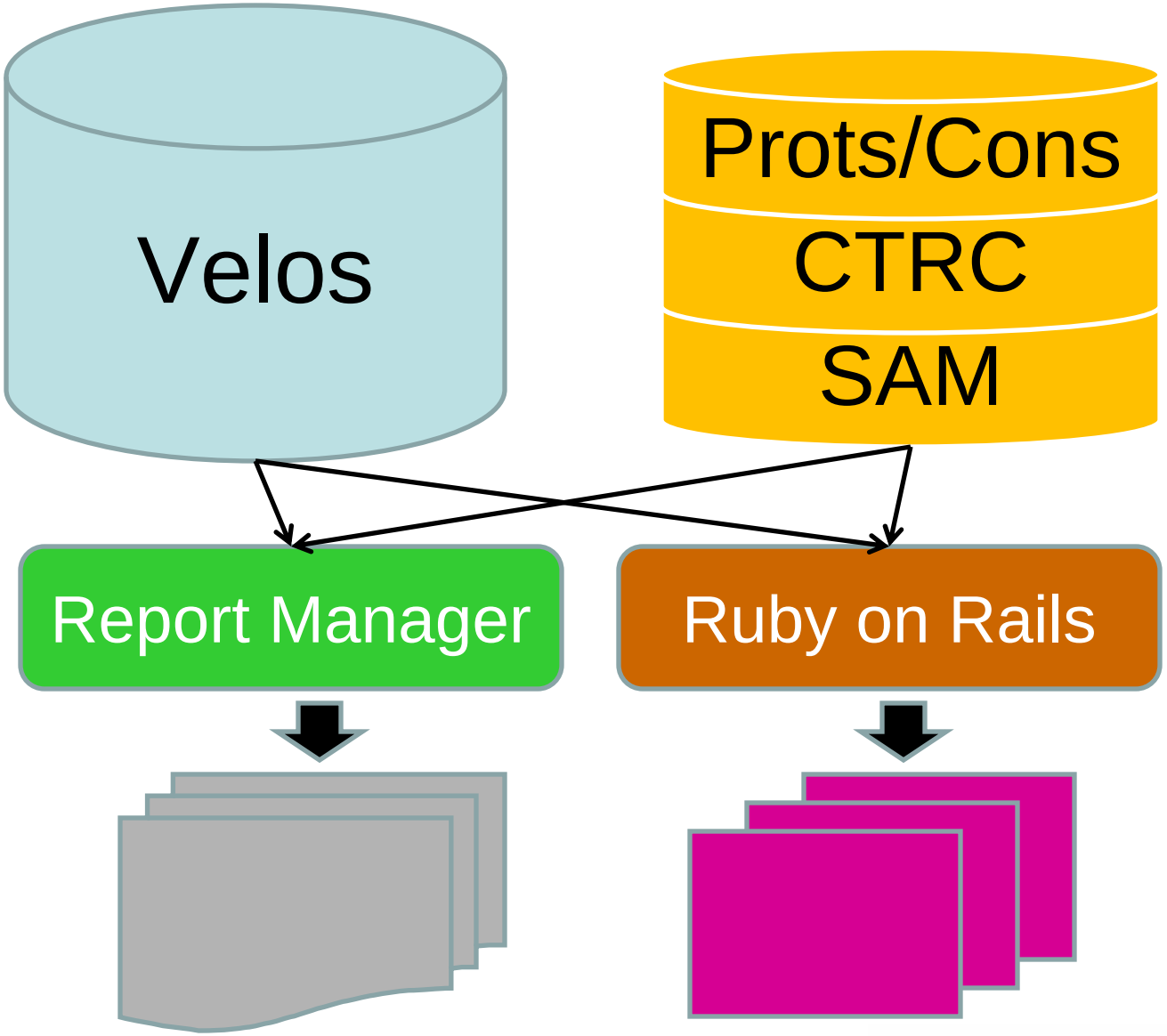
THE UNIVERSITY OF CHICAGO
CANCER RESEARCH CENTER

12-Hour Blood Pressure Collection

Visit:	**Average systolic BP**:
Date:	**Average diastolic BP**:

	BP Index	Time	Systolic	Diastolic	Mean	Heart Rate
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						

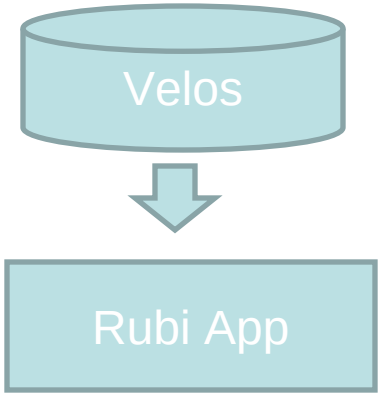

Research Nurses/
Data Managers
Regulatory Managers
Dashboard
Patient Registration
Forms Filling
Consents
Protocols
Medical
Records
Velos
Front-End
Velos
Back-End
Field 1
Field 2
Field 3
...
Field n
Form 1
Patients
PDF files
Researchers
PIs / Admin
Web
Application



THE UNIVERSITY OF CHICAGO
CANCER RESEARCH CENTER

Web Application

Protocol Listing



Clinical Trials at The University of Chicago Cancer Research Center

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CANCER RESEARCH CENTER

UCCRC Home

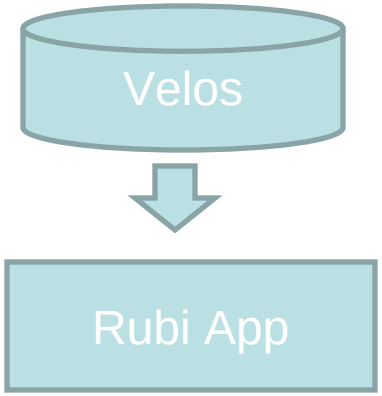
Open Protocols

Select Disease Site:

- **Advanced Disease (Phase I)**
- **Bladder**
- **Bone**
- **Brain and Nervous System**
- **Breast**
- Cancer Control
- **Cancer Risk**
- **Cervix**
- **Colorectal**
- **Esophagus**
- **Gastrointestinal (GI) Other**
- **Gastrointestinal Stroma (GIST Sarcoma)**
- **Head and Neck**
- **Hodgkins Lymphoma**
- **Kidney/ Renal**
- **Leukemia**
- **Liver/ Hepatobiliary**
- **Lung/ Chest**
- **Melanoma (skin)**
- **Mesothelioma**
- **Multiple Myeloma**
- **Myelodysplastic Syndrome (MDS)**

Web Application

Protocol Listing



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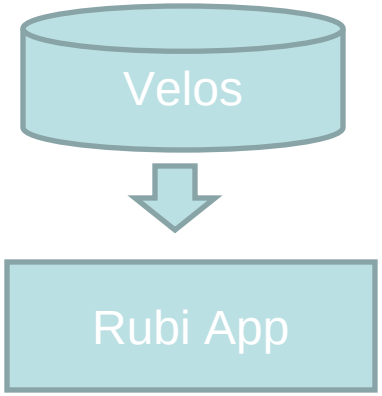
Leukemia Cancer Studies Currently Recruiting Participants at the University of Chicago Cancer Research Center

Protocol Title	IRB #	Physician
CALGB C10001/SWOG C10001: A Phase II Trial of Sequential Chemotherapy, Imatinib Mesylate (Geeevec,STI571) &" Transplantation for Adults with Newly Diagnosed PH+ Acute Lympoblastic Leukemia by the CALGB and SWOG	11700A	Stock, Wendy
CALGB 10002: A Phase II Study of Rituximab and Short Duration, High Intensity Chemotherapy with G-CSF Support in Previously Untreated Patients with Burkitt Lymphoma/Leukemia	11752B	Stock, Wendy
High-dose Cytarabine/Mitoxantrone followed by Autotransplantation for t-MDS/ t-AML	11884A	Godley, Lucy
CTSU E2902: A Phase III Randomized Study of Farnesyl Transferase Inhibitor R115777 in Acute Myeloid Leukemia (AML) Patients in Second or Subsequent Remission or in Remission after Primary Induction Failure	13686B	Rich, Elizabeth
An open-Label Extended-Use Study of Oral CEP-701 in Patients with Hematologic and Non-Hematologic Malignancies Who Have completed a Clinical Study of CEP-701	14054B	Godley, Lucy
Phase I Study of PXD101 in Combination with 5-Azacitidine (5-Aza) for Advanced Hematologic Malignancies	14510A	Odenike, Olatoyosi
	14649A	Stock, Wendy
A Randomized, Double Blind, Placebo Controlled Study Evaluating the Efficacy and Safety of AMG 531 Treatment of Subjects with Low or Intermediate-1 Risk Myelodysplastic Syndrome (MDS) Receiving Lenalidomide.	15070B	Larson, Richard

Web Application

Protocol/ Consents



Protocols by Program

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CANCER RESEARCH CENTER

UCCRC Home

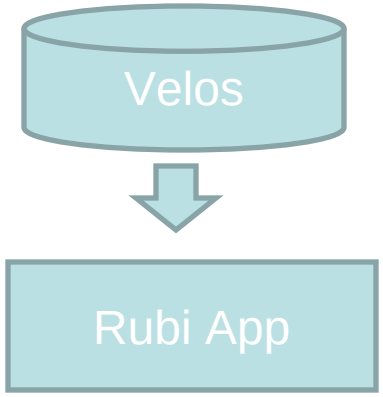
Programs > **Protocols by Program**

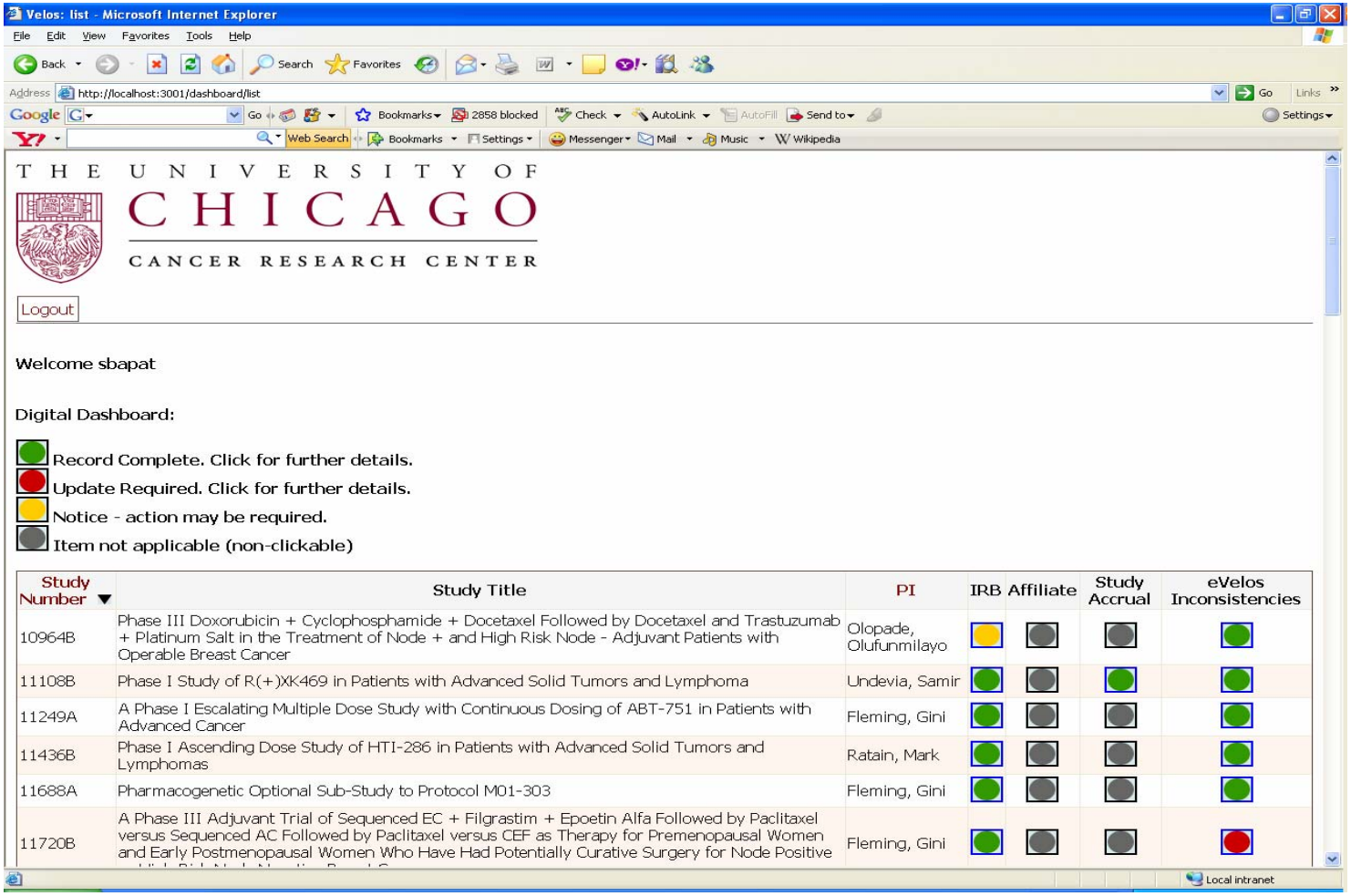
Logout

CRC_Breast Program

Title	Consent	Protocol	I.Brochure	Schema	IRB#	PI
Multicenter Phase III Randomized Trial Comparing Doxorubicin and Cyclophosphamide Followed by Docetaxel with Docetaxel and Cyclophosphamide Followed by Docetaxel and Trastuzumab and with Docetaxel, Platinum Salt and Trastuzumab (TCH) in the Treatment of Node Positive and High Risk Node Negative Adjuvant Patients with Operable Breast Cancer Containing					10964B	Olopade

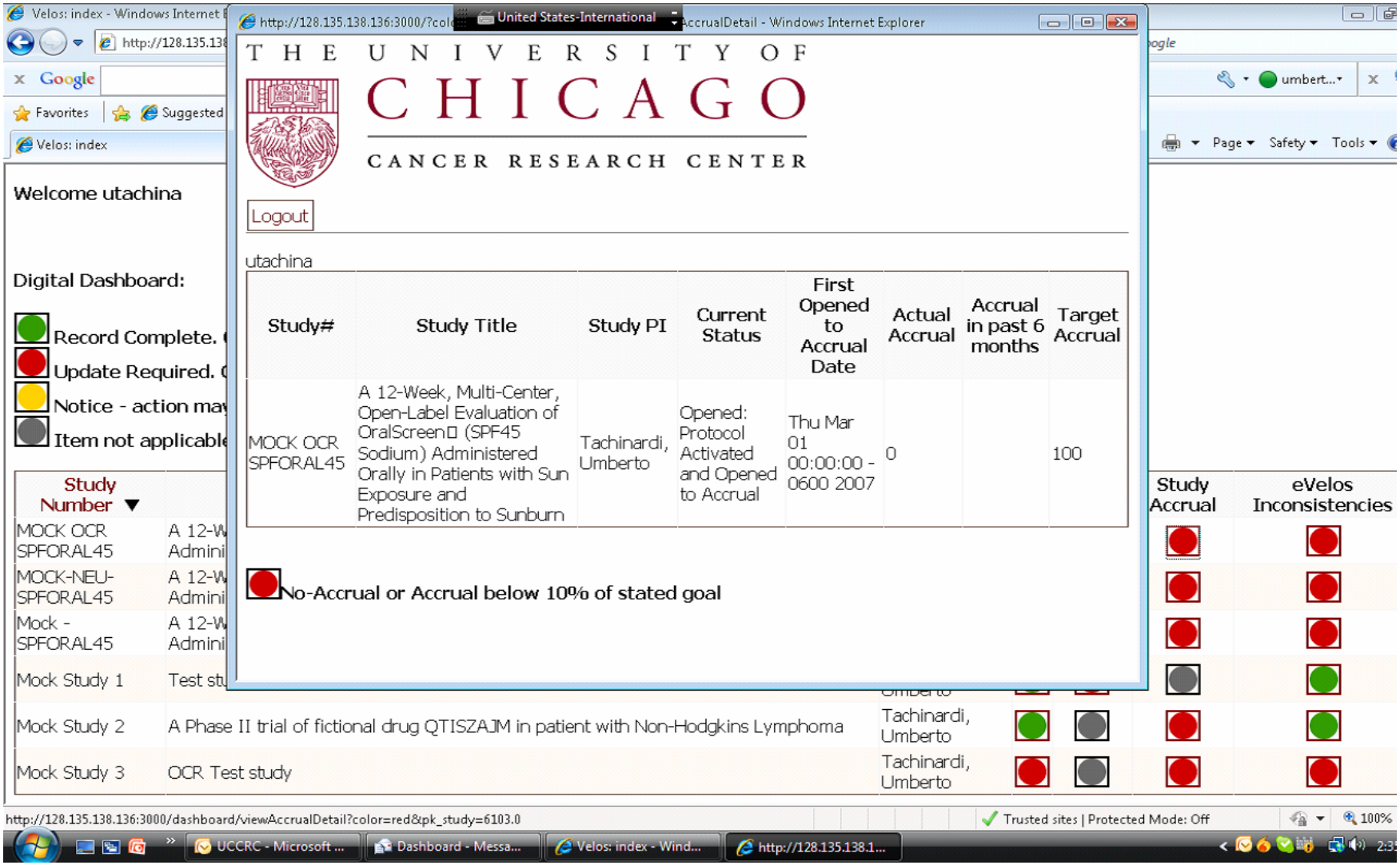
Regulatory Dashboard Application





Study Number	Study Title	PI	IRB	Affiliate	Study Accrual	eVelos Inconsistencies
10964B	Phase III Doxorubicin + Cyclophosphamide + Docetaxel Followed by Docetaxel and Trastuzumab + Platinum Salt in the Treatment of Node + and High Risk Node - Adjuvant Patients with Operable Breast Cancer	Olopade, Olufunmilayo				
11108B	Phase I Study of R(+)XK469 in Patients with Advanced Solid Tumors and Lymphoma	Undevia, Samir				
11249A	A Phase I Escalating Multiple Dose Study with Continuous Dosing of ABT-751 in Patients with Advanced Cancer	Fleming, Gini				
11436B	Phase I Ascending Dose Study of HTI-286 in Patients with Advanced Solid Tumors and Lymphomas	Ratain, Mark				
11688A	Pharmacogenetic Optional Sub-Study to Protocol M01-303	Fleming, Gini				
11720B	A Phase III Adjuvant Trial of Sequenced EC + Filgrastim + Epoetin Alfa Followed by Paclitaxel versus Sequenced AC Followed by Paclitaxel versus CEF as Therapy for Premenopausal Women and Early Postmenopausal Women Who Have Had Potentially Curative Surgery for Node Positive	Fleming, Gini				

Regulatory Dashboard Application



The Velos "Core Team" at UofC

UCCRC

Marcy List
Amber Burnett
Jia Cheng
Eugene Limb
Swapna Bapat
Arthur Christoph
Consuelo Skosey

OCR

Dionisia Saner
Bethany Martell

Department of Medicine

Don Saner
Nick Shank
Tim Holper

Department of Pediatrics

Eneida Mendonca
Michael Rose

CBIS

Seigmund Johnson
Ryan Crist
Clyde Danganan

& many more….

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CANCER RESEARCH CENTER

Translational Data Mart (TraM):

What Is TraM and What Can TraM Do?

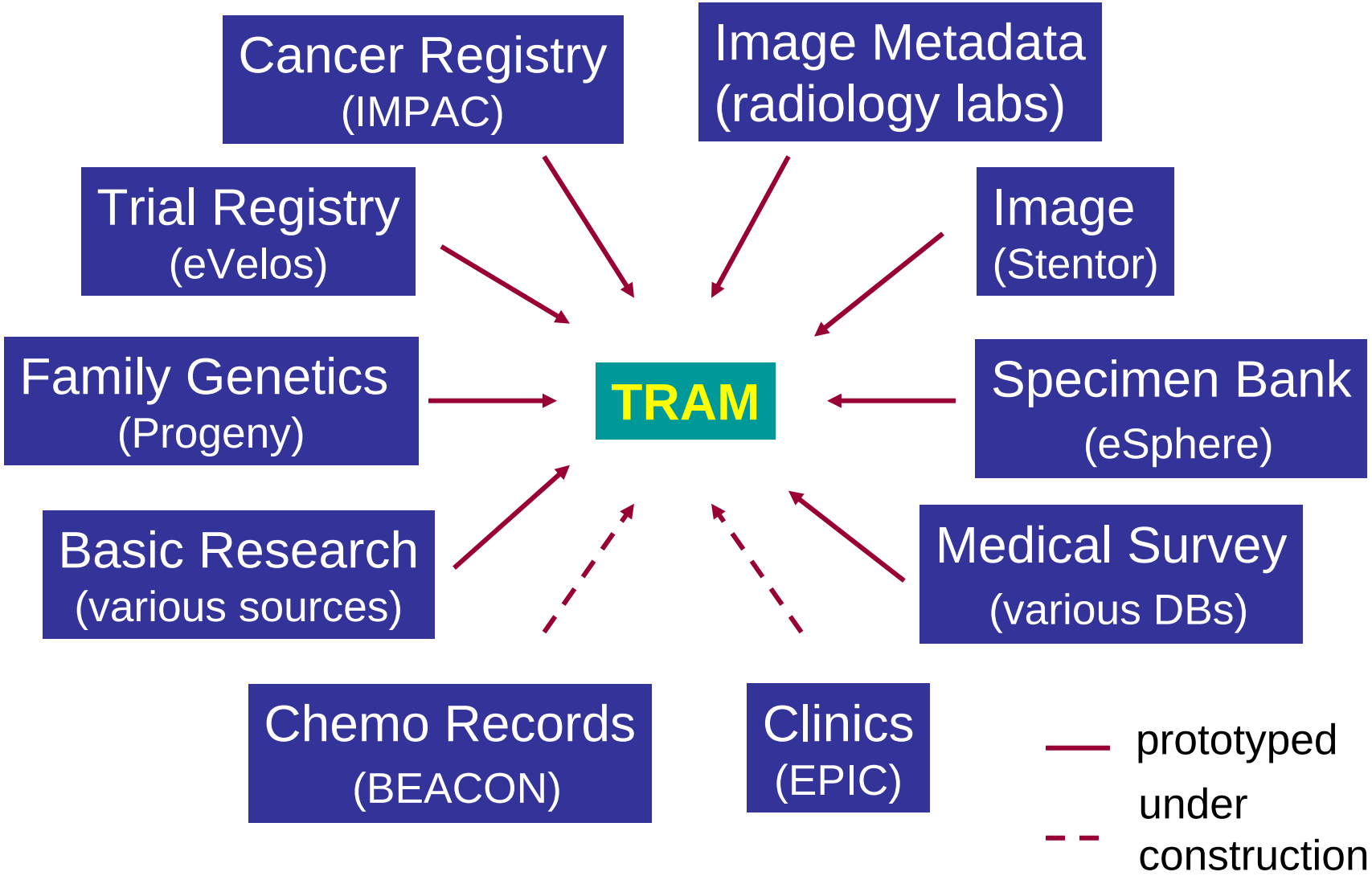
Xiaoming Wang

April 22, 2009

What Is TraM and What Does It Do?

- TraM is a healthcare data integration warehouse with a web-based application interface: https://tram.uchicago.edu
- TraM is a “generic” system that can be used with a broad range of healthcare data and has been customized for all types of cancer data, not just breast cancer
- TraM can provide an integration environment for various biomedical domain databases
- TraM is scalable and configurable but still a work in progress

Data Unification and Integration Workflows at UCMC

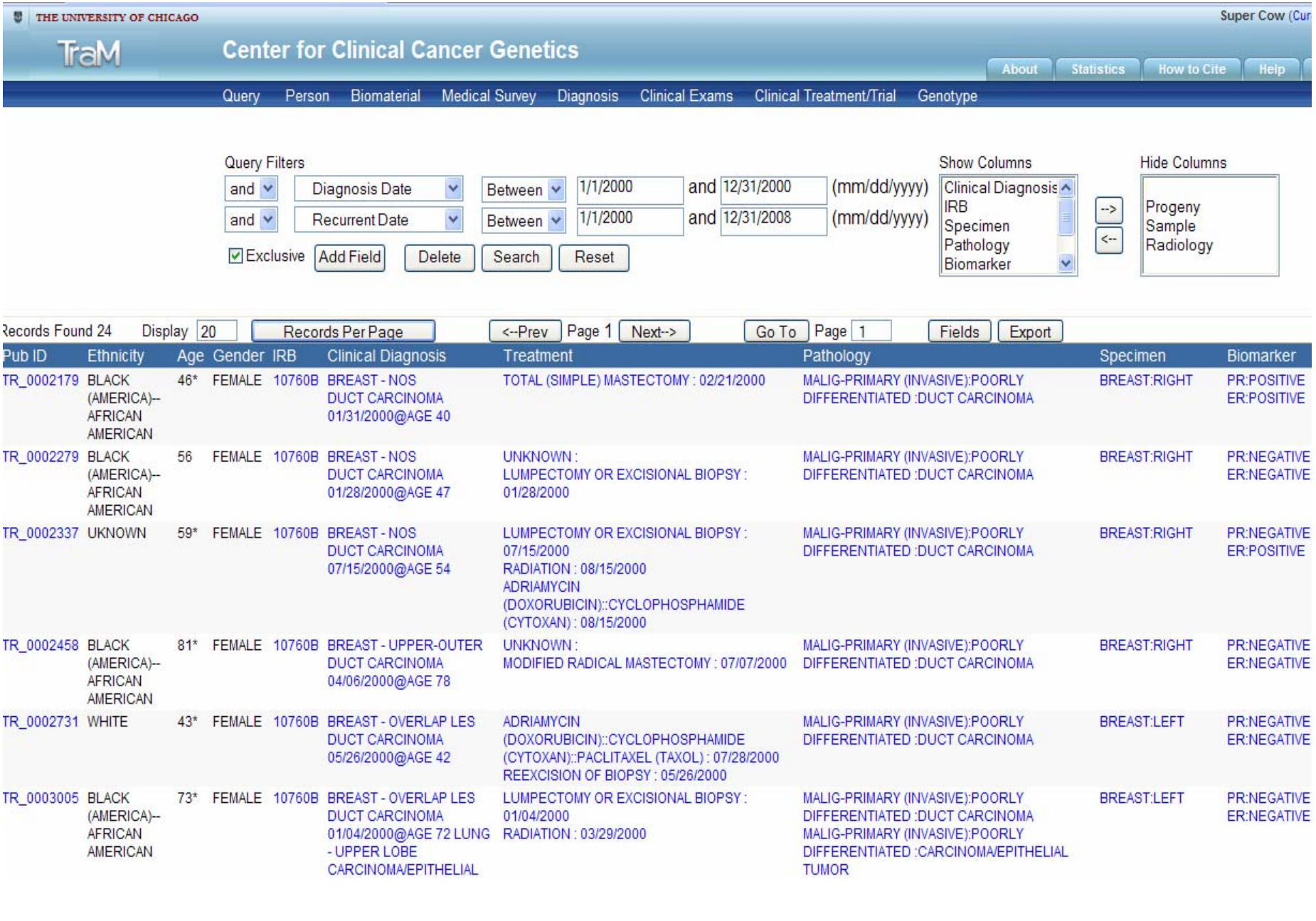


Dynamic Statistics
(not yet synced to source data)

Cancer Cases in TraM

Cancer Site	Cases	Percentage of Total
BLOOD, BONE MARROW, & HEMATOPOIETIC SYS	2199	6.22
BONES & JOINTS	163	0.46
BRAIN, & CRANIAL NERVES, & SPINAL CORD, (EXCL. VENTRICLE, CEREBELLUM)	659	1.86
BREAST	5199	14.70
CERVIX UTERI	800	2.26
CONNECTIVE & SOFT TISSUE	775	2.19
CORPUS UTERI	944	2.67
ESOPHAGUS	469	1.33
GALLBLADDER & EXTRAHEPATIC BILE DUCTS	224	0.63
GUM, FLOOR OF MOUTH, & OTHER MOUTH	265	0.75
HYPOPHARYNX	104	0.29
KIDNEY	1530	4.33
LARGE INTESTINE, (EXCL. APPENDIX)	2004	5.67
LARYNX	382	1.08
LIVER	452	1.28
LUNG & BRONCHUS	3375	9.54
LYMPH NODES	1256	3.55
MENINGES (CEREBRAL,SPINAL)	215	0.61
OROPHARNYX	223	0.63
OVARY	761	2.15
PANCREAS	917	2.59
PLEURA	277	0.78
PROSTATE GLAND	5088	14.38
RECTUM	684	1.93
RETROPERITONEUM & PERITONEUM	138	0.39
SALIVARY GLAND	116	0.33
SKIN	859	2.43
SMALL INTESTINE	184	0.52
STOMACH	662	1.87
TESTIS	195	0.55
THYROID GLAND	807	2.28
TONGUE	411	1.16
UNKNOWN	648	1.83
URINARY BLADDER	985	2.78
UTERUS, NOS	92	0.26
UTVAGINA & LABIA	135	0.38
VULVA, NOS	203	0.57
OTHER	973	2.75
TOTAL	35373	100.00

Support Data Mining (Longitudinal)



THE UNIVERSITY OF CHICAGO

Super Cow (Cur

TraM

Center for Clinical Cancer Genetics

About | Statistics | How to Cite | Help

Query | Person | Biomaterial | Medical Survey | Diagnosis | Clinical Exams | Clinical Treatment/Trial | Genotype

Query Filters

and	Diagnosis Date	Between	1/1/2000	and	12/31/2000	(mm/dd/yyyy)
and	Recurrent Date	Between	1/1/2000	and	12/31/2008	(mm/dd/yyyy)

Exclusive | Add Field | Delete | Search | Reset

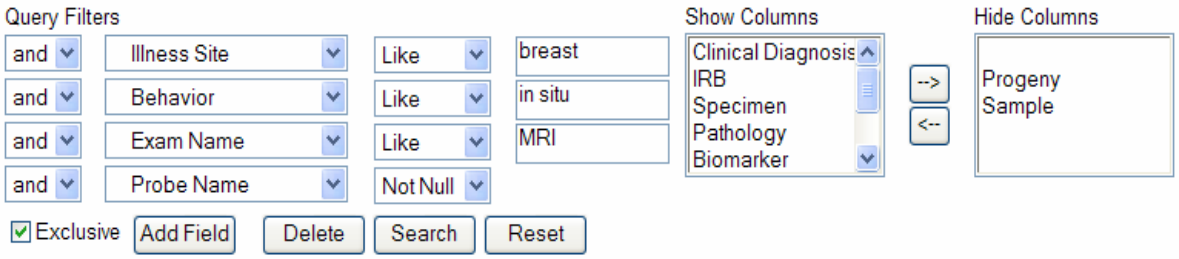
Show Columns: Clinical Diagnosis, IRB, Specimen, Pathology, Biomarker

Hide Columns: Progeny, Sample, Radiology

Records Found 24 | Display 20 | Records Per Page | <--Prev | Page 1 | Next--> | Go To | Page 1 | Fields | Export

Pub ID	Ethnicity	Age	Gender	IRB	Clinical Diagnosis	Treatment	Pathology	Specimen	Biomarker
TR_0002179	BLACK (AMERICA)--AFRICAN AMERICAN	46*	FEMALE	10760B	BREAST - NOS DUCT CARCINOMA 01/31/2000@AGE 40	TOTAL (SIMPLE) MASTECTOMY : 02/21/2000	MALIG-PRIMARY (INVASIVE):POORLY DIFFERENTIATED :DUCT CARCINOMA	BREAST:RIGHT	PR:POSITIVE ER:POSITIVE
TR_0002279	BLACK (AMERICA)--AFRICAN AMERICAN	56	FEMALE	10760B	BREAST - NOS DUCT CARCINOMA 01/28/2000@AGE 47	UNKNOWN : LUMPECTOMY OR EXCISIONAL BIOPSY : 01/28/2000	MALIG-PRIMARY (INVASIVE):POORLY DIFFERENTIATED :DUCT CARCINOMA	BREAST:RIGHT	PR:NEGATIVE ER:NEGATIVE
TR_0002337	UKNOWN	59*	FEMALE	10760B	BREAST - NOS DUCT CARCINOMA 07/15/2000@AGE 54	LUMPECTOMY OR EXCISIONAL BIOPSY : 07/15/2000 RADIATION : 08/15/2000 ADRIAMYCIN (DOXORUBICIN)::CYCLOPHOSPHAMIDE (CYTOXAN) : 08/15/2000	MALIG-PRIMARY (INVASIVE):POORLY DIFFERENTIATED :DUCT CARCINOMA	BREAST:RIGHT	PR:NEGATIVE ER:POSITIVE
TR_0002458	BLACK (AMERICA)--AFRICAN AMERICAN	81*	FEMALE	10760B	BREAST - UPPER-OUTER DUCT CARCINOMA 04/06/2000@AGE 78	UNKNOWN : MODIFIED RADICAL MASTECTOMY : 07/07/2000	MALIG-PRIMARY (INVASIVE):POORLY DIFFERENTIATED :DUCT CARCINOMA	BREAST:RIGHT	PR:NEGATIVE ER:NEGATIVE
TR_0002731	WHITE	43*	FEMALE	10760B	BREAST - OVERLAP LES DUCT CARCINOMA 05/26/2000@AGE 42	ADRIAMYCIN (DOXORUBICIN)::CYCLOPHOSPHAMIDE (CYTOXAN)::PACLITAXEL (TAXOL) : 07/28/2000 REEXCISION OF BIOPSY : 05/26/2000	MALIG-PRIMARY (INVASIVE):POORLY DIFFERENTIATED :DUCT CARCINOMA	BREAST:LEFT	PR:NEGATIVE ER:NEGATIVE
TR_0003005	BLACK (AMERICA)--AFRICAN AMERICAN	73*	FEMALE	10760B	BREAST - OVERLAP LES DUCT CARCINOMA 01/04/2000@AGE 72 LUNG - UPPER LOBE CARCINOMA/EPITHELIAL	LUMPECTOMY OR EXCISIONAL BIOPSY : 01/04/2000 RADIATION : 03/29/2000	MALIG-PRIMARY (INVASIVE):POORLY DIFFERENTIATED :DUCT CARCINOMA MALIG-PRIMARY (INVASIVE):POORLY DIFFERENTIATED :CARCINOMA/EPITHELIAL TUMOR	BREAST:LEFT	PR:NEGATIVE ER:NEGATIVE

Support Data Mining (cross-sectional)



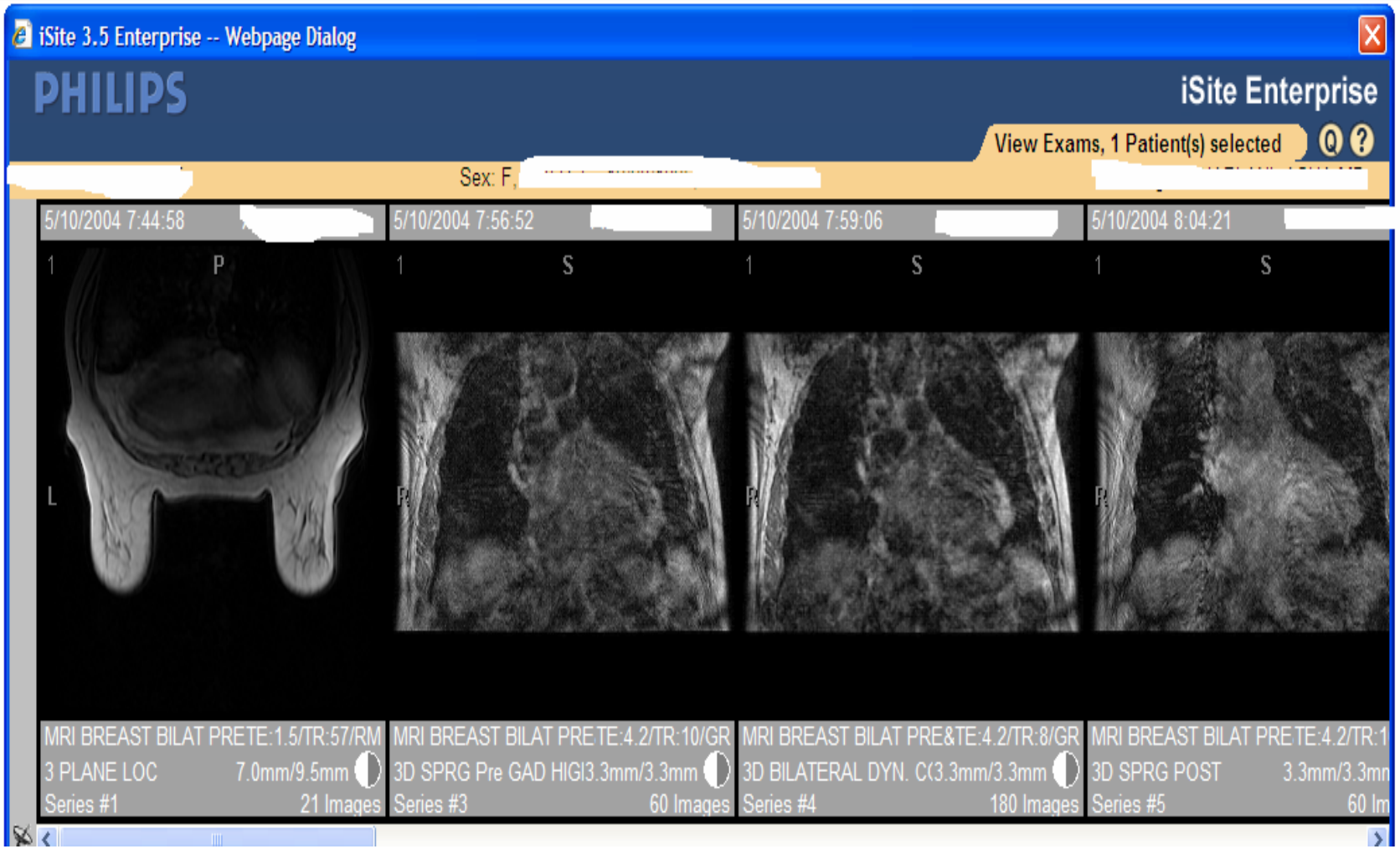
Records Found 43 Display 20 Records Per Page <--Prev Page 1 Next--> Go To Page 1 Fields Export

Pub ID	Ethnicity	Age	Gender	IRB	Clinical Diagnosis	Treatment	Pathology	Radiology	Specimen	Biomarker
TR_0001972	WHITE	82	FEMALE	10760B	BREAST - UPPER-OUTER DUCT CARCINOMA 03/20/2006@AGE 79 BREAST - OVERLAP LES SOLID CARCINOMA 03/20/2006@AGE 79	LUMPECTOMY OR EXCISIONAL BIOPSY : 06/09/2006 LUMPECTOMY OR EXCISIONAL BIOPSY : 06/09/2006	MALIG-PRIMARY (INVASIVE):WELL DIFFERENTIATED :DUCT CARCINOMA CA IN SITU:MODERATELY DIFFERENTIATED:SOLID CARCINOMA	MRI : 05/01/2006 :MASS : OVAL MRI : 05/01/2006 :NON-MASS : LINEAR MAMMOGRAM :	BREAST:LEFT BREAST:RIGHT	PR:POSITIVE ER:POSITIVE PR:POSITIVE ER:POSITIVE
TR_0002284	BLACK (AMERICA)--AFRICAN AMERICAN	64	FEMALE	10760B	BREAST - NOS DUCT CARCINOMA 09/05/2001@AGE 57	RADIATION : 11/05/2001 LUMPECTOMY OR EXCISIONAL BIOPSY : 10/05/2001	CA IN SITU:WELL DIFFERENTIATED :DUCT CARCINOMA	MRI : 03/22/2004 :MASS : OVAL MAMMOGRAM : 03/16/2004 :	BREAST:LEFT	PR:POSITIVE ER:POSITIVE
TR_0002344	UKNOWN	51	FEMALE	10760B	BREAST - OVERLAP LES CRIBRIFORM CARCINOMA 01/24/2005@AGE 47 BREAST - UPPER-OUTER LOBULAR CARCINOMA 02/18/2005@AGE 47	MODIFIED RADICAL MASTECTOMY WITH REMOVAL OF UNINVOLVED CONTRALATERAL BREAST : 02/18/2005 MODIFIED RADICAL MASTECTOMY WITH REMOVAL OF UNINVOLVED CONTRALATERAL BREAST : 02/18/2005	CA IN SITU:MODERATELY DIFFERENTIATED:CRIBRIFORM CARCINOMA MALIG-PRIMARY (INVASIVE):MODERATELY DIFFERENTIATED:LOBULAR CARCINOMA	MRI : 02/07/2005 :MASS : ROUND MRI : 02/07/2005 :NON-MASS : DIFFUSE MAMMOGRAM : 02/07/2005 :	BREAST:RIGHT BREAST:LEFT	PR:POSITIVE ER:POSITIVE PR:POSITIVE ER:POSITIVE
TR_0002351	WHITE	57	FEMALE	10760B	BREAST - UPPER-OUTER LOBULAR CARCINOMA 03/14/2003@AGE 51	LUMPECTOMY OR EXCISIONAL BIOPSY : 03/14/2003	CA IN SITU:NOT DETERMINED; N/A; UNK :LOBULAR CARCINOMA	MRI : 04/14/2003 :NON-MASS : FOCAL MRI : 04/25/2005 : MAMMOGRAM : 04/10/2003 :	BREAST:RIGHT	PR:POSITIVE ER:POSITIVE
TR_0002360	WHITE	91	FEMALE	10760B	BREAST - UPPER-INNER	TOTAL (SIMPLE) MASTECTOMY : 12/22/2003	CA IN SITU:POORLY DIFFERENTIATED :COMEDOCARCINOMA	MRI : 02/09/2004 :NON-	BREAST:LEFT	PR:NEGATIVE ER:POSITIVE

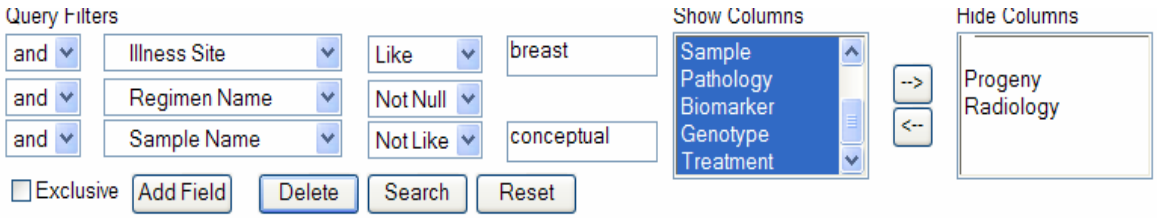
Support Data Mining (zone in study)

currently underdevelopment

Exam Date	Organ Name	Image	Birads	Lesion Type	Shape	Margin	Enhancement	Lesion Laterality	Lesion Birads	Size AP	Size CC	Size LR	Init	Delay	Path Nu
05/06/2004	BREAST		5												
05/10/2004	BREAST	Image1		MASS	IRREGULAR	IRREGULAR	RIM ENHANCEMENT	RIGHT					RAPID	WASHOUT	



Locate Sample for Basic Research



cords Found 244 Display 20 Records Per Page <--Prev Page 1 Next--> Go To Page 1 Fields Export

b ID	Ethnicity	Age	Gender	IRB	Clinical Diagnosis	Treatment	Pathology	Specimen	Sample
_0000685	BLACK (AFRICA)--BINI	209	FEMALE	13304B	BREAST - NOS BREAST CANCER	LOCAL/PART PANCREATECT & DUODENECT WITH PARTIAL GASTRECTOMY (WHIPPLE) : 02/28/2007	UNKNOWN	BLOOD:	DNA:977684
_0001980	BLACK (AMERICA)--AFRICAN AMERICAN	76	FEMALE	8962	BREAST - UPPER-INNER LOBULAR CARCINOMA 10/04/2006@AGE 74	TOTAL (SIMPLE) MASTECTOMY : 11/01/2006	MALIG-PRIMARY (INVASIVE):WELL DIFFERENTIATED :LOBULAR CARCINOMA	BLOOD: BREAST:RIGHT	CONCEPTUAL_TISSUE:TUMOR:2 SERUM:6016779 DNA:6027910 SERUM:6016781 SERUM:6016780 DNA:6022715
_0002002	WHITE	62	FEMALE	8962 10760B	BREAST - UPPER-OUTER LOBULAR CARCINOMA 09/21/2006@AGE 60	RADIATION : 12/05/2006 LUMPECTOMY OR EXCISIONAL BIOPSY : 10/20/2006	MALIG-PRIMARY (INVASIVE):WELL DIFFERENTIATED :LOBULAR CARCINOMA	BLOOD:NOS BLOOD:NOS BREAST:LEFT	EBV CELLS:7042801 SERUM:7043860 CONCEPTUAL_TISSUE:TUMOR:2 EBV CELLS:7042804 DNA:7068300 EBV CELLS:7042802 EBV CELLS:7042803 SERUM:7043859 EBV CELLS:7042805 SERUM:7043858
_0002018	BLACK (AMERICA)--AFRICAN AMERICAN	71	FEMALE	10760B	BREAST - NOS DUCT CARCINOMA 09/16/2003@AGE 66	MODIFIED RADICAL MASTECTOMY : 10/15/2003 ADRIAMYCIN (DOXORUBICIN)::CYCLOPHOSPHAMIDE (CYTOXAN) : 11/21/2003	MALIG-PRIMARY (INVASIVE):POORLY DIFFERENTIATED :DUCT CARCINOMA	BREAST:LEFT BREAST:RIGHT	CONCEPTUAL_TISSUE:TUMOR:1 TISSUE FROZEN:Diseased:8016 TISSUE FROZEN:Normal:801642 TISSUE PARAFFIN:Diseased:801 TISSUE FROZEN:Normal:801642 TISSUE FROZEN:Diseased:8016 TISSUE PARAFFIN:Normal:80164
_0002029	BLACK (AMERICA)--AFRICAN AMERICAN	43	FEMALE	13344A	BREAST - NOS DUCT CARCINOMA 10/16/2006@AGE 40	ADRIAMYCIN (DOXORUBICIN)::CYCLOPHOSPHAMIDE (CYTOXAN)::PACLITAXEL (TAXOL) : 11/16/2006 LUMPECTOMY OR EXCISIONAL BIOPSY : 03/16/2007 RADIATION : 04/26/2007	MALIG-PRIMARY (INVASIVE):MODERATELY DIFFERENTIATED:DUCT CARCINOMA	OVARY:LEFT BREAST: FALLOPIAN TUBE:LEFT FALLOPIAN TUBE:RIGHT BLOOD: BREAST:RIGHT	SERUM:6028866 TISSUE PARAFFIN:Normal:80188 TISSUE PARAFFIN:Normal:80188 TISSUE FROZEN:Normal:801881 TISSUE FROZEN:TUMOR:600606 TISSUE FROZEN:Normal:801881 TISSUE FROZEN:NORMAL:60060 TISSUE FROZEN:Normal:801881

Support Full Scale Curation (editing survey questionnaire)

Add Question-Category

Branch Name: Reproductive System (Section G-J)

Branch Name: Reproductive System (Section G-J)

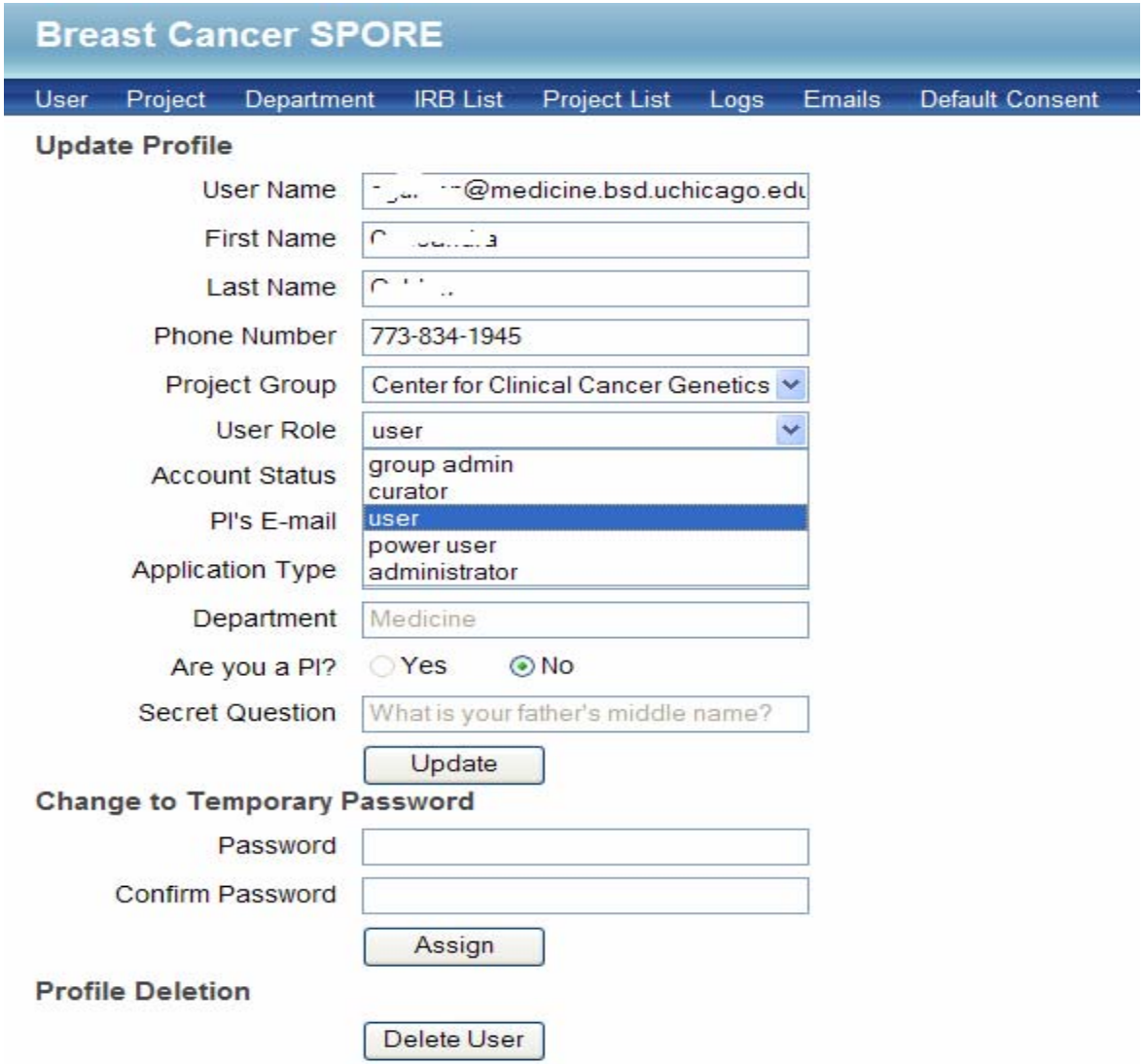
Category: Pregnancy history (Section H)

Update | Delete | Cancel

Update Order | Add Item

Order	Item Name	Description	Unit of Measurement	Options
1	ever_pregnant	H1. Have you ever been pregnant?		Yes; No; Don't know
2	num_pregnan	H2. How many pregnancies have you had	Pregnancies	
3	num_livebirths	H3. How many live births have you had	Live births	
4	age_first_birth	H4. Age you had your first live birth	Years	
5	age_last_birth	H5. Age you had your last live birth	Years	
6	ever_breastfeed_one_month	H6. Ever breast-feed for at least one month		Yes; No; Don't know
7	pregancy_id (Enter pregnancy number)			
8	preg_outcome	H7. What was the outcome of this pregnancy?		Currently pregnant; Single live birth; Multiple birth; Still birth; Miscarriage; Tubal or ectopic pregnancy; Induced abortion; Don't know
9	date_baby_born	H8. When was your baby born for this pregnancy? (format mm/YYYY)	mm/YYYY	
10	preg_duration	H9. How long did this pregnancy last?	Months	<=3; 4-6; >=7; Don't know
11	num_boys_preg	H.10 How many boys did you have in this pregnancy?		
12	num_girls_preg	H10. How many girls did you have in this pregnancy?		
13	ever_breastfeed	H.11 Did you breast feed this baby?		Yes; No; Don't know
14	mths_breastfeed	H12. How many months did you breastfeed this baby?	Months	<1; 1-5; 6-11; 12-24; >24; Don't know

Multiple Level of Data Privacy Control (per IRB, project, and user role)



Acknowledgements

Computation Institute

Xiaoming Wang

Lili Liu

Greg Cross

Ian Foster

Center for Cancer Genetics

Funmi Olopade

Kisha Hope

Shelly Porcellino

Jim Fackenthal

Others

Dept. of Radiology

Paul Chang

Gilliam Newstead

Sunny Arkani Janson

Other

Breast Cancer SPORE

Cancer Registry (Cassie Simon)

Specimen Bank (Leslie Martin)

Department of Medicine

T.R.I.D.O.M.

Total patients asked: 6943

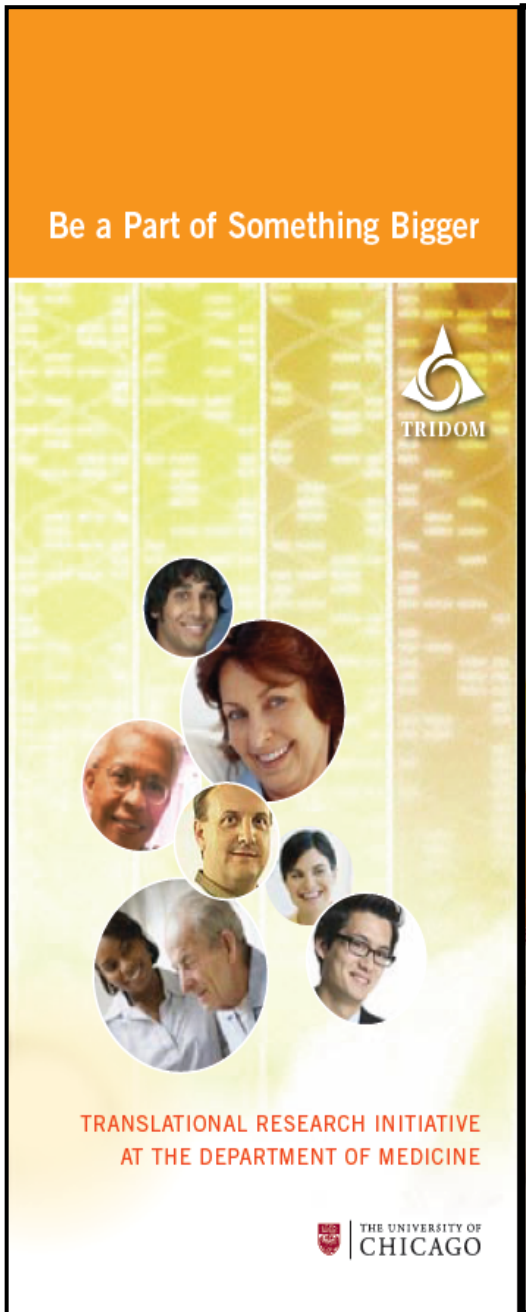
Patients consented: 5370

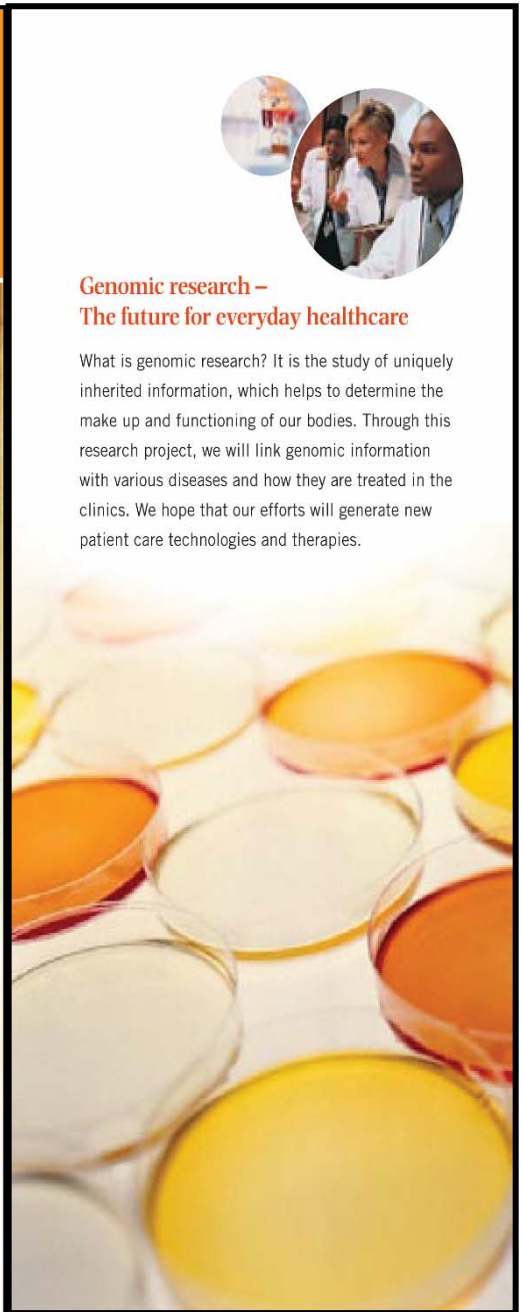
Patients refused : 1499

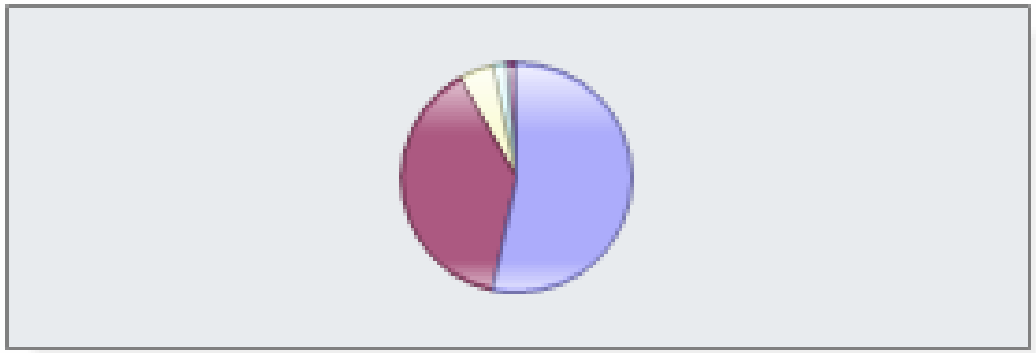
Percent consented : 77.34%

Samples received : 3446

Department	Consented	Samples Received
CARDIOLOGY	155	118
DERMATOLOGY	2	1
EMERGENCY MEDICINE	2	2
ENDOCRINOLOGY	214	166
GASTROENTEROLOGY	1312	932
GENERAL MEDICINE	800	527
HEMATOLOGY/ONCOLOGY	310	225
HOSPITALIST MEDICINE	5	5
INPATIENT	168	64
NEPHROLOGY	52	48
NEUROPHYSIOLOGY	10	4
PULMONARY/CRITICAL CARE	1335	521
RHEUMATOLOGY	975	842
Unknown	30	17







White:	1,839	53%
Black or African American:	1,319	38%
Unknown or Not Reported:	170	5%
Asian:	65	2%
More Than One Race:	38	1%
American Indian/Alaska Native :	10	0%
Native Hawaiian or Other Pacific Islander:	4	0%

Tridom

Consent in Clinic

Patient Consented

Web Entry Form enforces rules about asking patients who have already been asked to participate

If eligible and willing, Web Entry Form collects MRN, Diagnoses, Medications, Race and Ethnicity

MRN is entered and verified by searching TRIDOM database of all registered patients and verifying the name.

TRIDOM statlan code entered into patient lab requisition (Sunquest)

Patient Registers for Blood Draw

Patient is registered for a blood draw in clinic location and a TRIDOM sticker is affixed to the encounter sheet.

Blood Drawn in Phlebotomy

Sample label has Sunquest accession number bar coded and MRN, name and date type written

Sample Received in GCRC

Samples are aliquoted and labeled with pre printed pathology bar code labels. Samples are scanned into Esprit and patient MRN is entered as well.

Sample Received in Pathology

Sample labels scanned into Pathology Tissue Bank System

TRIDOM can query the Tissue Bank System to verify arrival of specimens in Pathology

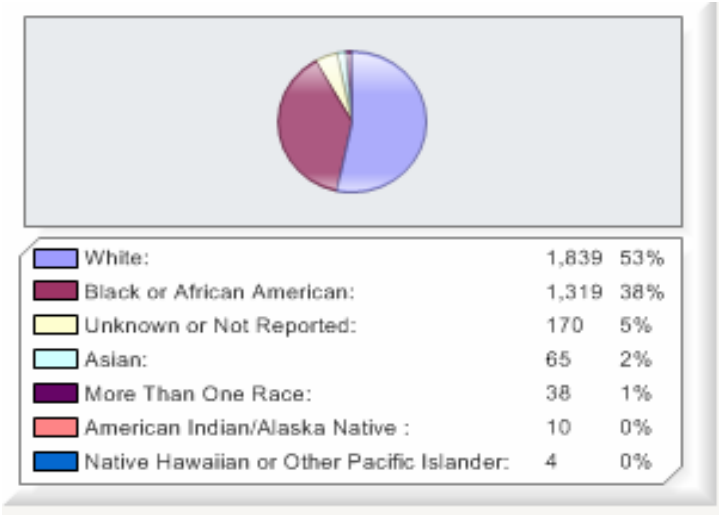
Quality Control

CRSO staff check Oacis to verify / augment diagnoses

Physicians receive email notifying them that a patient has consented to the study. They login and verify the diagnoses

TRIDOM

Pathology Tissue Banking System



Acknowledgement:
Don Saner
Nancy Cox

The Chicago BioMedicine Information Services (CBIS) Service Oriented Architecture (SOA)

Translational Research Support Services:

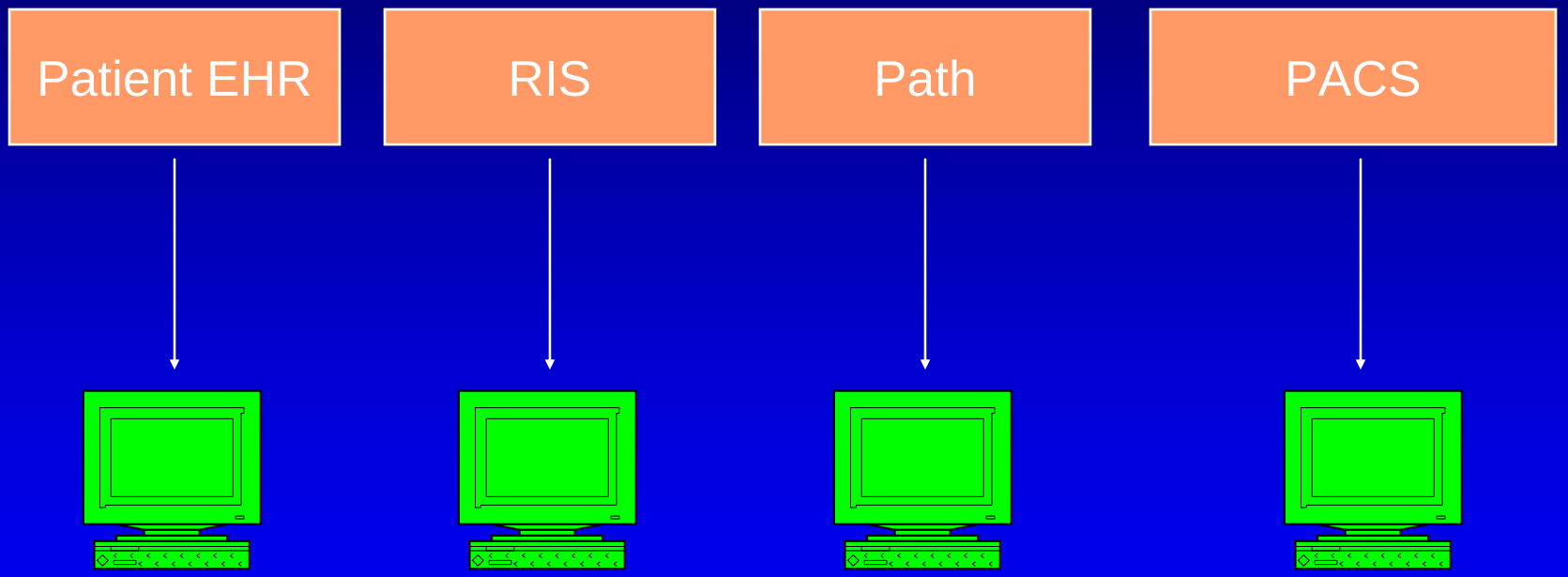
Patient Data Services
(Laboratory, Pathology, Radiology)
Electronic Honest Broker
DICOM iBroker

Paul J. Chang, M.D., FSIIM

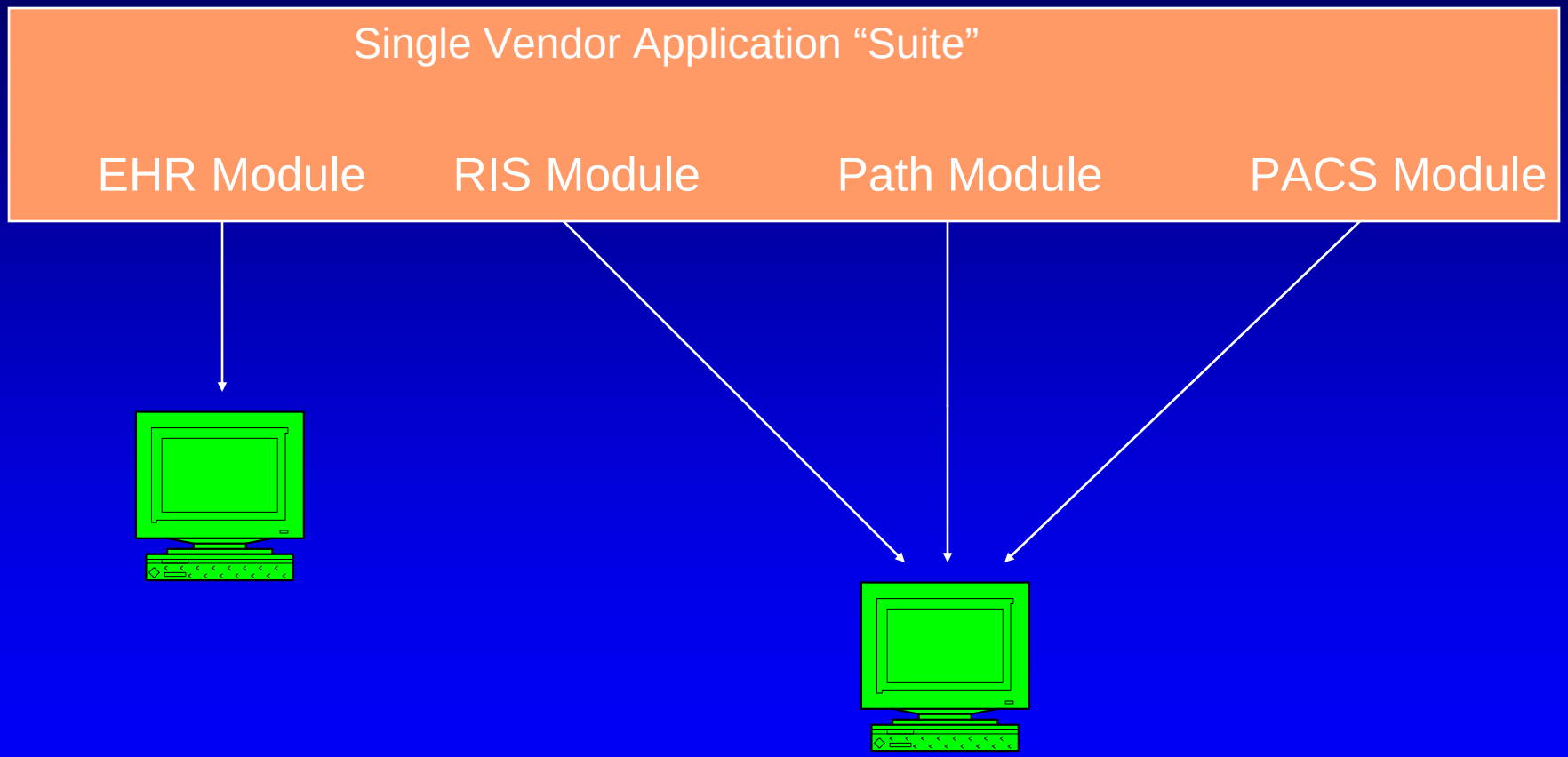
Professor & Vice-Chairman, Radiology Informatics
Medical Director, Pathology Informatics
University of Chicago School of Medicine

Medical Director, Enterprise Imaging
Architect, CBIS SOA Initiative
University of Chicago Medical Center

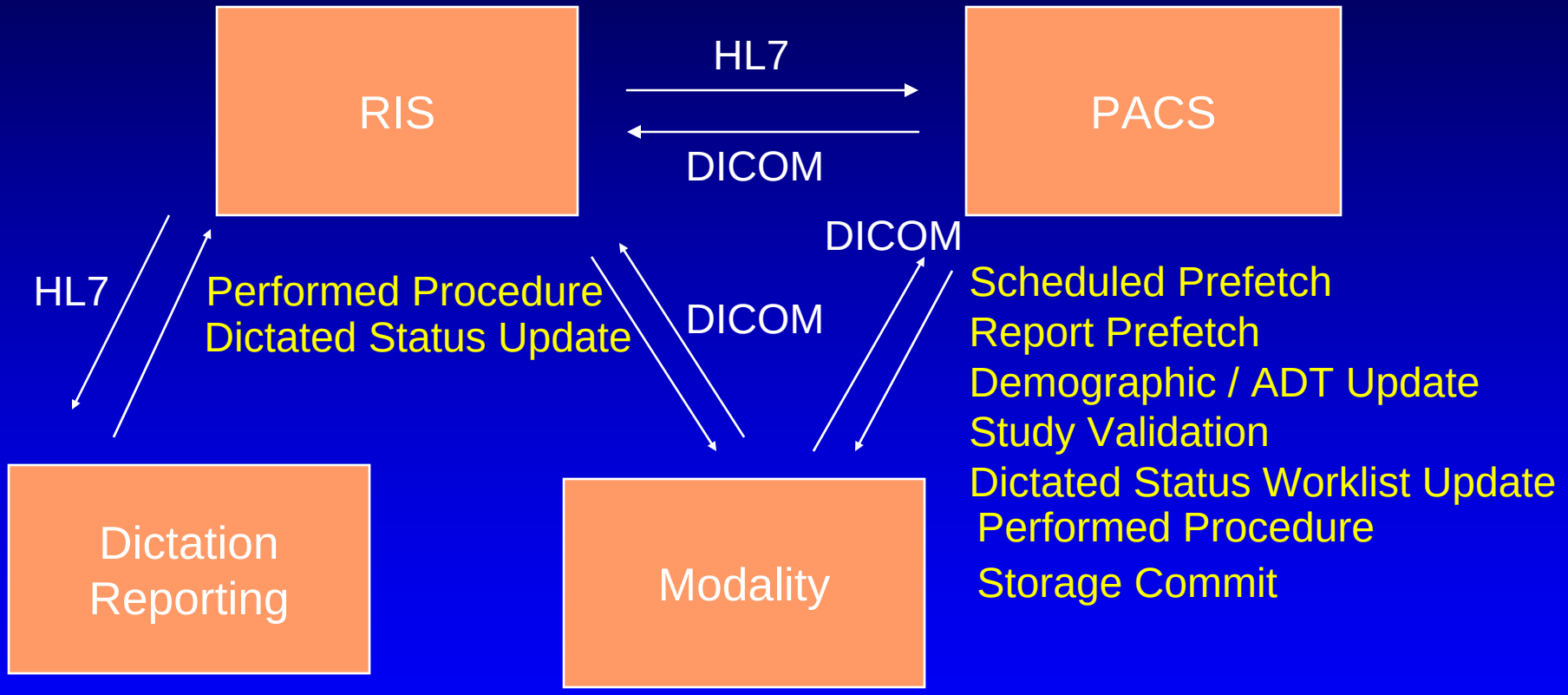
Typical Legacy-based IT Environment:
"Using humans to integrate workflow"



Integration using a "Single Vendor Solution"

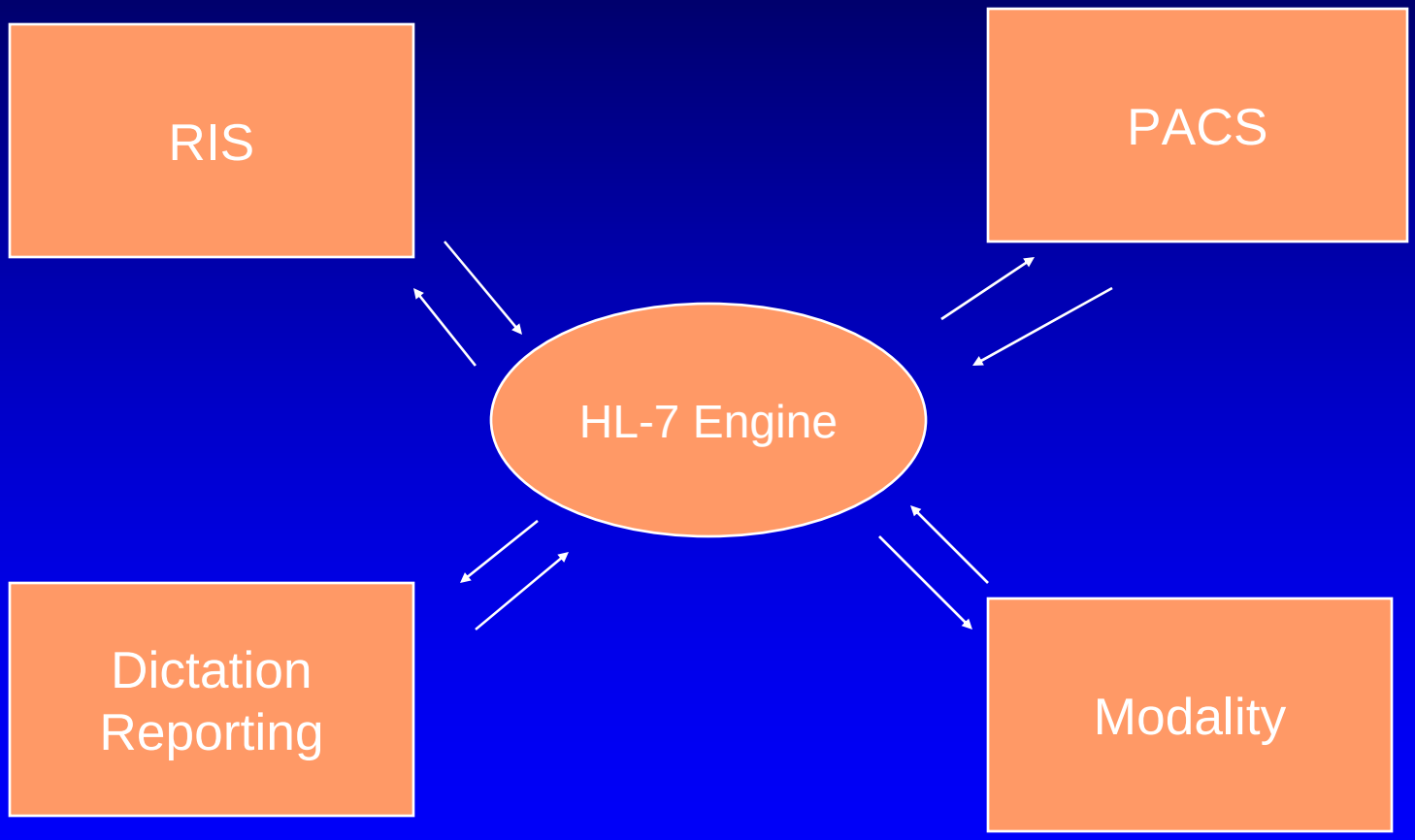


Using “Edge” Protocols (DICOM & HL7) to Orchestrate Integrated Workflow: IHE PACS – RIS Integration Workflow Model



Integration Engine Approach Using Edge Protocols (HL-7, DICOM) to Transfer State

Example: PACS – RIS Integration Workflow Model



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Hello, Paul Chang. We have recommendations for you. (If you're not Paul Chang, click here.)

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- Textbooks

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XB360 Call of Duty 2

Product Description

Call of Duty 2 redefines the cinematic intensity and chaos of battle as seen through the eyes of ordinary soldiers fighting together in epic WWII conflicts. The sequel to 2003's Call of Duty, winner of over 80 Game of the Year awards, Call of Duty 2 offers more immense, more intense, more realistic... Read more (Why was I recommended this?)

Recommended for you

Xbox 360 Play and Charge Kit by Microsoft Software (Why was I recommended this?)

Batman: The Dark Knight Returns by Frank Miller (Why was I recommended this?)

XB360 Fight Night: Round 3 by Electronic Arts (Why was I recommended this?)

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Browse Movies

Movies for You

You Have Recommendations!

Red Dwarf: Series 3

Not Interested

Add

Three million years into the future, only Dave Lister has survived a radiation leak on the ship Red Dwarf in this

Add All

with some of the

Monty Python Live! (2001)

This collection is a Python lover's dream come true, with some of the legendary British comedy troupe's most memorable live performances -- including 1972's Monty Python Live at the Hollywood Bowl and 1998's reunion performance, Monty Python Live at Aspen. Also included is the rarely seen tribute documentary, 20 Years of Python. Hosted by Steve Martin, the program features some of the group's most famous clips.

Starring: John Cleese, Eric Idle
Director: Paul Miller
Genre: Television
Rating: NR

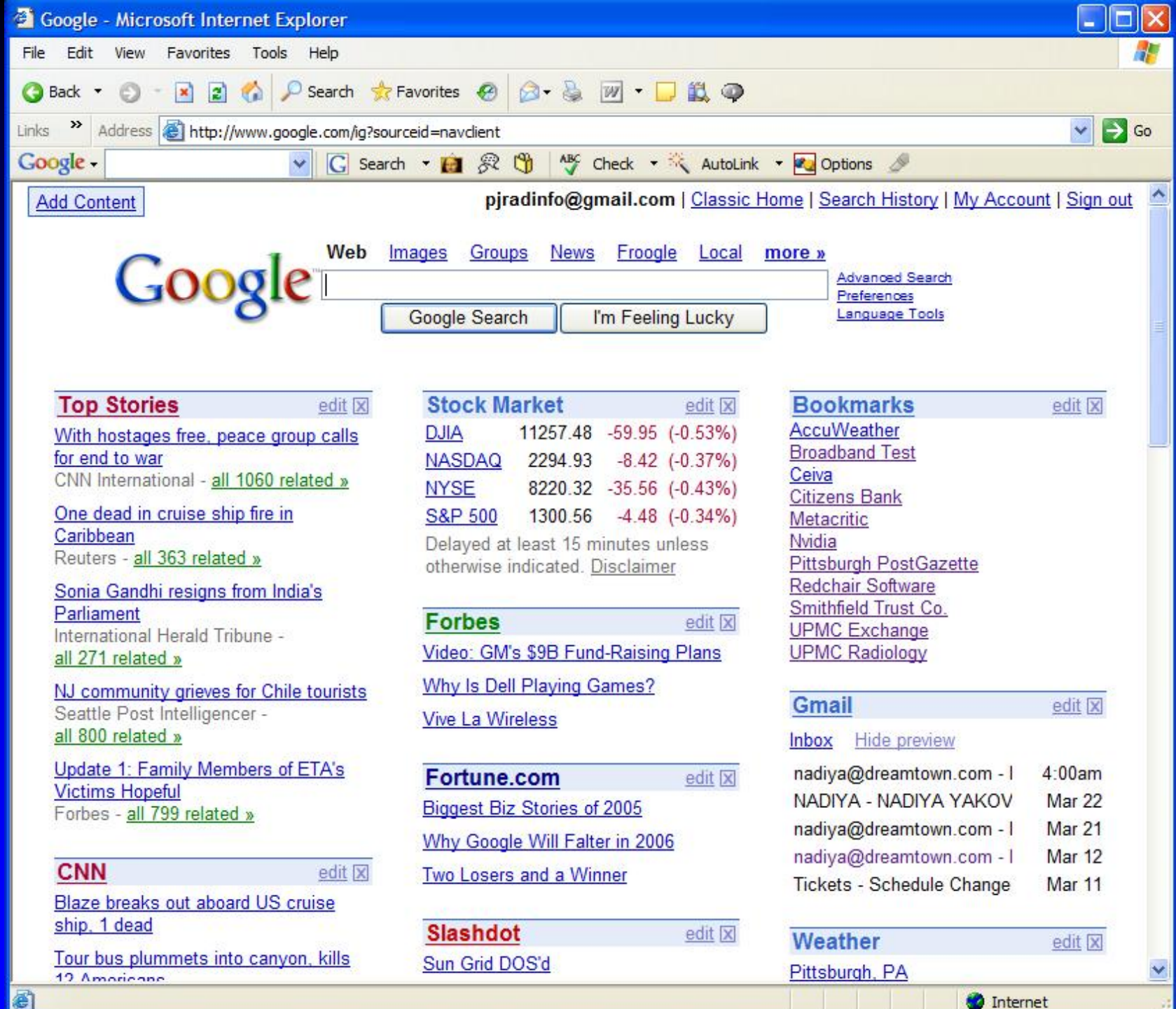
Recommended based on 2 ratings

ecommendations from 93 ratings.

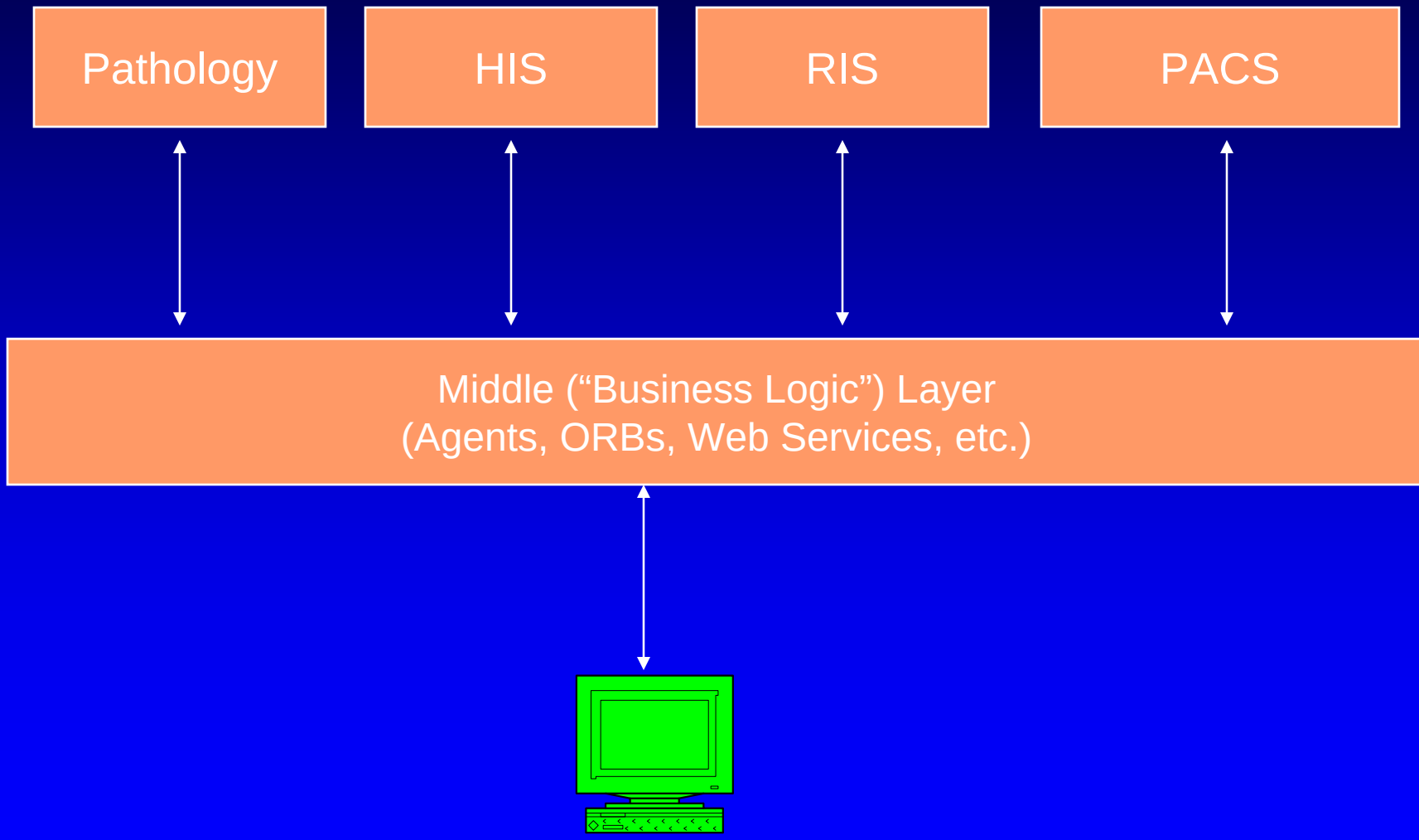
movies in Queue

Genres: (Edit)
Adventure
Animation
Family
Musicals

Internet


Google - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Links Address http://www.google.com/ig?sourceid=navclient
Go
Google Search Check AutoLink Options
Add Content
pjradinfo@gmail.com | Classic Home | Search History | My Account | Sign out
Google
Web Images Groups News Froogle Local more »
Advanced Search
Preferences
Language Tools
Google Search
I'm Feeling Lucky
Top Stories edit
With hostages free, peace group calls for end to war
CNN International - all 1060 related »
One dead in cruise ship fire in Caribbean
Reuters - all 363 related »
Sonia Gandhi resigns from India's Parliament
International Herald Tribune - all 271 related »
NJ community grieves for Chile tourists
Seattle Post Intelligencer - all 800 related »
Update 1: Family Members of ETA's Victims Hopeful
Forbes - all 799 related »
CNN edit
Blaze breaks out aboard US cruise ship, 1 dead
Tour bus plummets into canyon, kills
Stock Market edit
DJIA 11257.48 -59.95 (-0.53%)
NASDAQ 2294.93 -8.42 (-0.37%)
NYSE 8220.32 -35.56 (-0.43%)
S&P 500 1300.56 -4.48 (-0.34%)
Delayed at least 15 minutes unless otherwise indicated. Disclaimer
Forbes edit
Video: GM's $9B Fund-Raising Plans
Why Is Dell Playing Games?
Vive La Wireless
Fortune.com edit
Biggest Biz Stories of 2005
Why Google Will Falter in 2006
Two Losers and a Winner
Slashdot edit
Sun Grid DOS'd
Bookmarks edit
AccuWeather
Broadband Test
Ceiva
Citizens Bank
Metacritic
Nvidia
Pittsburgh PostGazette
Redchair Software
Smithfield Trust Co.
UPMC Exchange
UPMC Radiology
Gmail edit
Inbox Hide preview
nadiya@dreamtown.com - I 4:00am
NADIYA - NADIYA YAKOV Mar 22
nadiya@dreamtown.com - I Mar 21
nadiya@dreamtown.com - I Mar 12
Tickets - Schedule Change Mar 11
Weather edit
Pittsburgh, PA
Internet

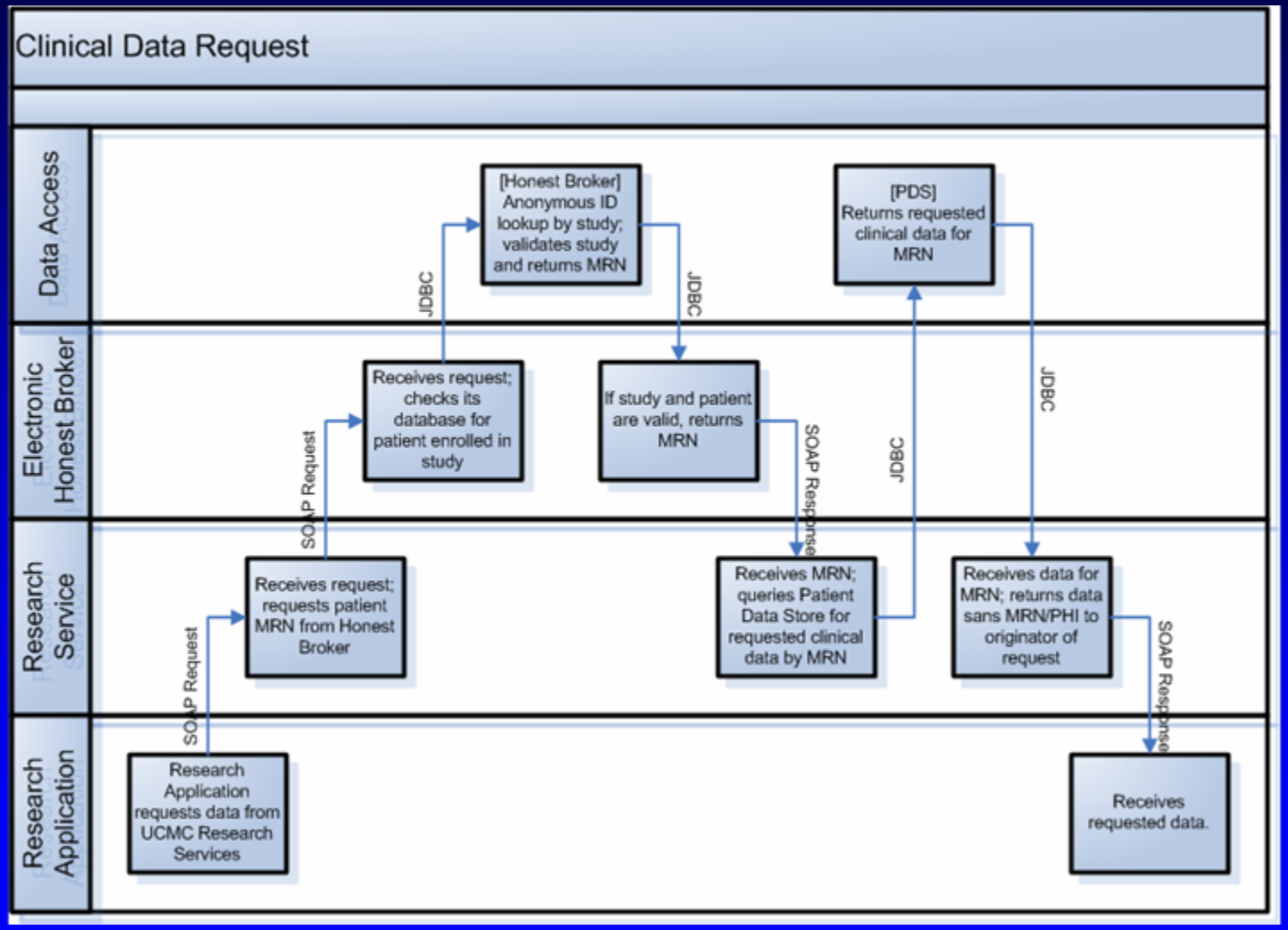
Enterprise Integration Model: Towards a Service Oriented Architecture



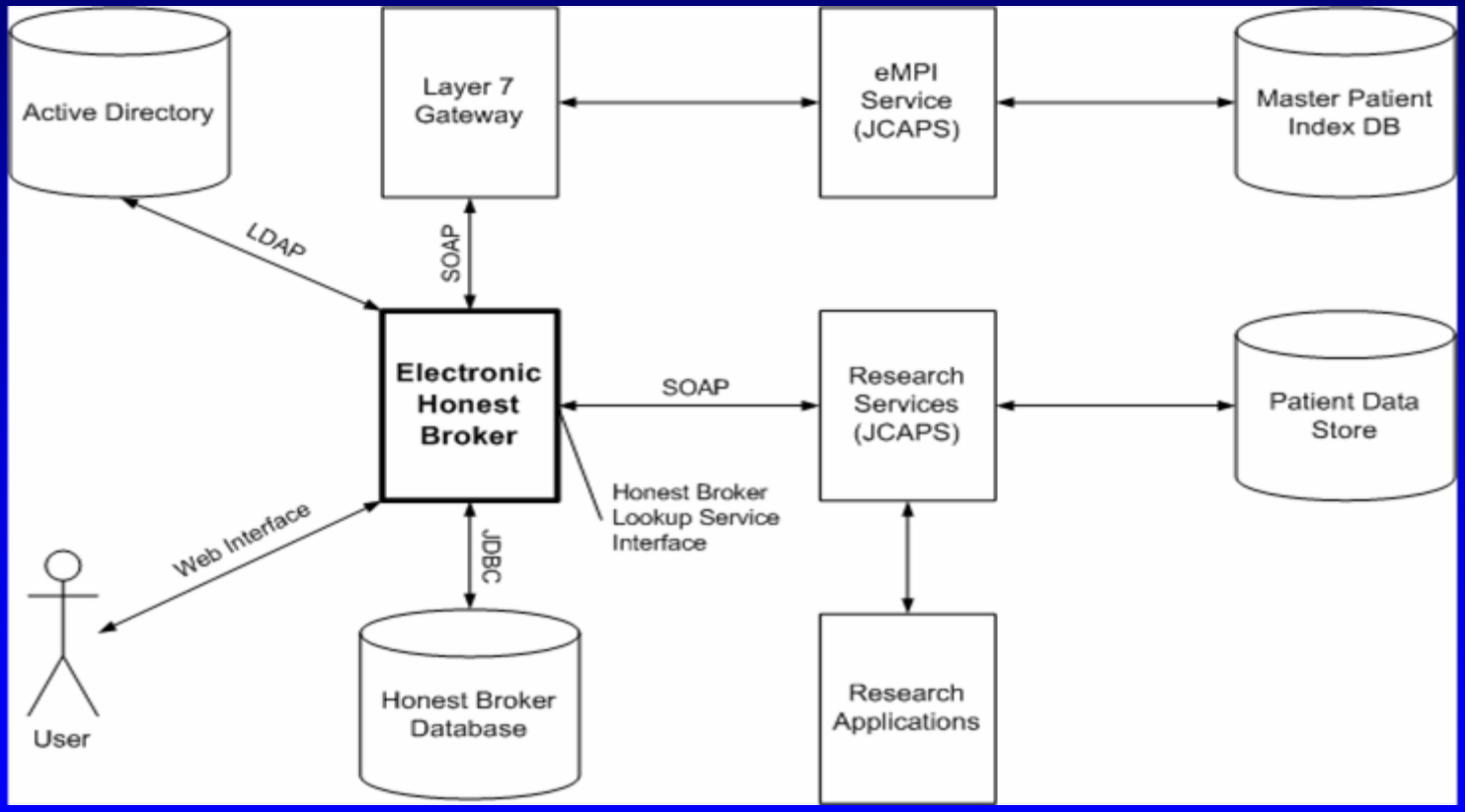
Patient Data Services (Laboratory, Pathology, Radiology)

Electronic Honest Broker

Process Overview



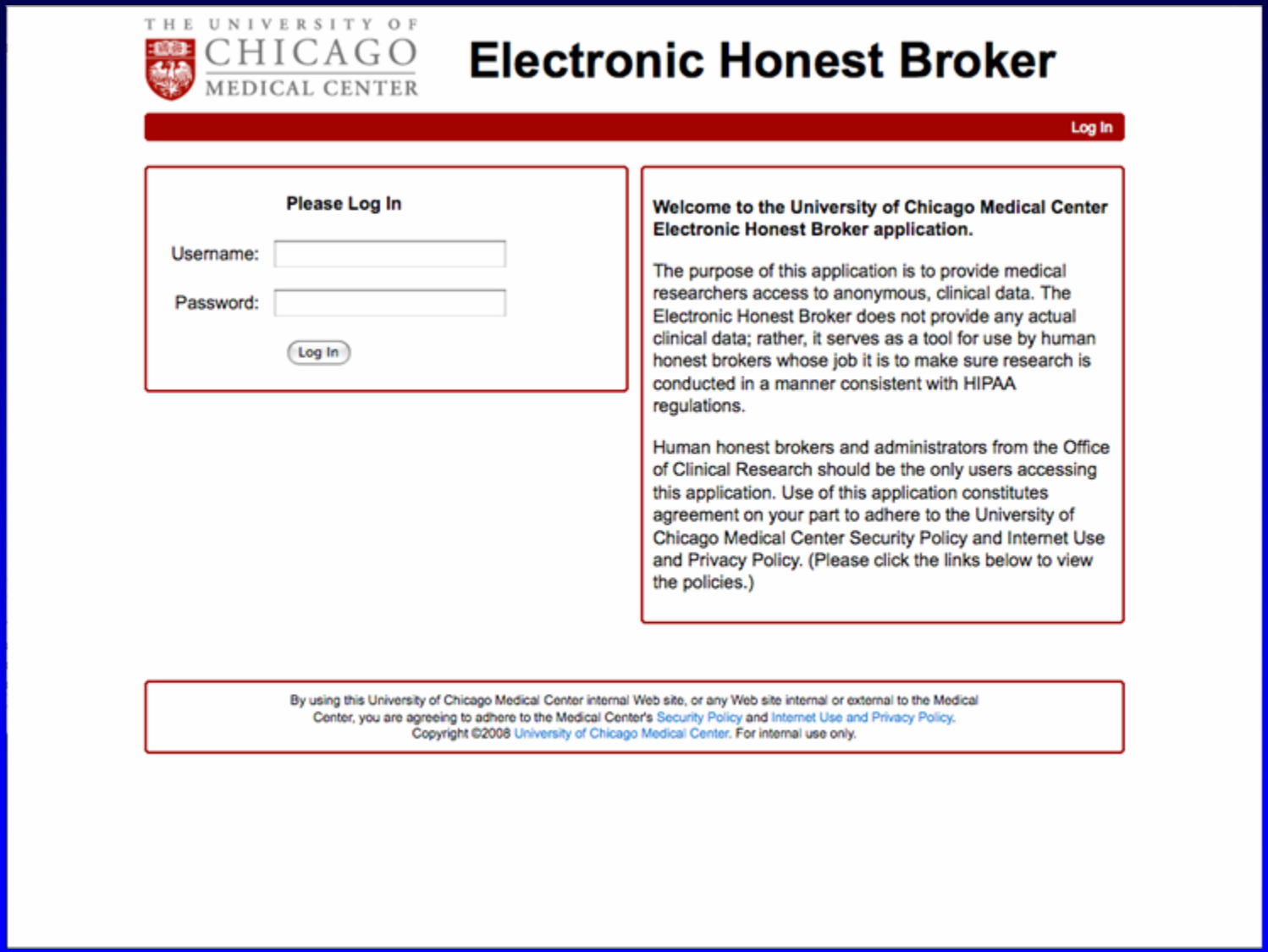
High-Level Logical Architecture



Technologies Overview

- Java – SE6, EE5, JAX-WS 2.1
- SOAP Service and Client – JAX-WS generated from WSDL
- Database agnostic; Oracle implementation
- LDAP agnostic; AD implementation
- Servlet Container agnostic; Tomcat implementation

Login Page


THE UNIVERSITY OF CHICAGO MEDICAL CENTER
Electronic Honest Broker
Log In
Please Log In
Username:
Password:
Log In
Welcome to the University of Chicago Medical Center Electronic Honest Broker application.
The purpose of this application is to provide medical researchers access to anonymous, clinical data. The Electronic Honest Broker does not provide any actual clinical data; rather, it serves as a tool for use by human honest brokers whose job it is to make sure research is conducted in a manner consistent with HIPAA regulations.
Human honest brokers and administrators from the Office of Clinical Research should be the only users accessing this application. Use of this application constitutes agreement on your part to adhere to the University of Chicago Medical Center Security Policy and Internet Use and Privacy Policy. (Please click the links below to view the policies.)
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Electronic Honest Broker

Active Studies

Study #	Title	Expiration	

Administrative Functions

- Enter a New Study
- User Administration
- Role Administration
- View Logs

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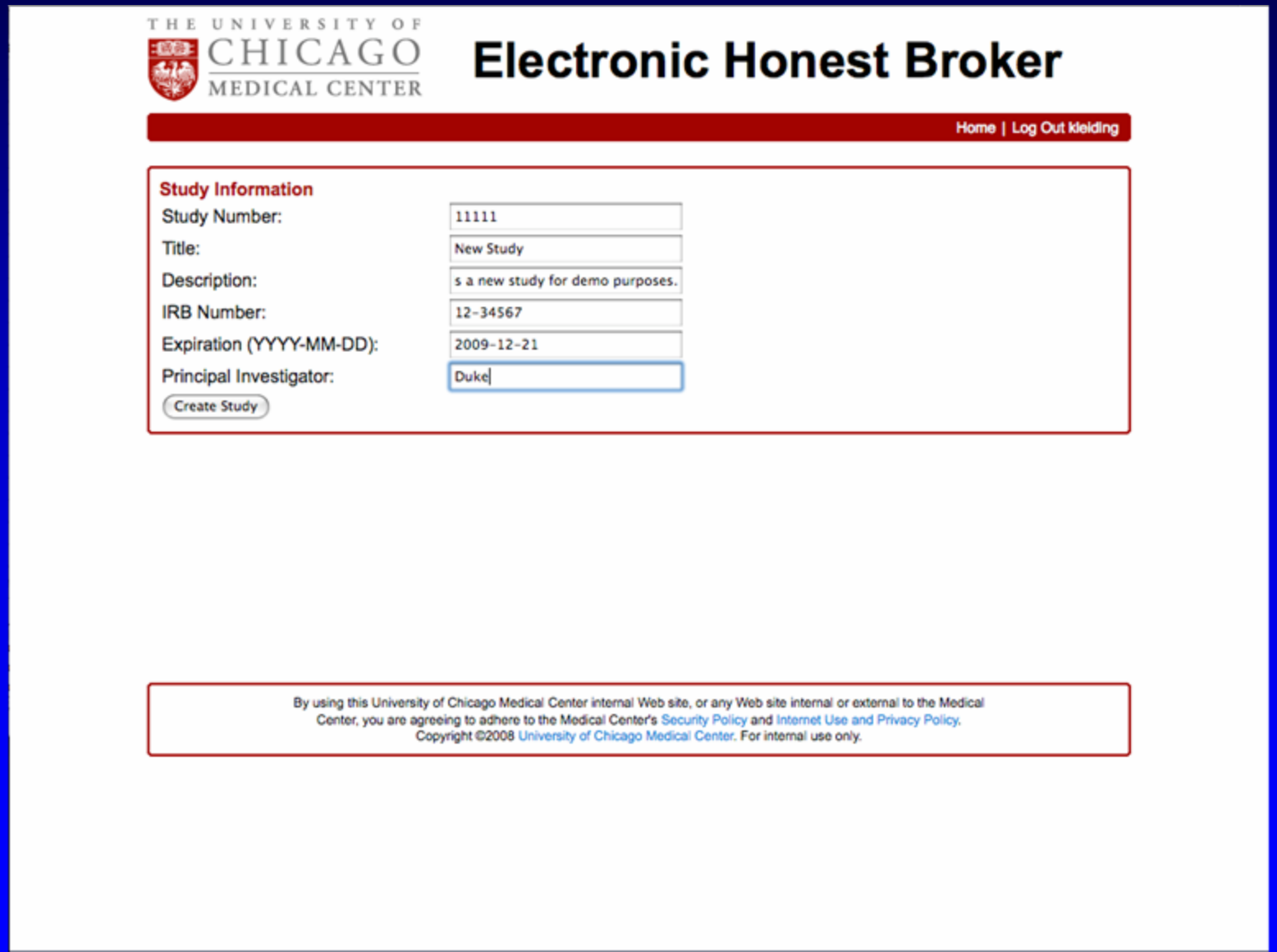
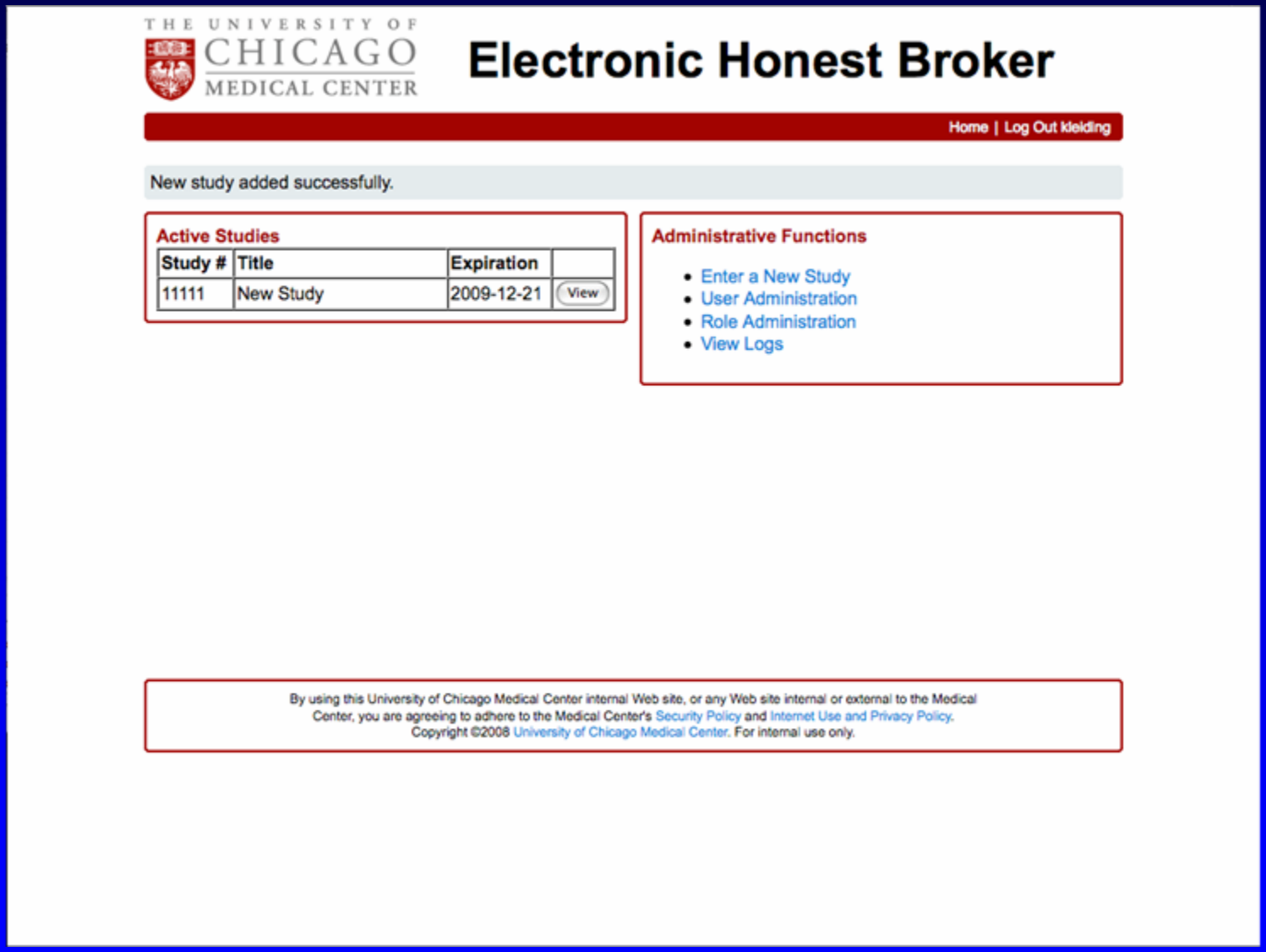
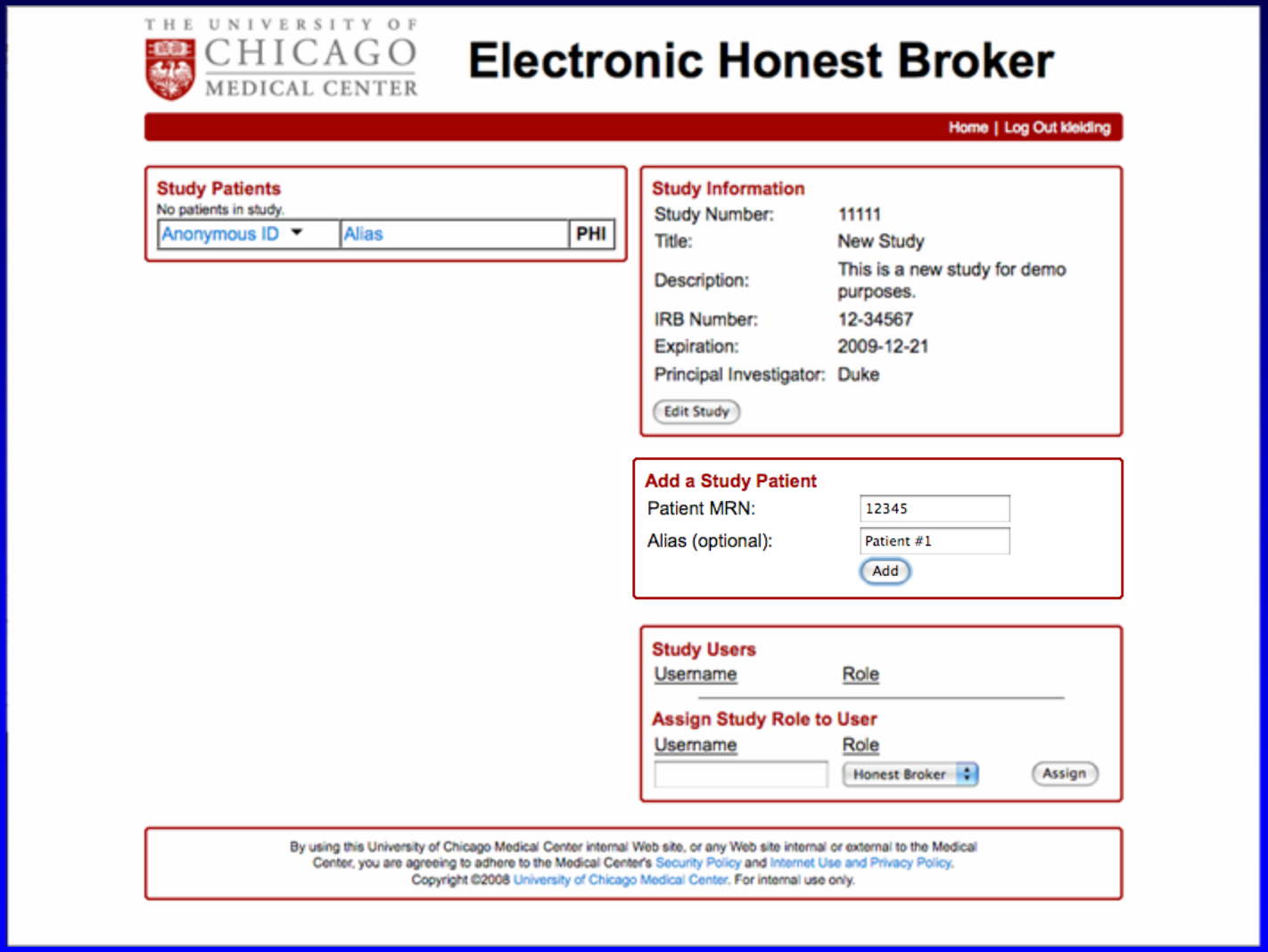
Electronic Honest Broker: Add Study



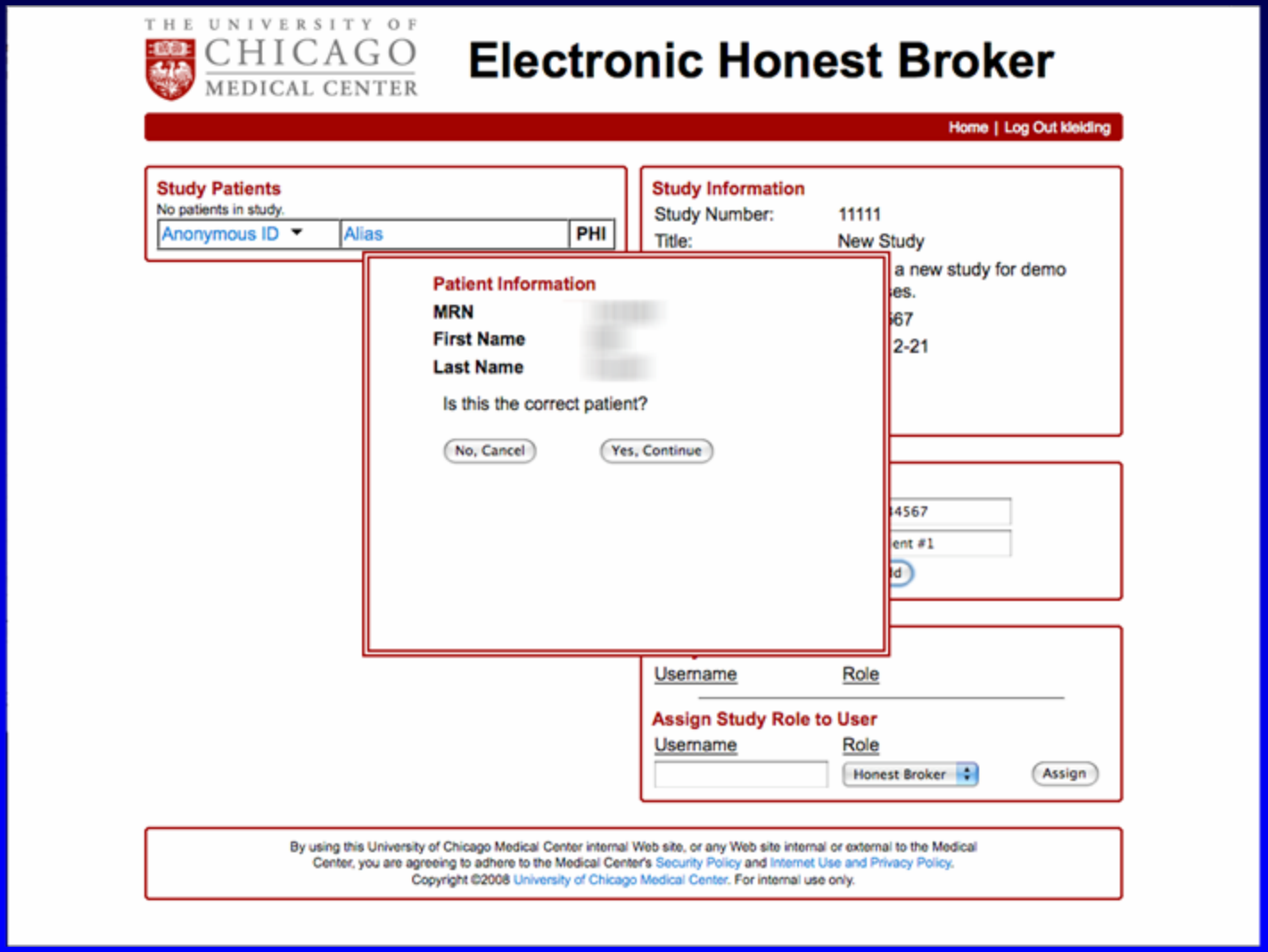
Electronic Honest Broker: New Study Added



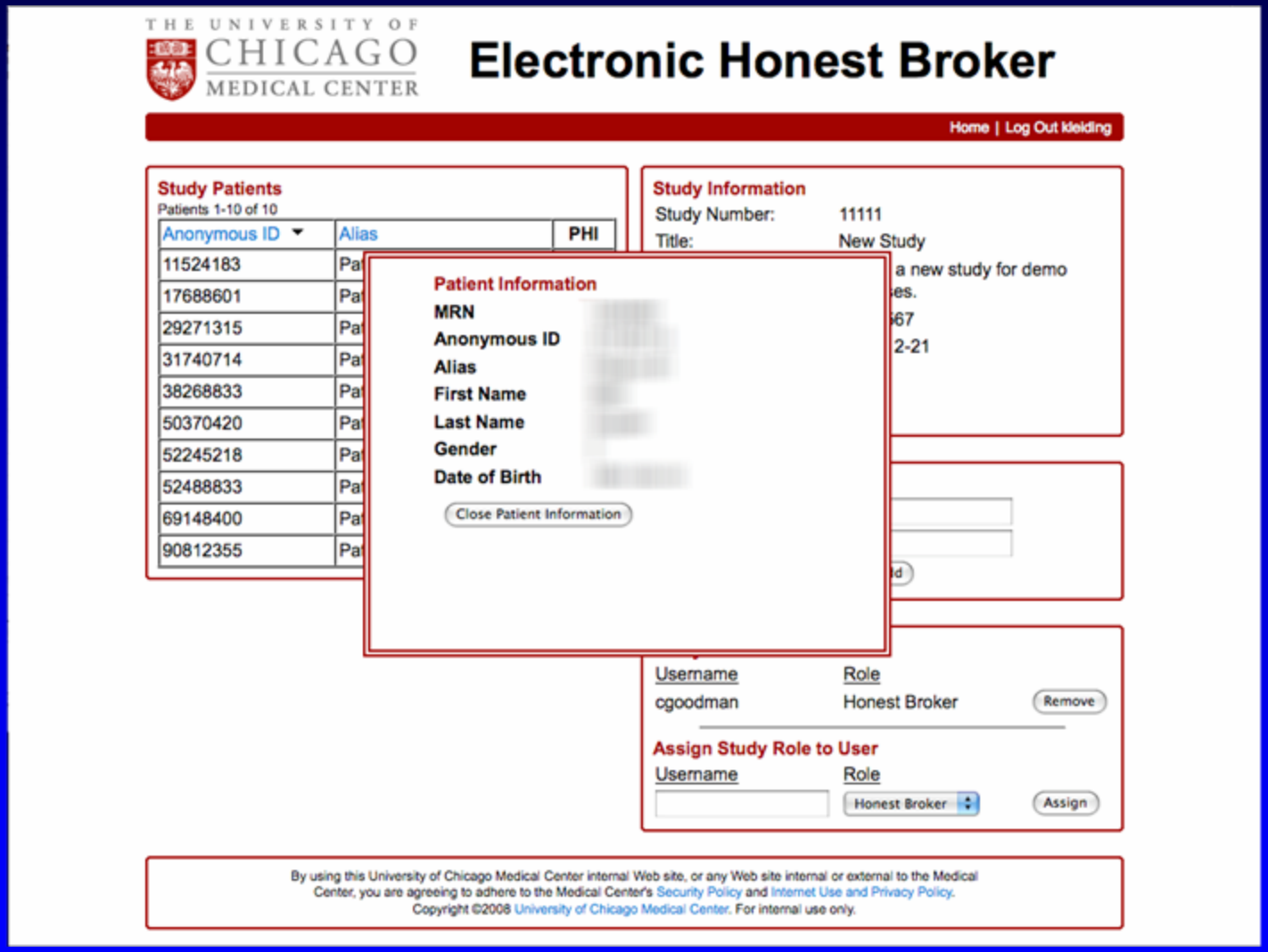
Electronic Honest Broker: Adding a New Patient



Electronic Honest Broker: Verify Patient



Viewing PHI


THE UNIVERSITY OF CHICAGO MEDICAL CENTER
Electronic Honest Broker
Home | Log Out kleiding
Study Patients
Patients 1-10 of 10
Anonymous ID
Alias
PHI
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31740714
38268833
50370420
52245218
52488833
69148400
90812355
Patient Information
MRN
Anonymous ID
Alias
First Name
Last Name
Gender
Date of Birth
Close Patient Information
Study Information
Study Number: 11111
Title: New Study
a new study for demo
Username
Role
cgoodman
Honest Broker
Remove
Assign Study Role to User
Username
Role
Honest Broker
Assign
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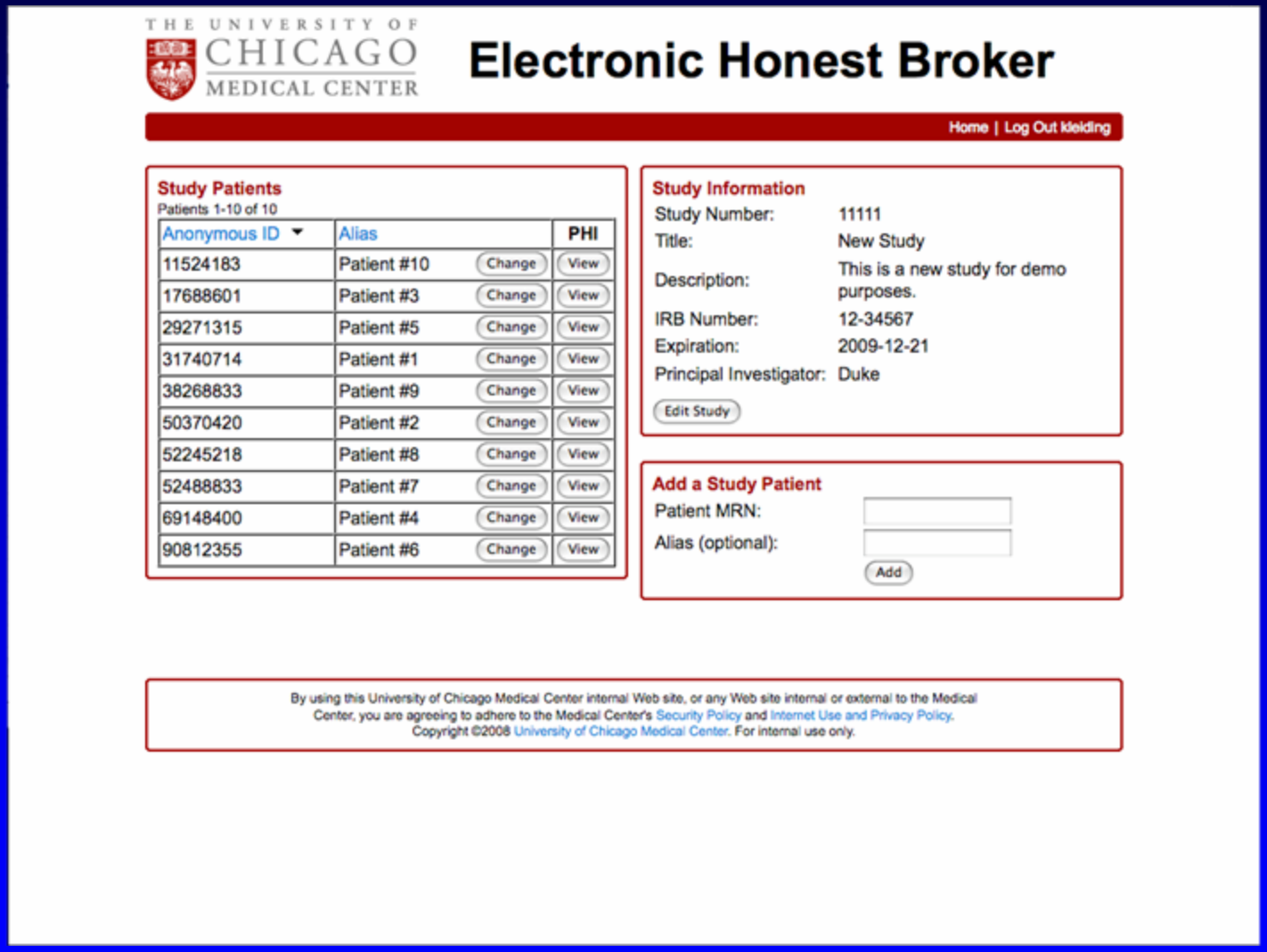
Honest Broker Study View

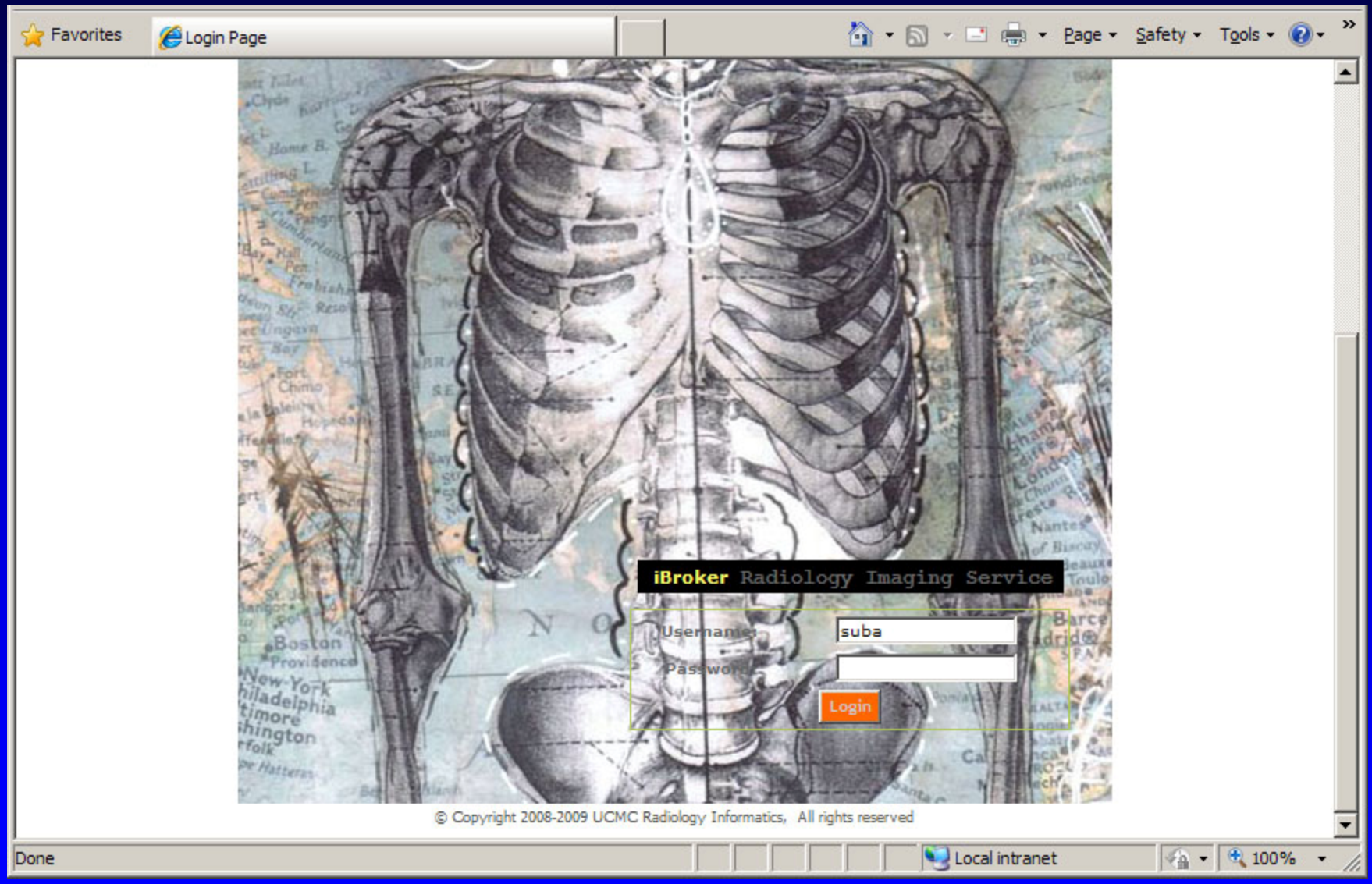


DICOM iBroker

DICOM iBroker

- A portal and related services that provide end-users simple and powerful HIPAA compliant access to clinical image datasets
- Leverages Electronic Honest Broker

DICOM iBroker



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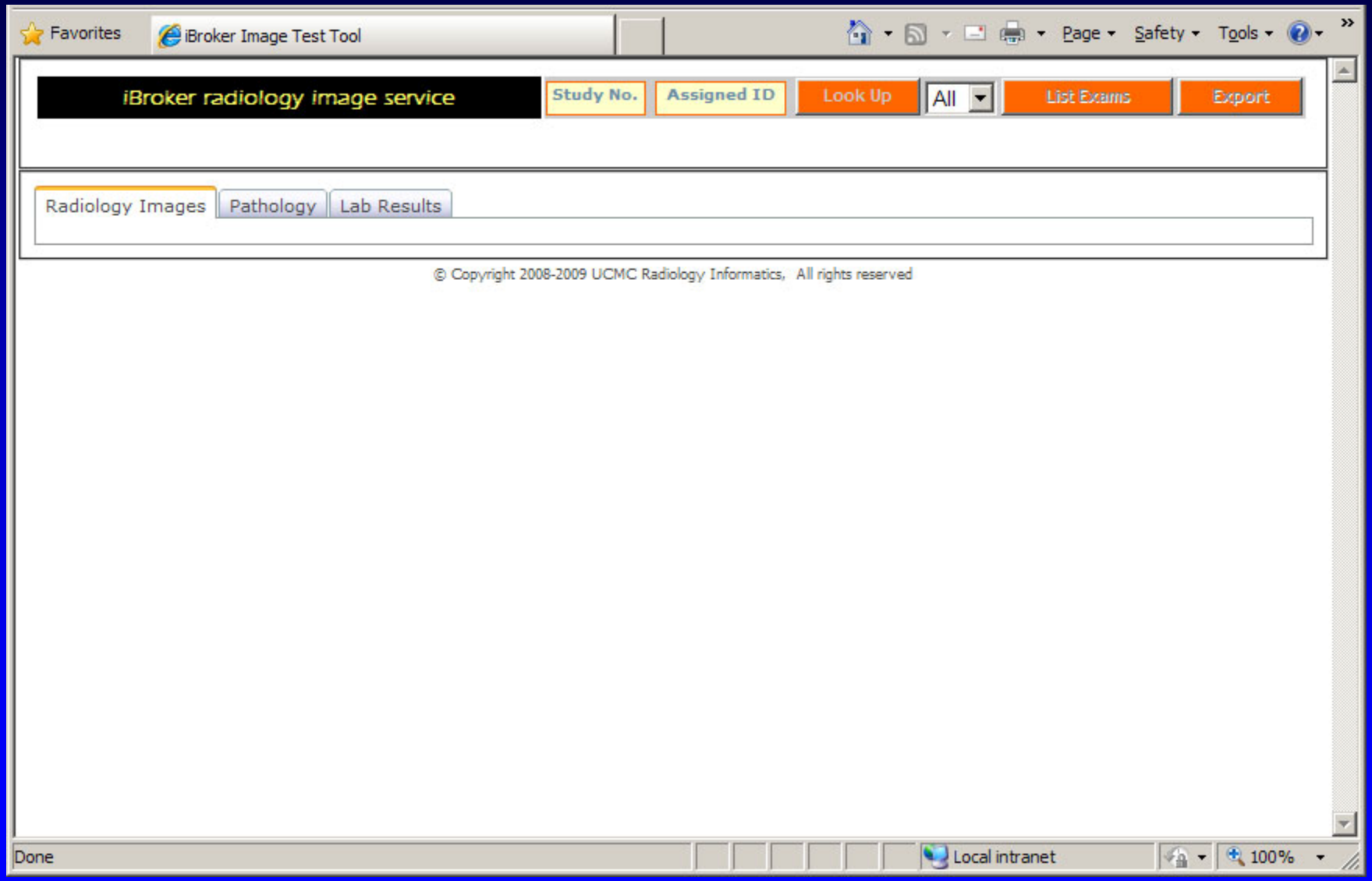

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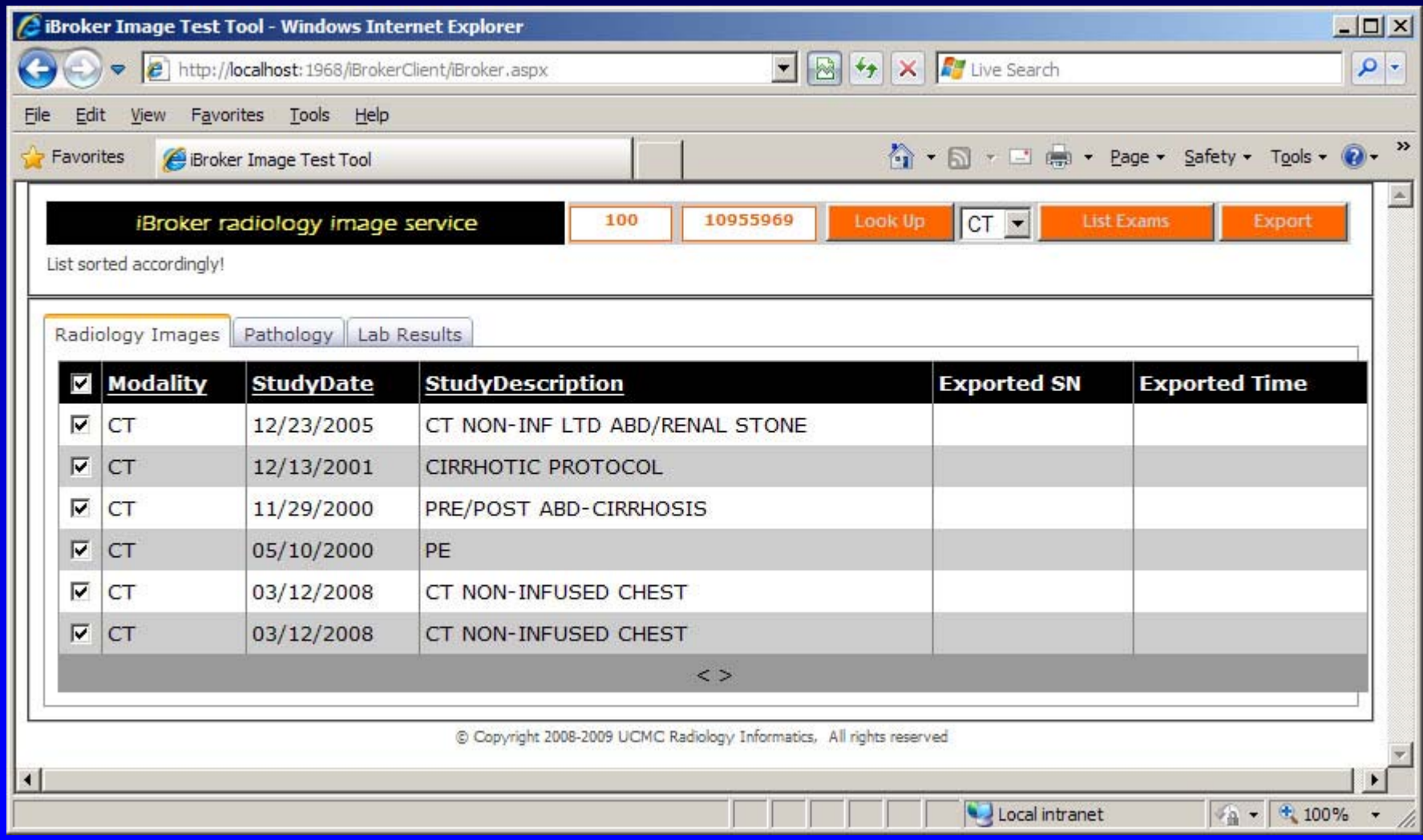

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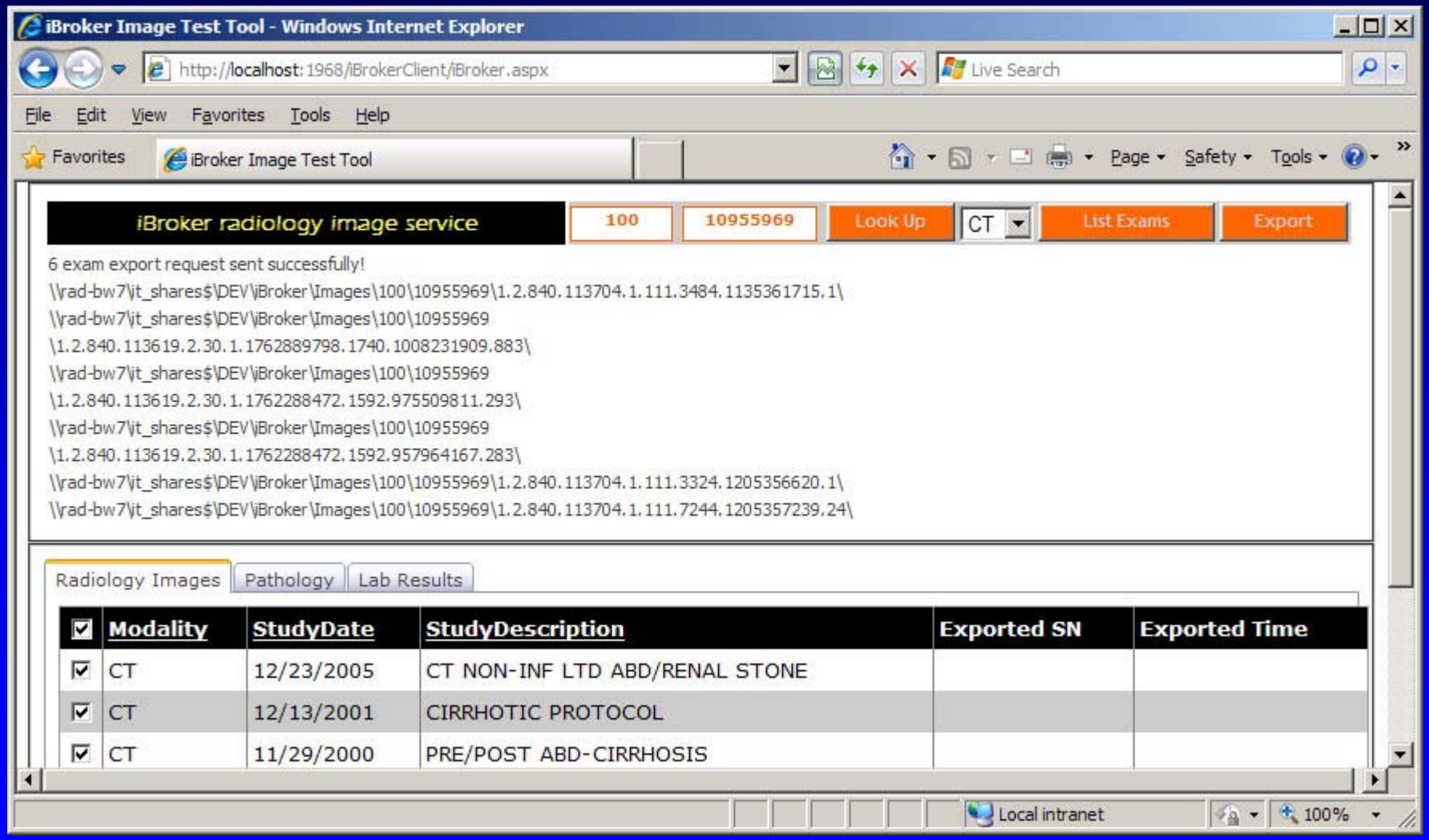

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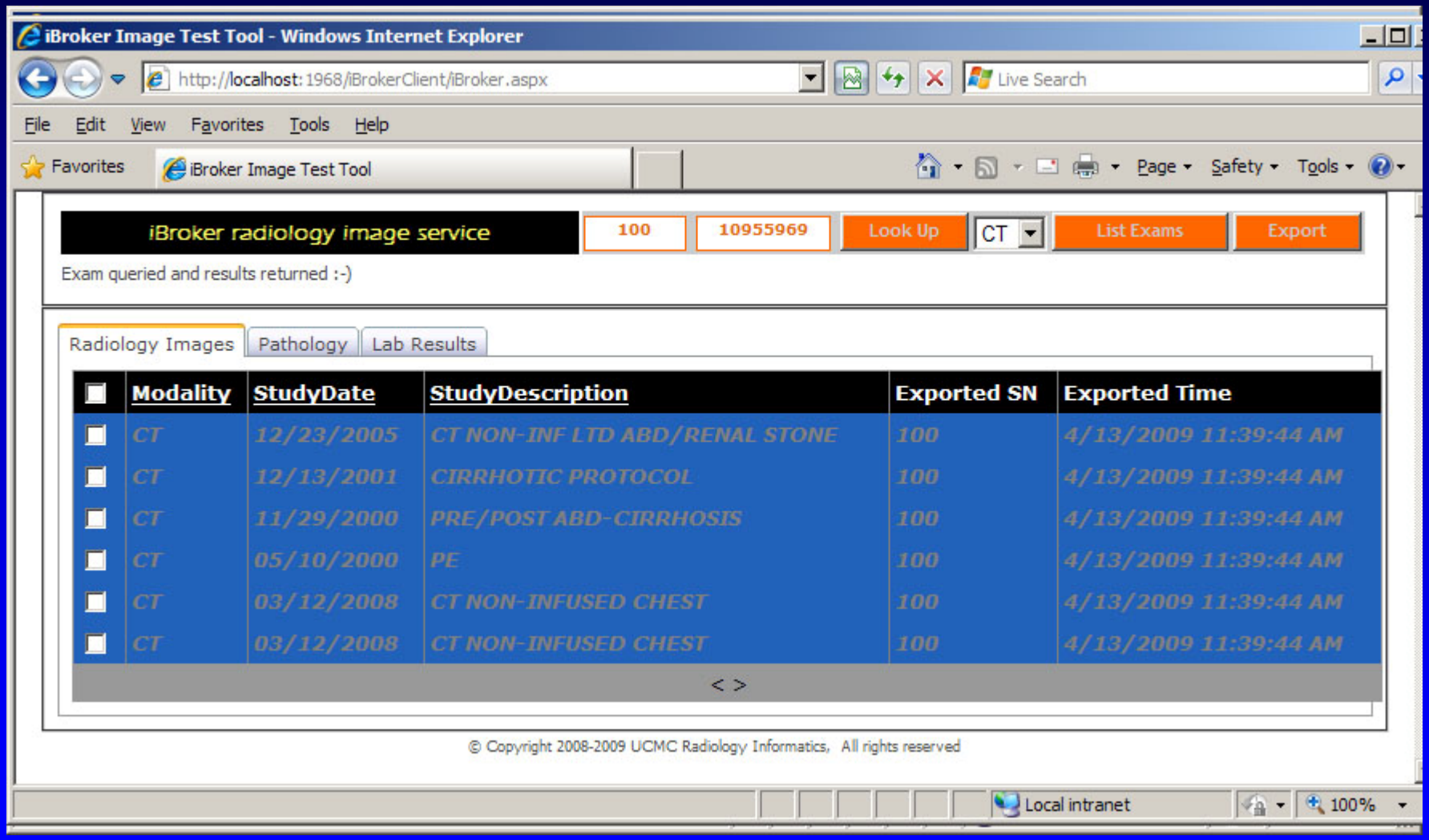

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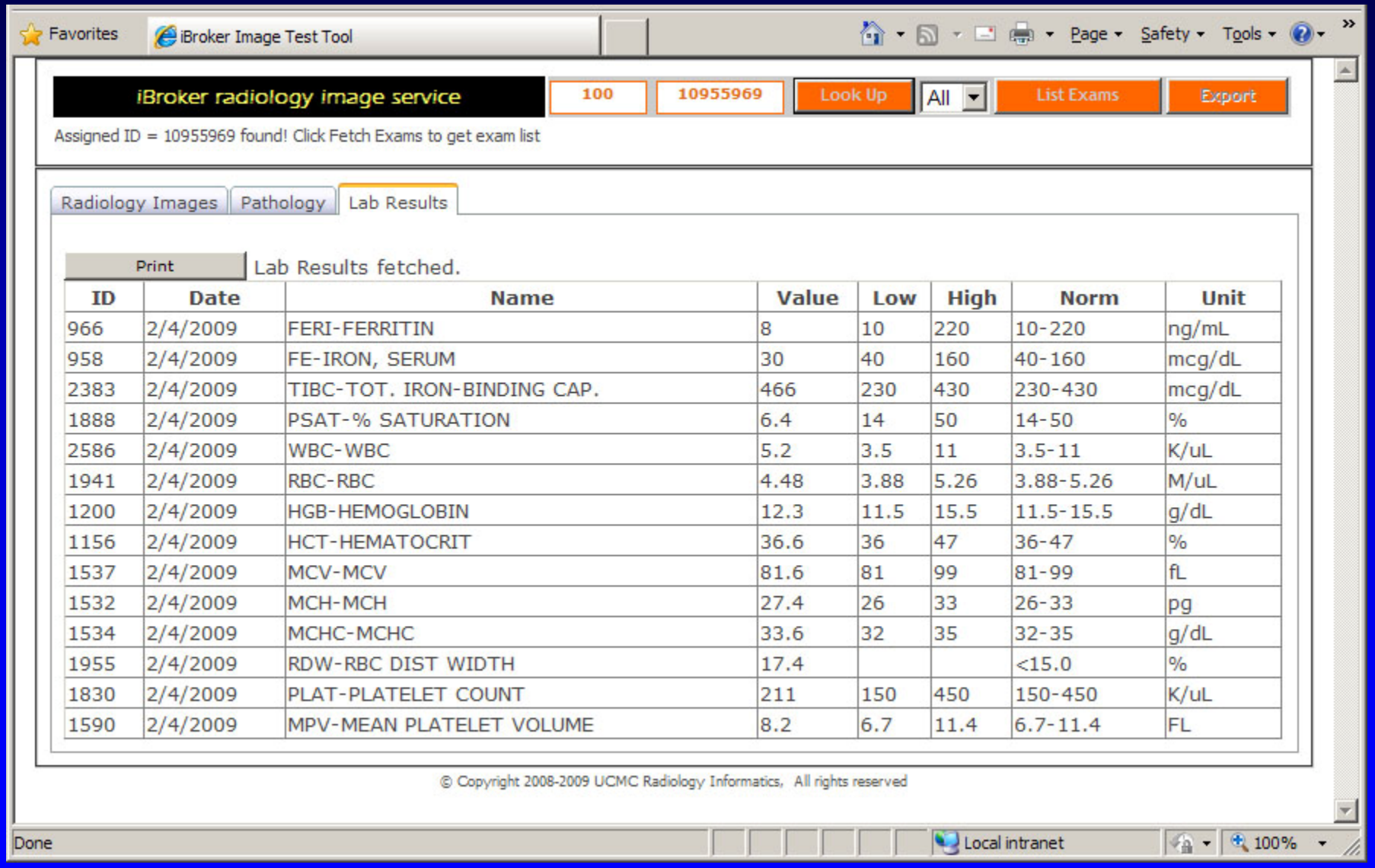
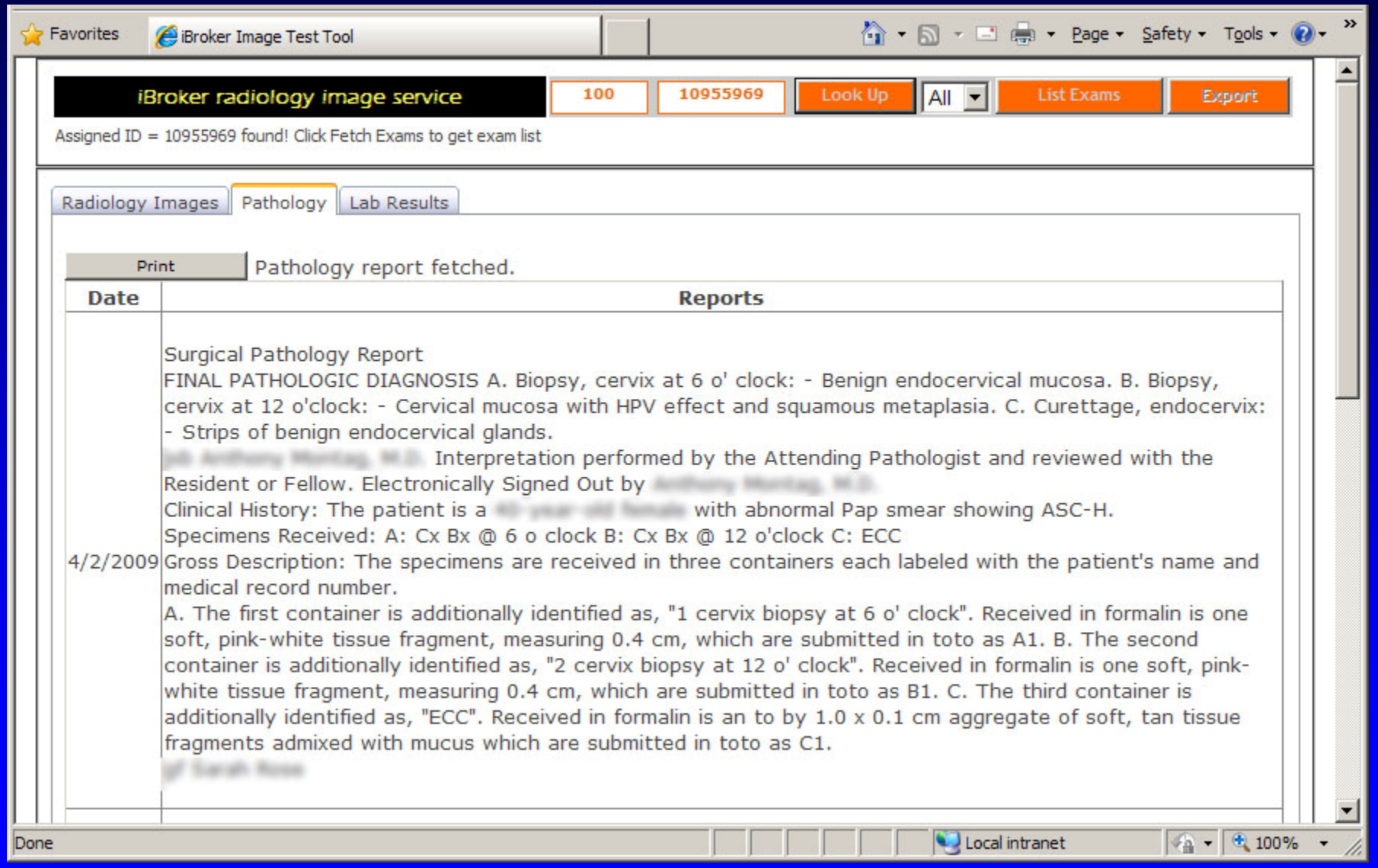
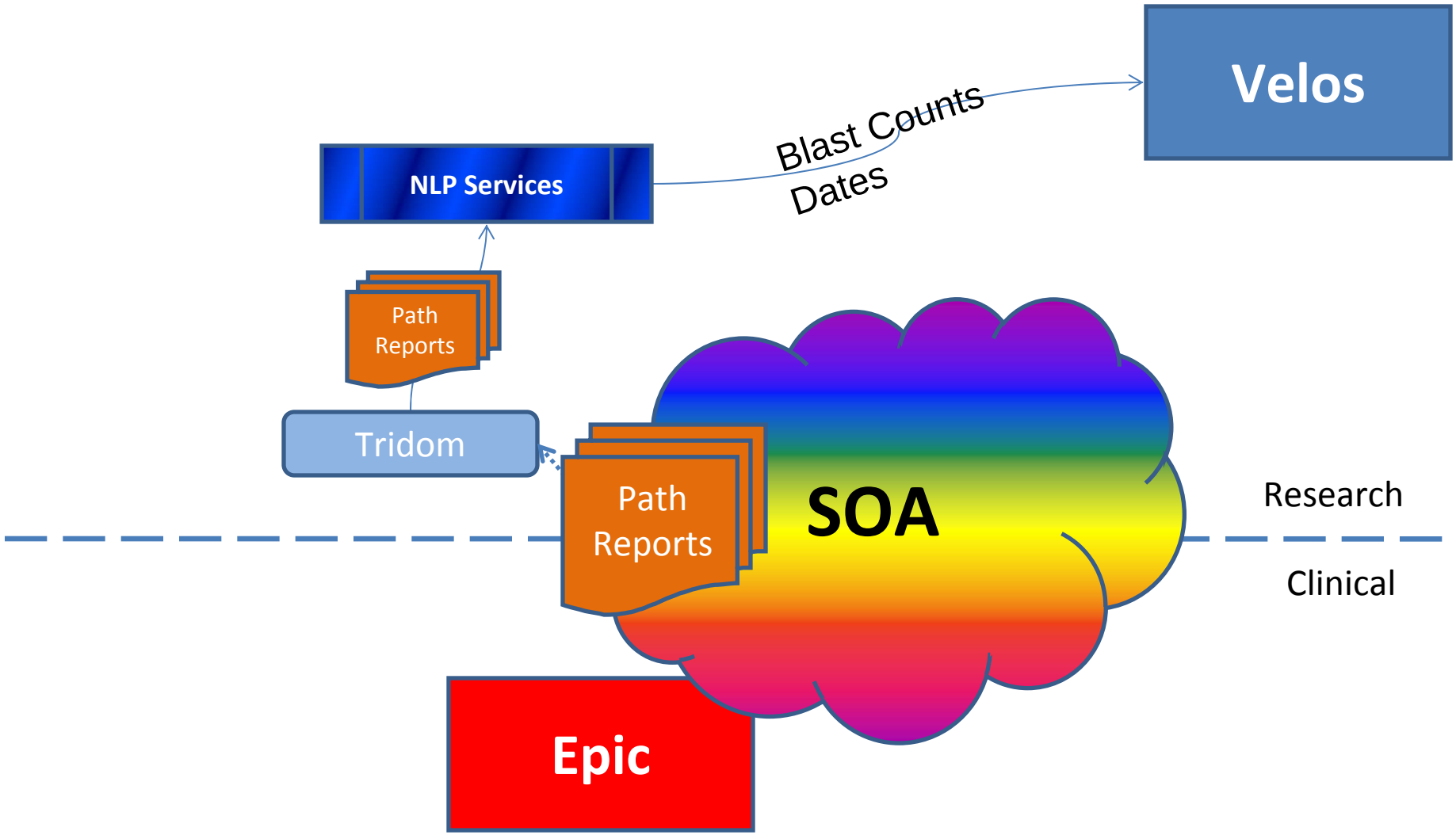


ID	Date	Name	Value	Low	High	Norm	Unit
966	2/4/2009	FERI-FERRITIN	8	10	220	10-220	ng/mL
958	2/4/2009	FE-IRON, SERUM	30	40	160	40-160	mcg/dL
2383	2/4/2009	TIBC-TOT. IRON-BINDING CAP.	466	230	430	230-430	mcg/dL
1888	2/4/2009	PSAT-% SATURATION	6.4	14	50	14-50	%
2586	2/4/2009	WBC-WBC	5.2	3.5	11	3.5-11	K/uL
1941	2/4/2009	RBC-RBC	4.48	3.88	5.26	3.88-5.26	M/uL
1200	2/4/2009	HGB-HEMOGLOBIN	12.3	11.5	15.5	11.5-15.5	g/dL
1156	2/4/2009	HCT-HEMATOCRIT	36.6	36	47	36-47	%
1537	2/4/2009	MCV-MCV	81.6	81	99	81-99	fL
1532	2/4/2009	MCH-MCH	27.4	26	33	26-33	pg
1534	2/4/2009	MCHC-MCHC	33.6	32	35	32-35	g/dL
1955	2/4/2009	RDW-RBC DIST WIDTH	17.4			<15.0	%
1830	2/4/2009	PLAT-PLATELET COUNT	211	150	450	150-450	K/uL
1590	2/4/2009	MPV-MEAN PLATELET VOLUME	8.2	6.7	11.4	6.7-11.4	FL

DICOM iBroker



First integrated use of SOA



caBIG

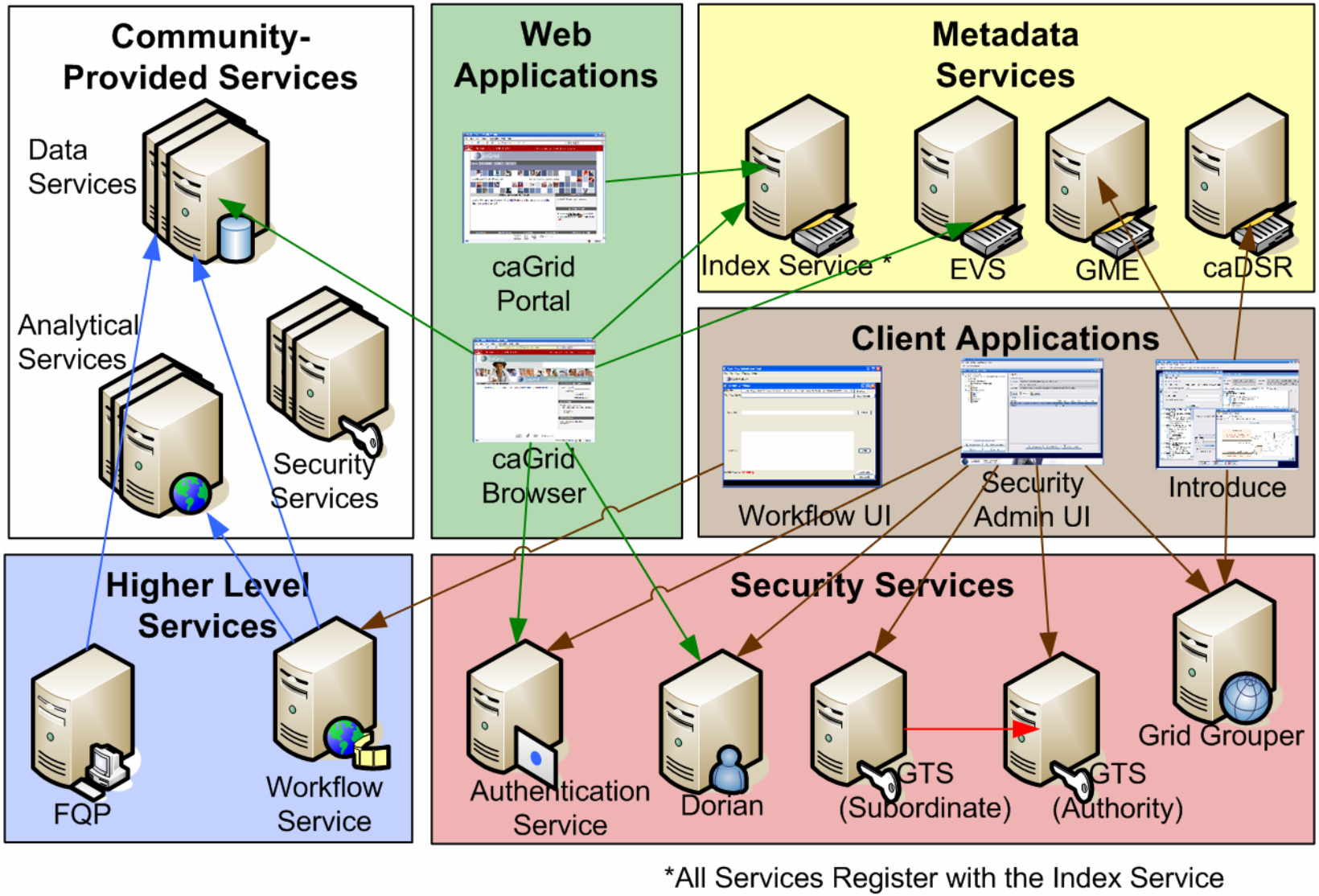
- caBIG uses caGrid as the foundation which uses various components of Globus Toolkit
  - WS-RF Framework
  - Security Framework
  - Index Service
- We lead the Workflow Project of caGrid
- We are part of the Architecture workspace

Acknowledgement: Ravi Madduri

UCCRC-caBIG

- We have a caGrid node up and running on caBIG
- We evaluated caArray and we deployed it in UCCRC
- We are working with Velos in an effort to do CDUS submissions using a caGrid Service

caGrid Environment



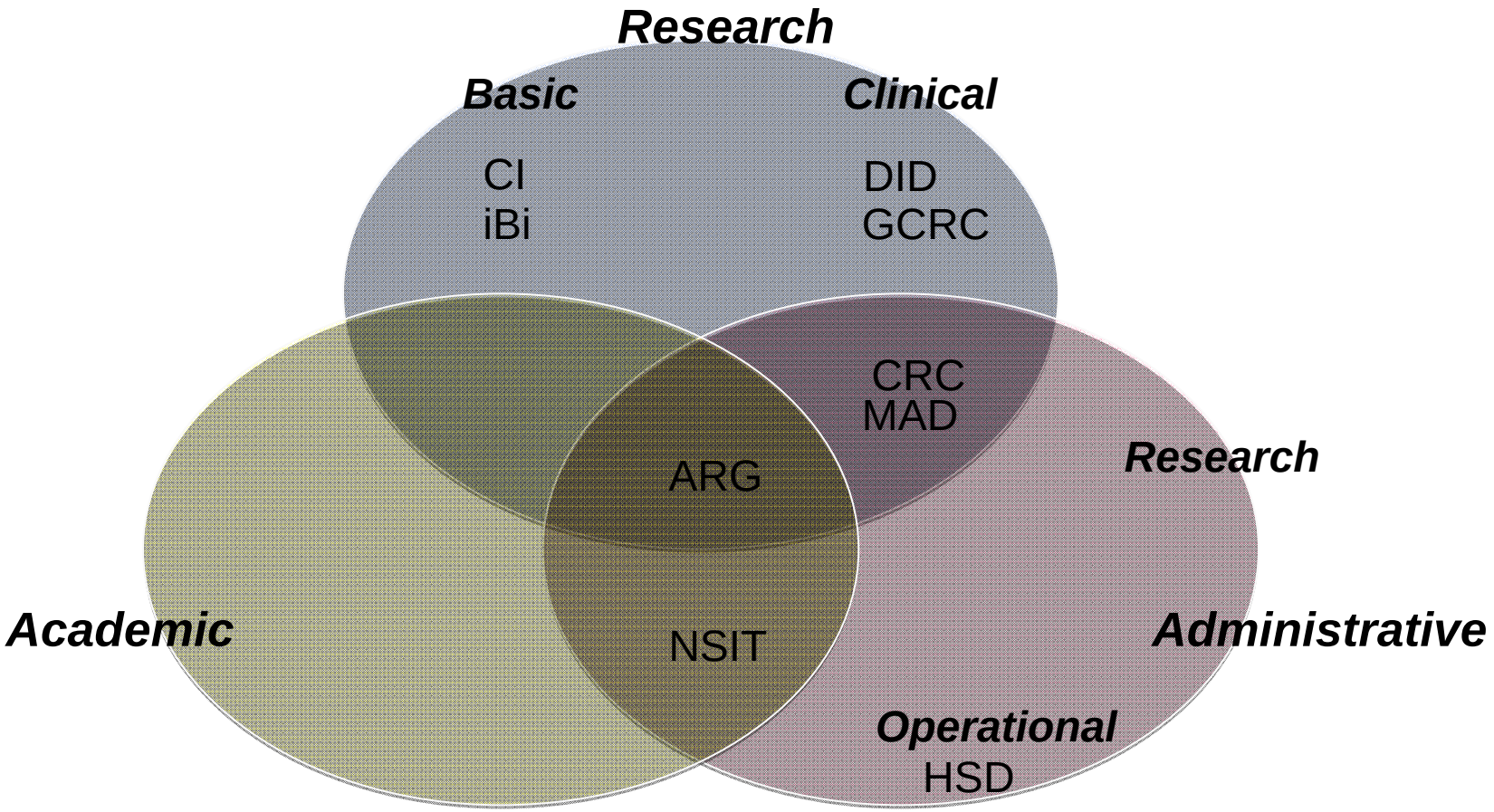
IRIS

Integrated Research Information Services

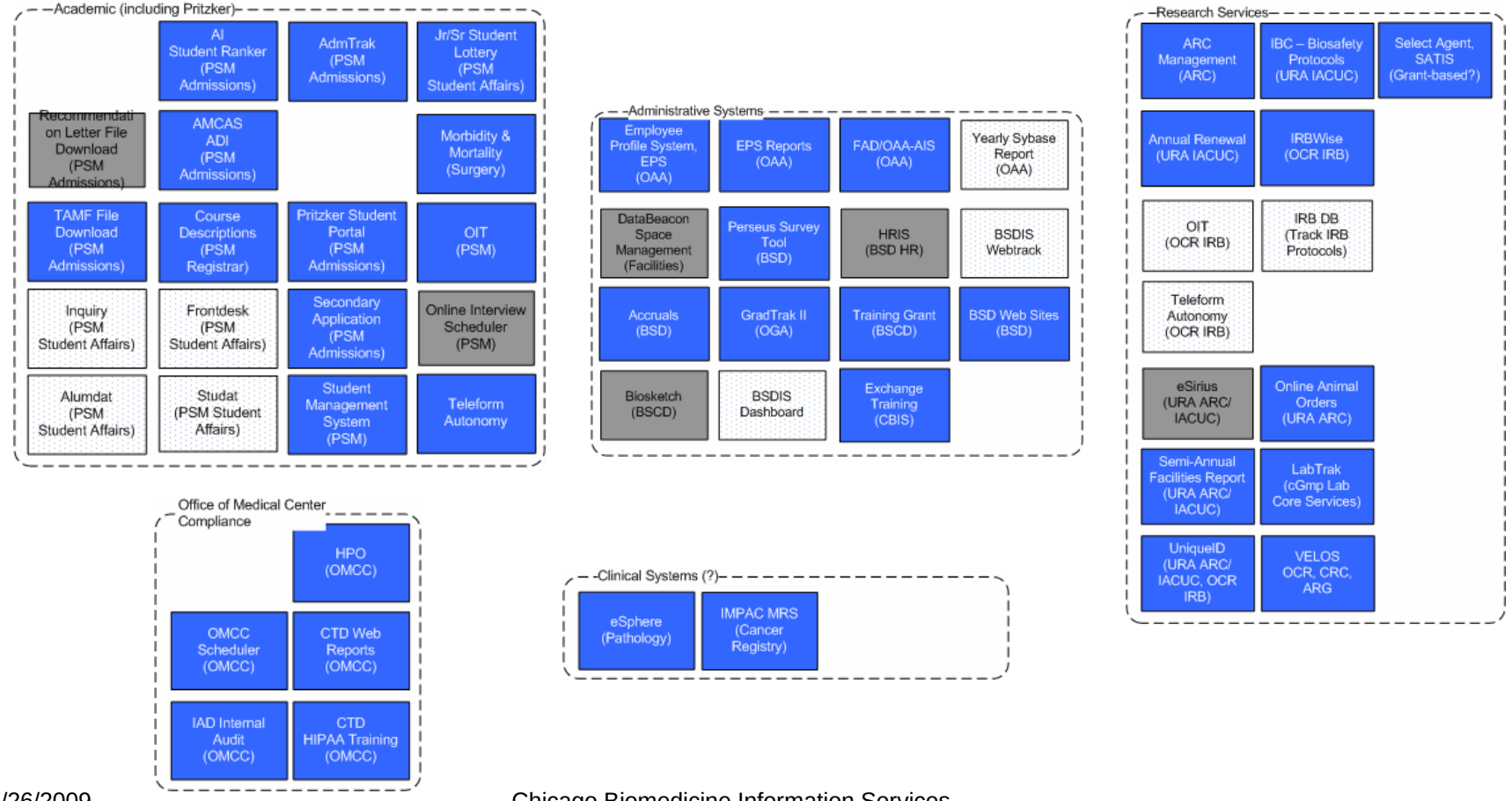
Current IT Research Environment

- ARG – Academic and Research Group (PSMTrak,
- CI – Computational Institute (TRAM)
- CRC – Cancer Research Center (Velos)
- DID – Development, Integration & Databases (Clinical SOA)
- HSD – Health Studies Department (Sandstone)
- iBi – Institute for BioInformatics
- MAD – Medicine Application Developers (TRIDOM)
- NSIT – Networking Services and Information Technologies

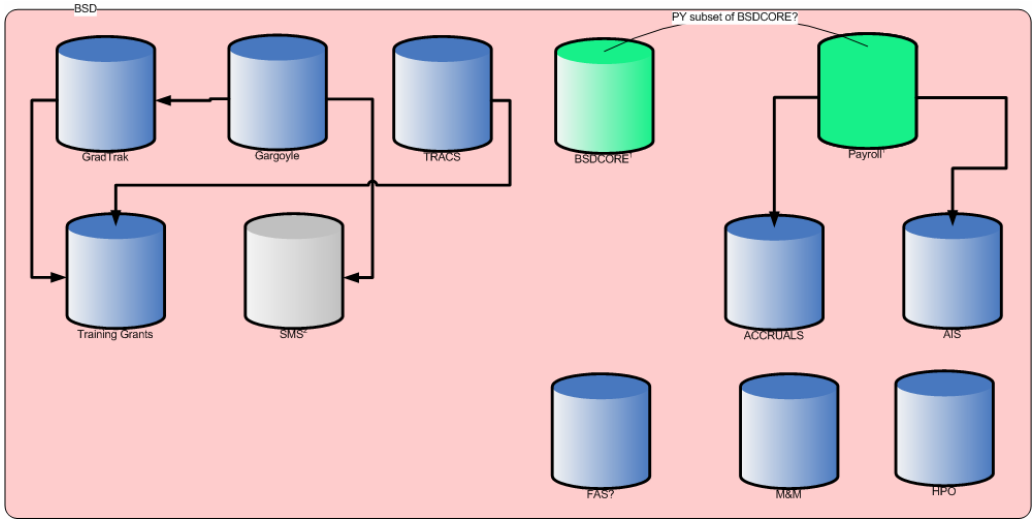
Functional Academic & Research Domains



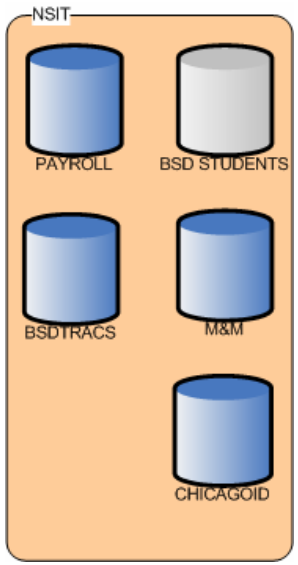
Current ARG Applications & Systems



Current Databases and Feeds

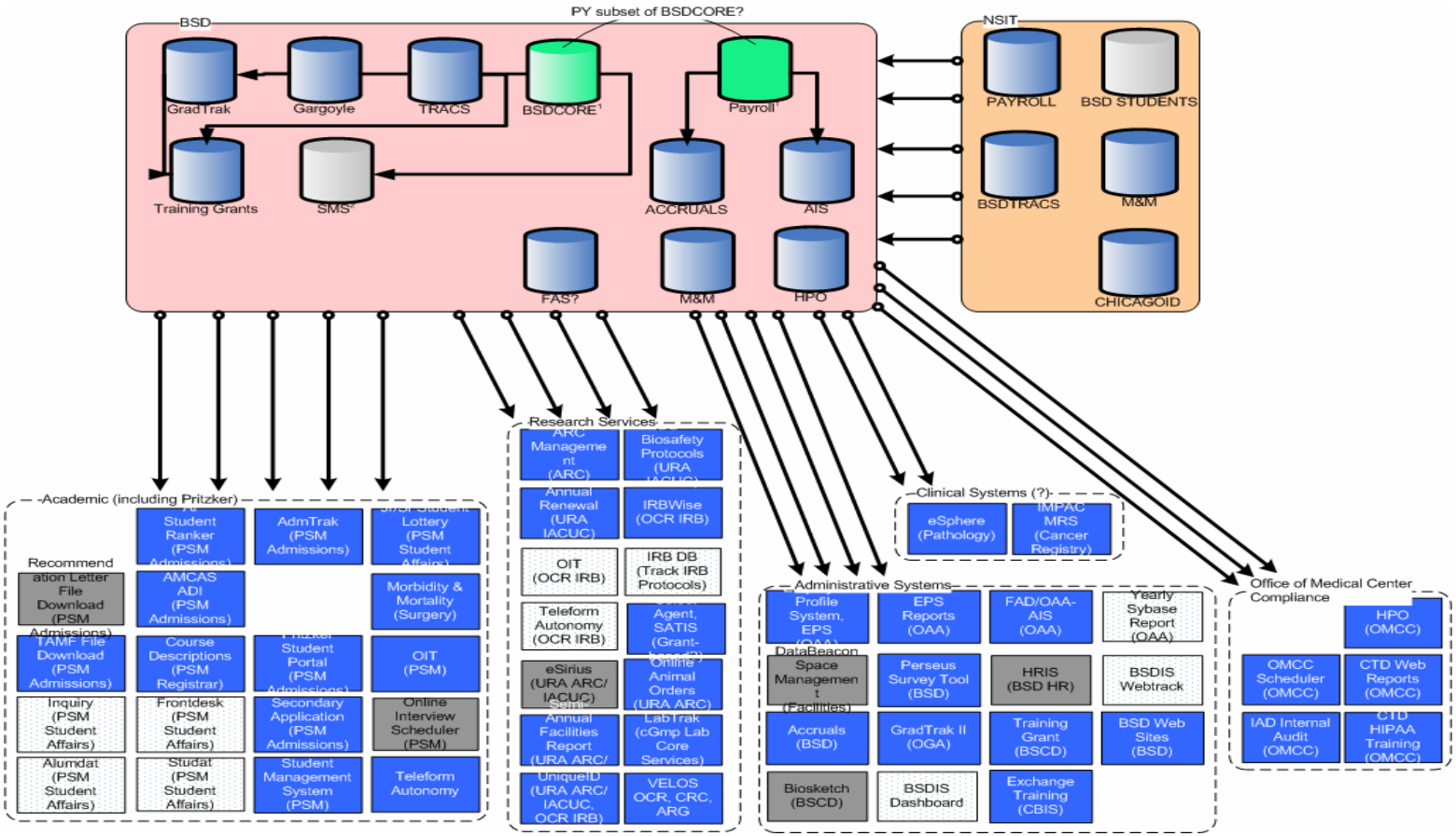


BSD

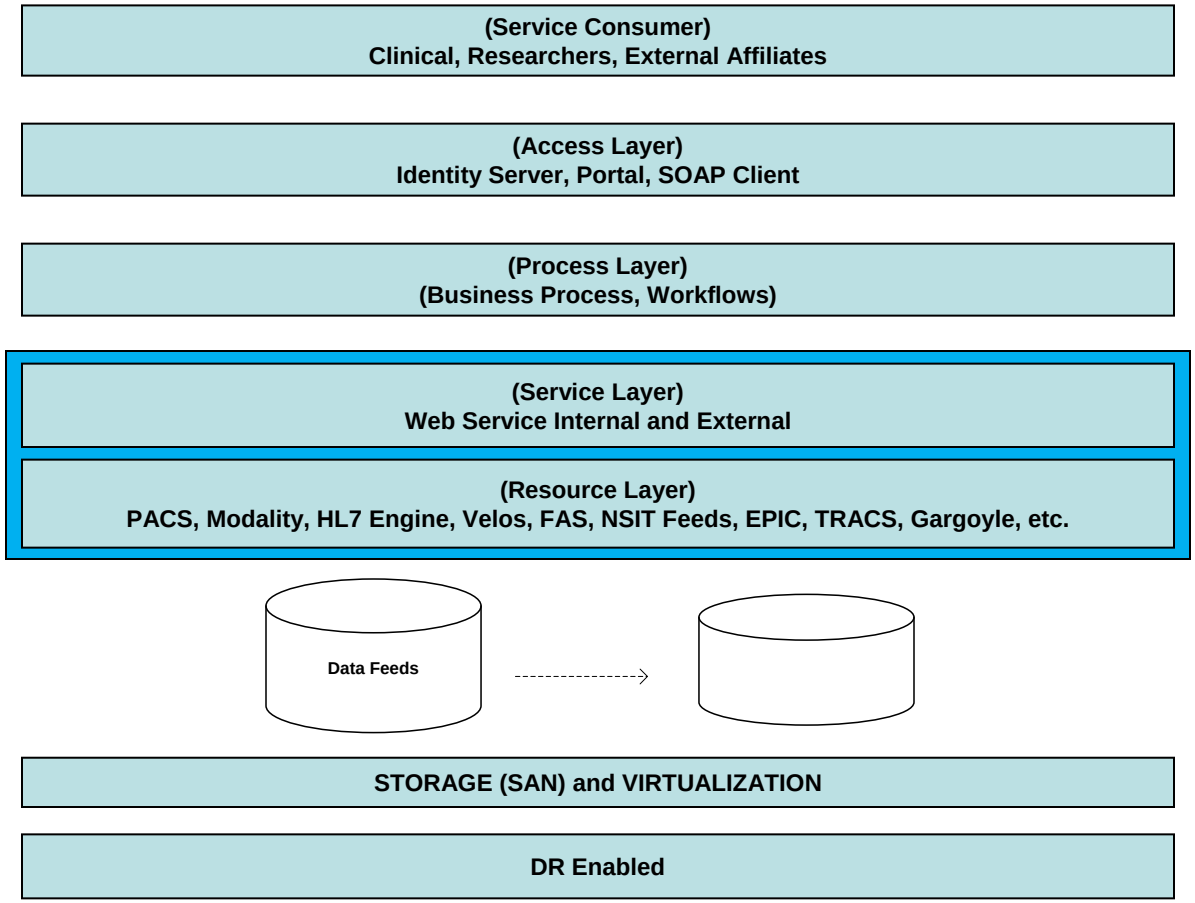


NSIT

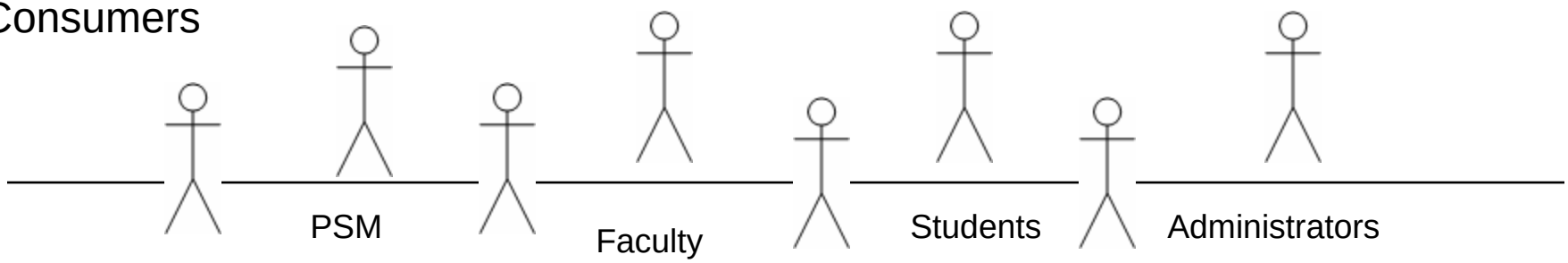
ARG Ecosystem



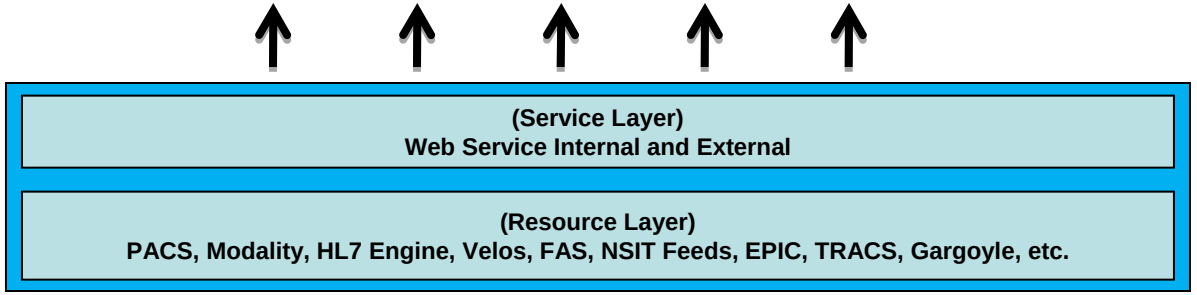
SOA Layers


(Service Consumer)
Clinical, Researchers, External Affiliates
(Access Layer)
Identity Server, Portal, SOAP Client
(Process Layer)
(Business Process, Workflows)
IRIS
(Service Layer)
Web Service Internal and External
(Resource Layer)
PACS, Modality, HL7 Engine, Velos, FAS, NSIT Feeds, EPIC, TRACS, Gargoyle, etc.
Data Feeds
STORAGE (SAN) and VIRTUALIZATION
DR Enabled

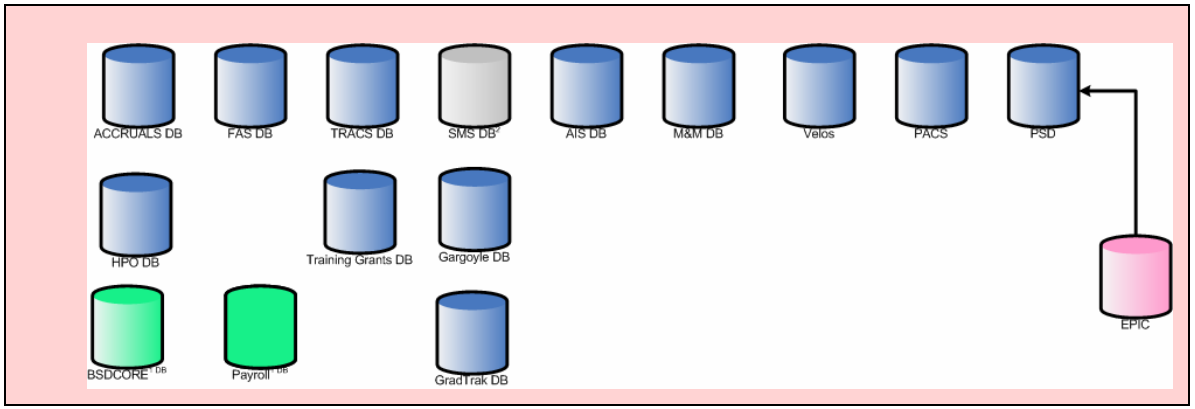
Consumers



IRIS



DB & Feeds



DOMAINS: Academic, Research, Administrative

UC|iBi

University of Chicago Initiative in Biomedical Informatics

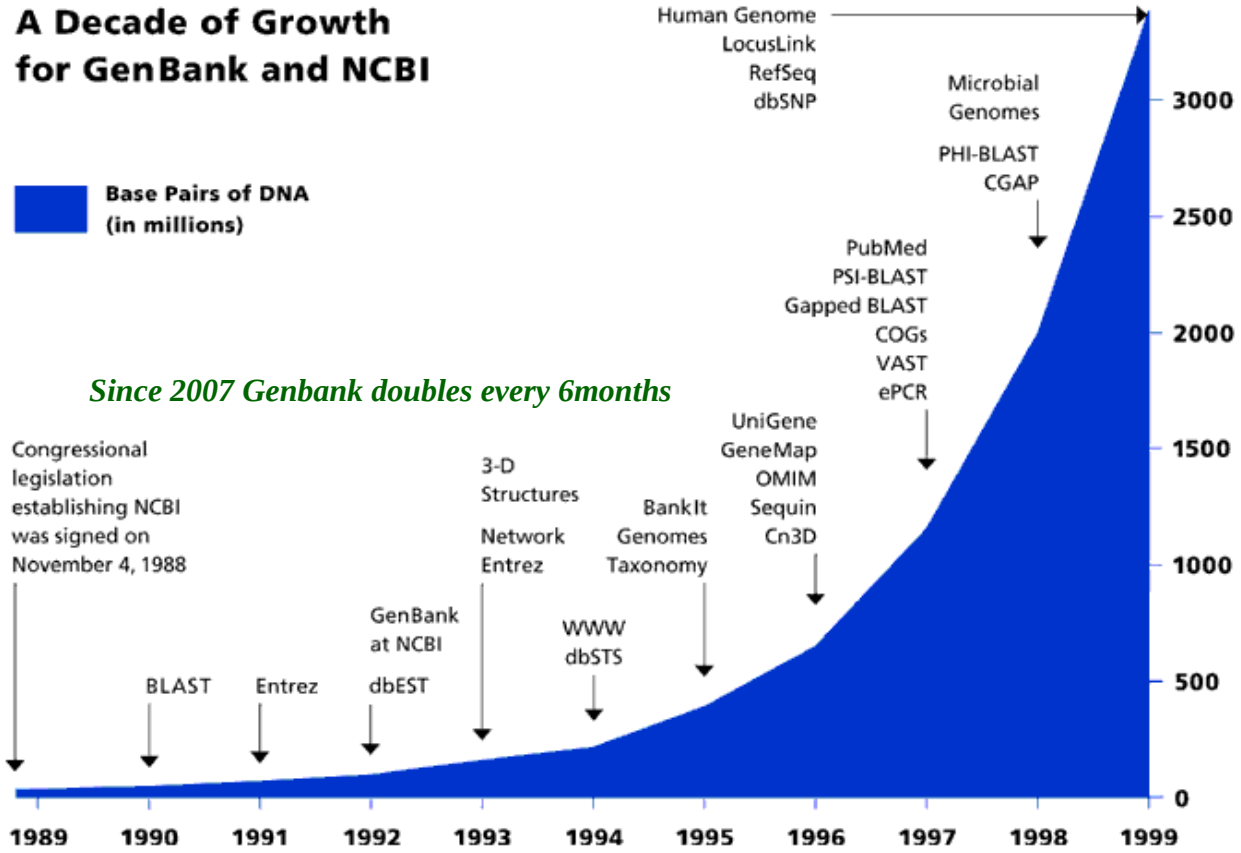
THE UNIVERSITY OF CHICAGO MEDICAL CENTER & BIOLOGICAL SCIENCES

Genome Science and **Biomedical Informatics** increase the "experimental space" and "clinical space", respectively one can "search" for biomedical solutions

Genetics, Genome Science, Systems Biology

Phenomics

In "**genetic**" studies we seek to correlate heritable changes in DNA to Disease Phenotype. In "**genomic**" studies we seek to correlate DNA changes with other changes in "molecular state" to predict Disease Phenotype. In **Biomedical Informatics** we seek to characterize "disease" by its component parts with the goal of predicting disease susceptibility by correlation to individual differences in "molecular states".



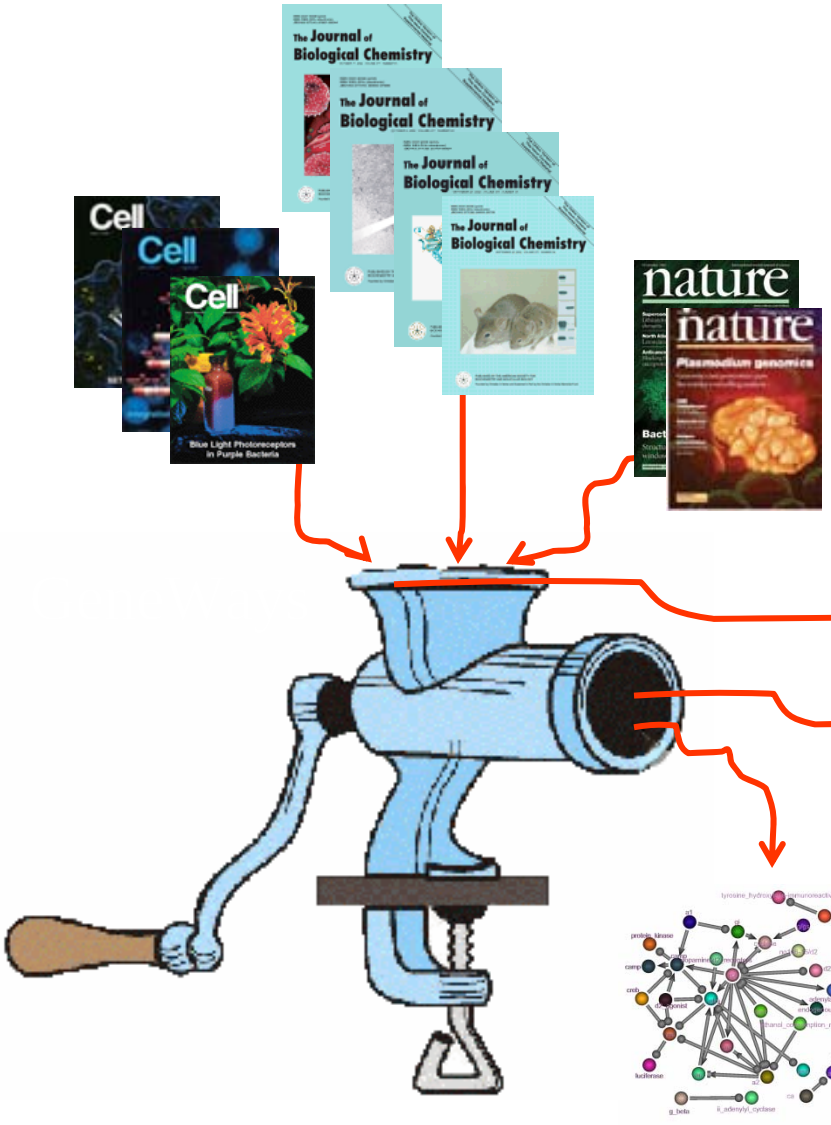
Since 2007 Genbank doubles every 6months

As of Jan 2008, *GenBank* houses just under 1 Terabyte (10^{12}) of DNA sequence information. Though huge by pre-genome sequencing standards, the data storage challenge is really a consequence of the new "experimental space" that genome science and genome technology enable.

Shorter than Moore's law (computer power doubling every 20 months!)

Automated literature mining to generate a Molecular Interaction Network

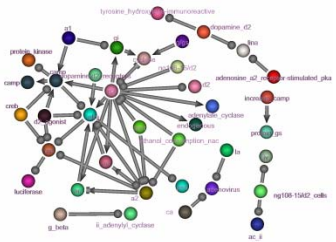
Rzhetsky et al., JBI 37, 2004

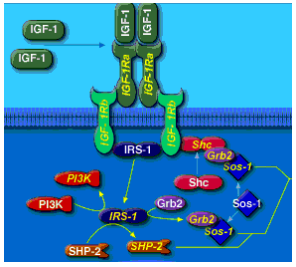


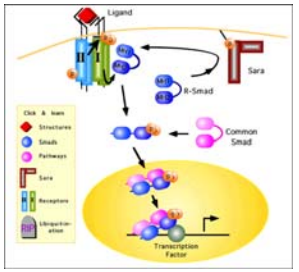
We are currently screening 250,000 journal articles…

2.5M reasoning chains

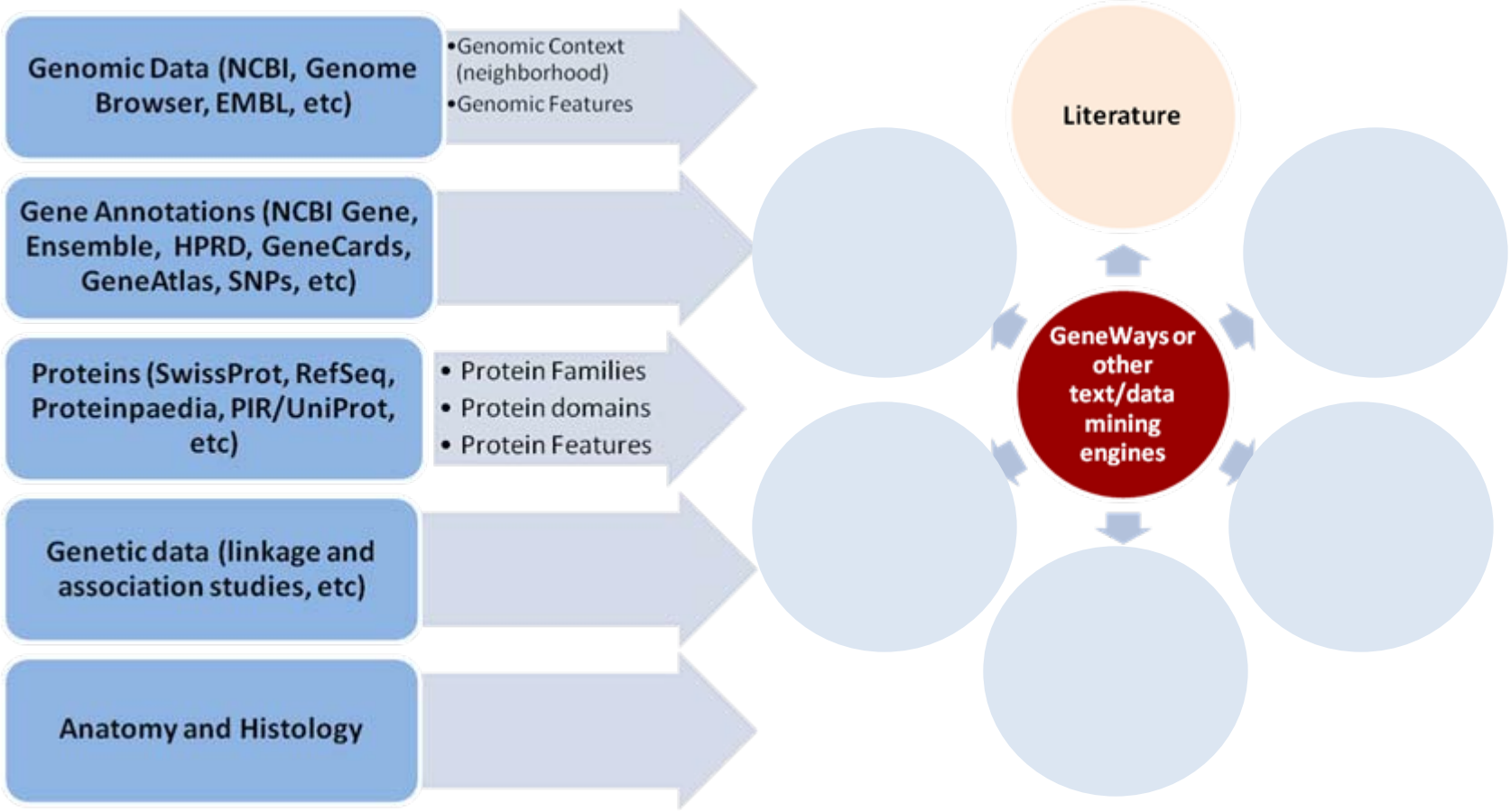
4M statements







Discovering Pathogenic Pathways: why do we need to integrate information?



All currently stored in iBi repository.

New “experimental space”

PhenoGO : A Resource for the Multiscale Integration of Clinical and Biological Data

Lee T. Sam, Eneida A. Mendonça, Carol Friedman,

Yves A. Lussier, M.D. (Corresponding Author)

Director, Dept. of Medicine Center for Biomedical Informatics

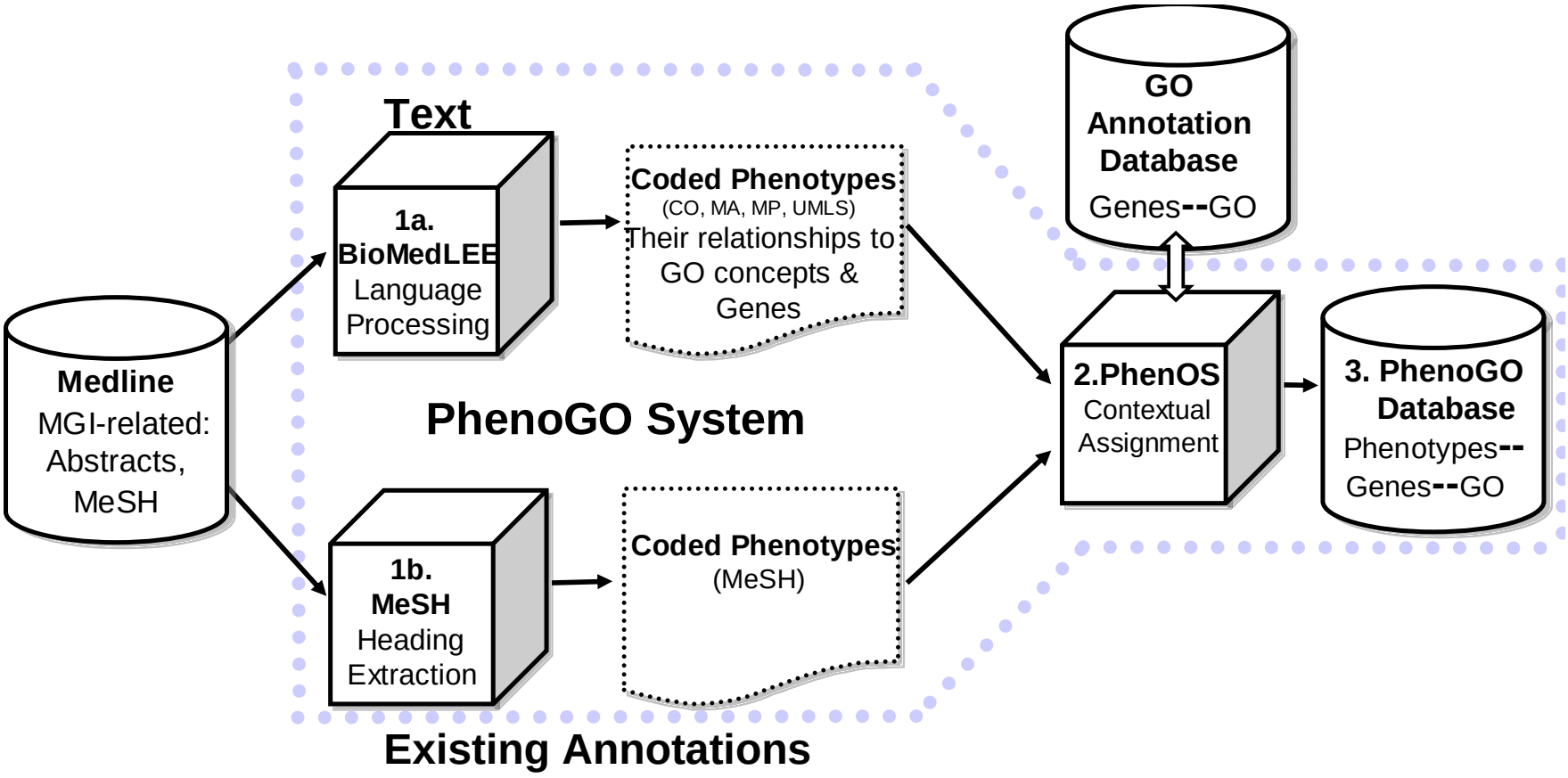
Associate Director for Informatics, Cancer Research Center

Co-Director, Clinical Translational Science Award (CTSA) Informatics Core

Associate Professor of Medicine, Biological Science Division

Judith Blake, Jackson Lab

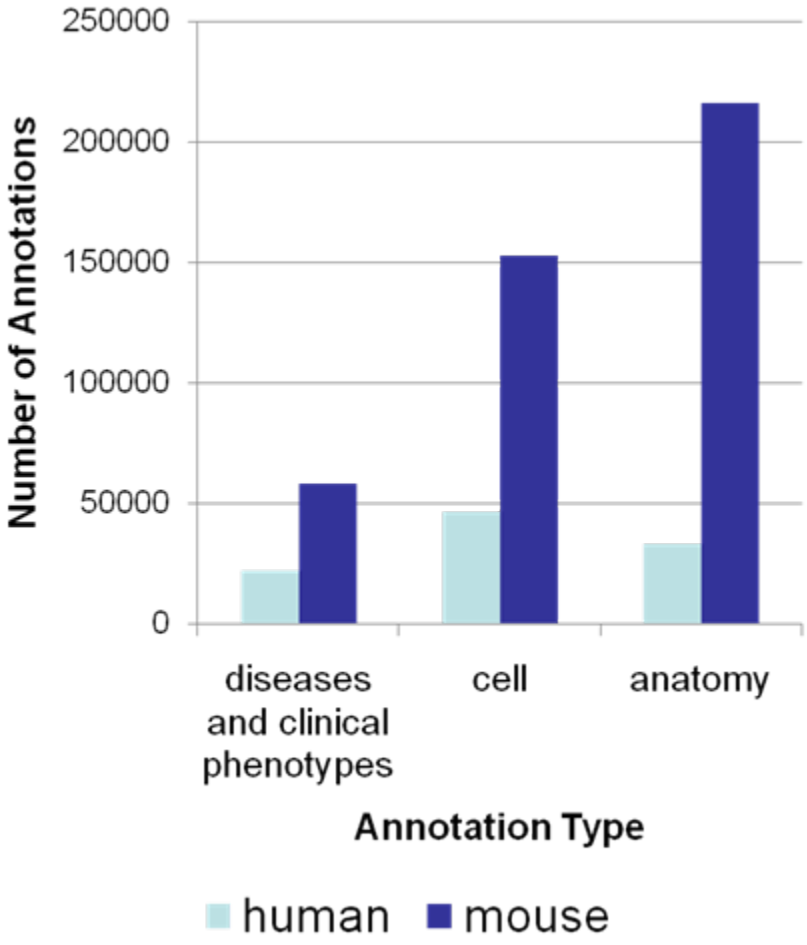
The PhenoGO Encoding Pipeline



Lussier Y, Borlawsky T, Rappaport D, Liu Y, Friedman C. PhenoGO: assigning phenotypic context to gene ontology annotations with natural language processing. *Pac Symp Biocomput*. 2006;:64-75.

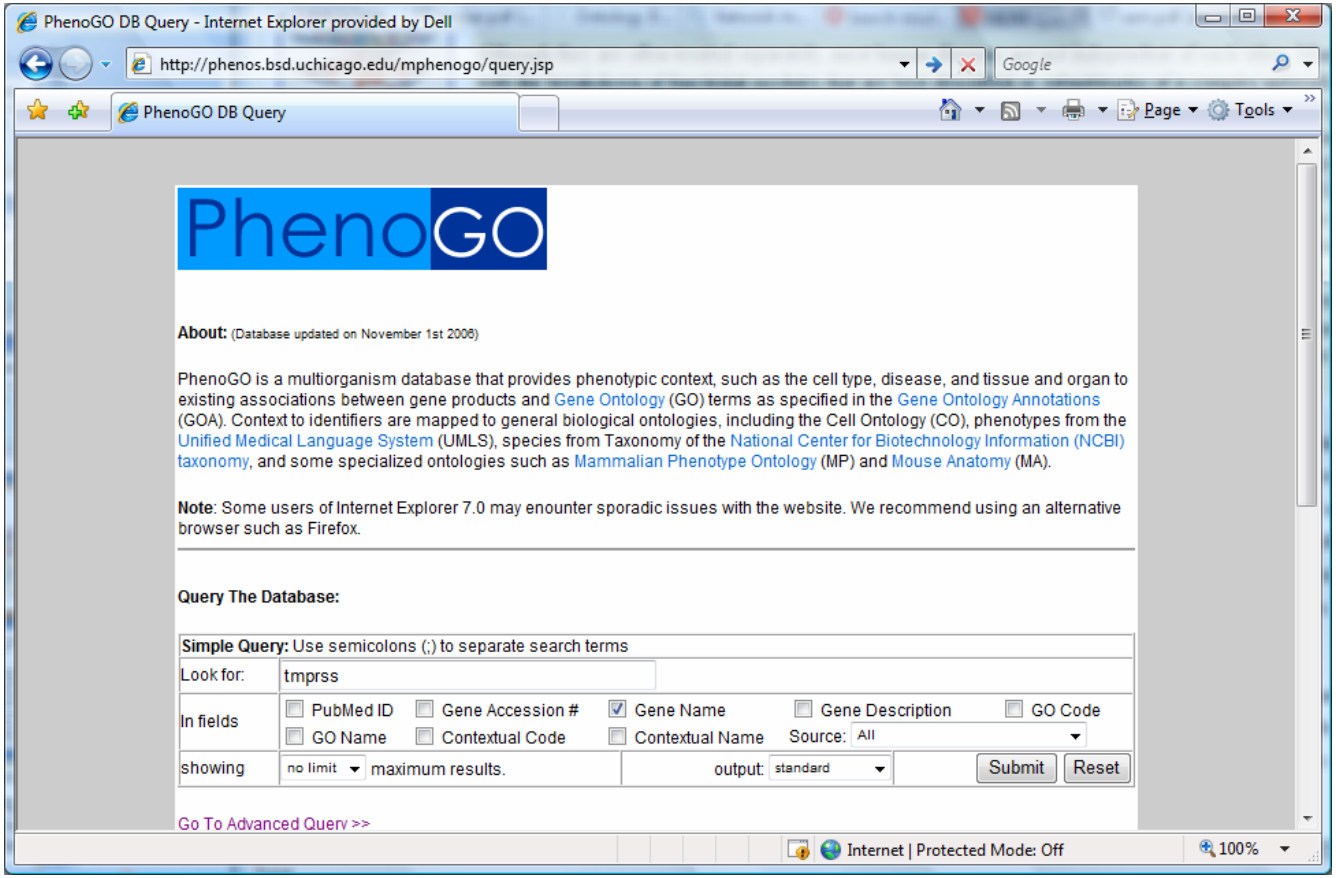
Diseases and Disorders

- 78,947 total annotations associated with diseases and disorders
  - 69,899 Human and mouse annotations
  - 3,209 distinct disease and disorders of 6,084 distinct contexts



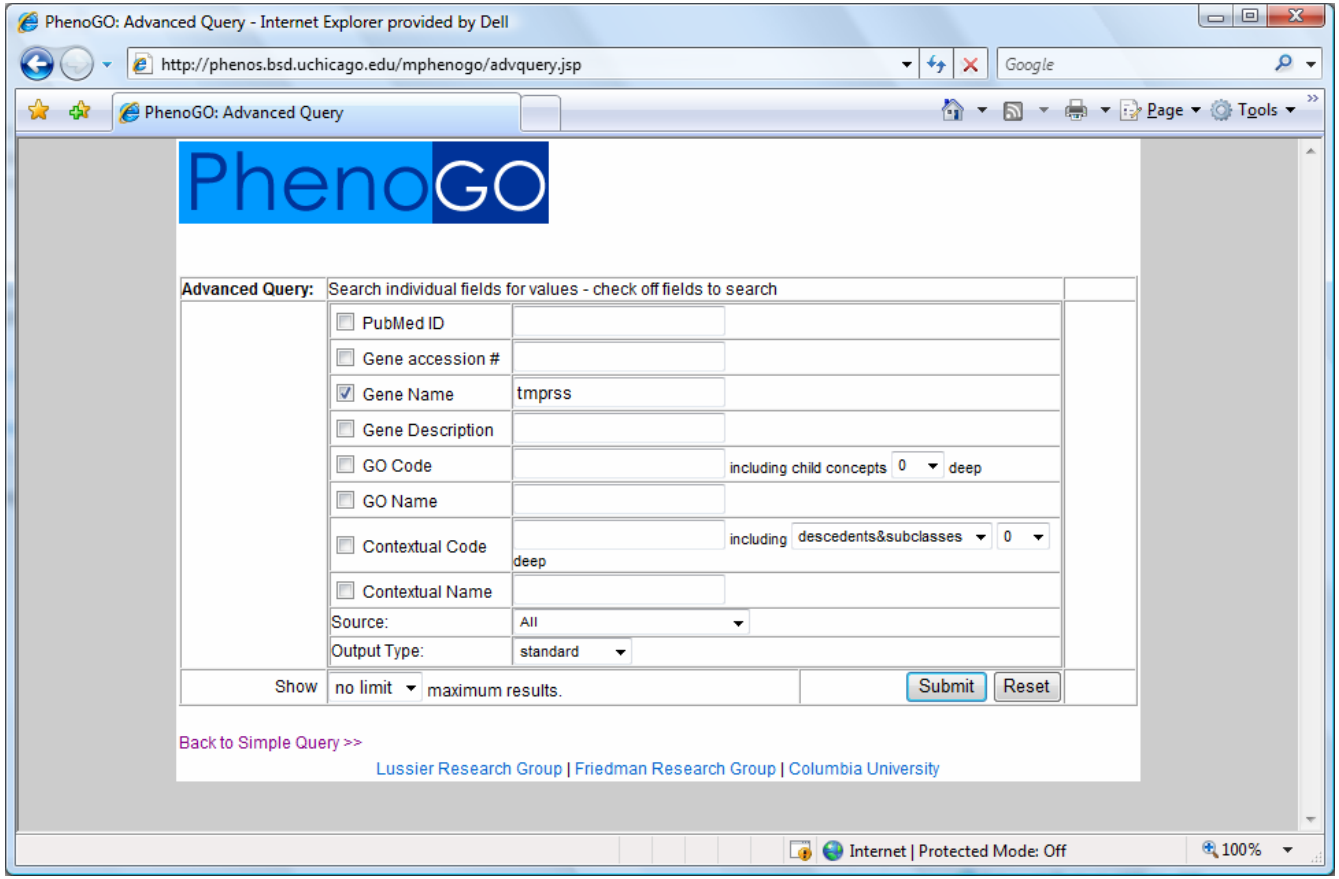
Web Query: Basic

- Runs a query analogous to an SQL OR for the search terms



Web Query: Advanced

- Runs a query analogous to an SQL AND for the search terms



Conclusions

- Substantial additions to a high-quality, wide-raging gene-GO-phenotype resource drawn from the biomedical literature and existing knowledge bases
- It’s a fantastic resource and I urge everyone to make use of it
- http://www.phenogo.org

Acknowledgements

- **University of Chicago**
  - Tara Borlawsky (now at Ohio State)
  - Yang Liu
  - Jianrong Li

- **Grants**
  - NLM, 1K22 LM008308-01 (YL)
  - NLM, R01 LM007659-01 (CF)
  - NLM 1U54 CA121852-01A1 National Center: Multi-Scale Study of Cellular Networks

Discovery of Protein Interaction Networks Shared by Diseases

Lee Sam, Yang Liu, Jianrong Li, Carol Friedman, Yves A. Lussier

COLUMBIA UNIVERSITY
MEDICAL CENTER

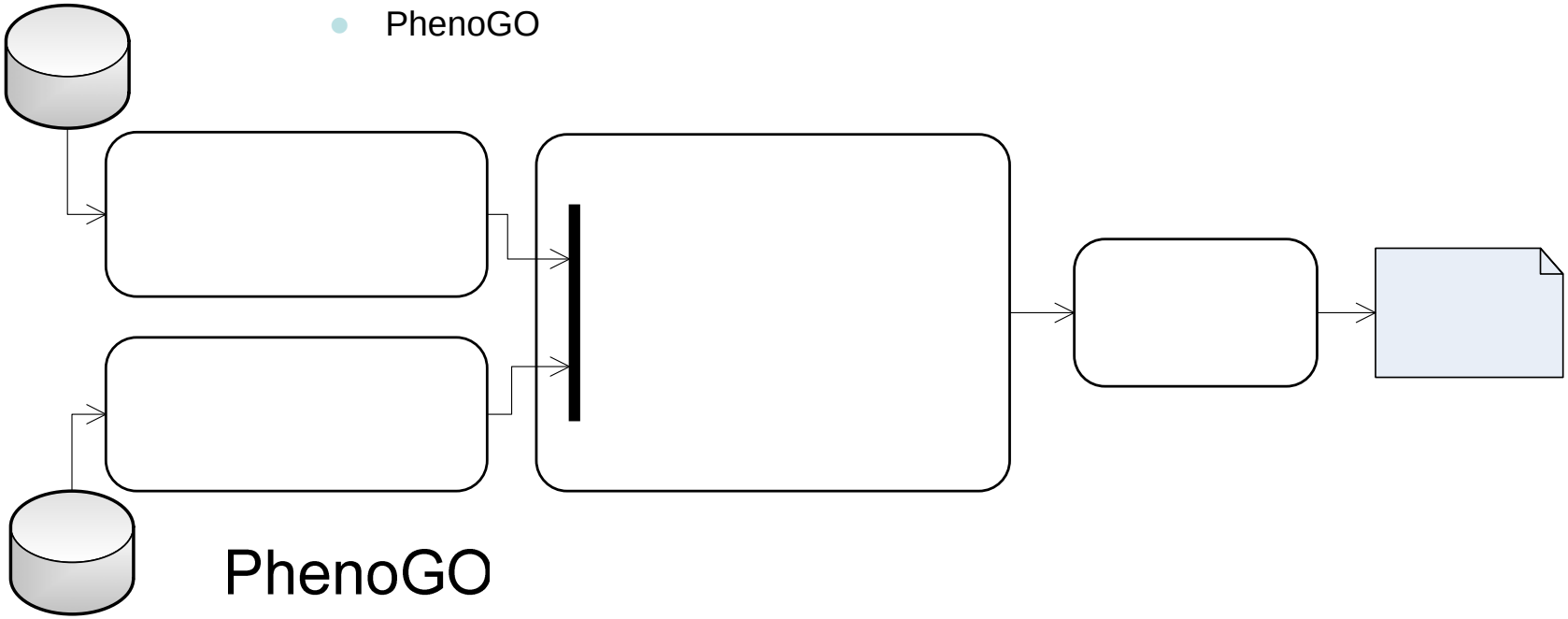
PhenoGO.org

Lussier Y, Borlawsky T, Rappaport D, Liu Y, Friedman C. **Pac Symp Biocomput. 2006**;:64-75.

- Database of Phenotypic context for GO annotations
  - Gene-phenotype-GO
  - NLP (BioMedLEE) and computational terminology-derived
- 3,102 distinct diseases and phenotypes (# human)
- 32,911 distinct proteins (7,016 human)
- 532,407 total records (# human)
- Precision: 85% [n=120]
- Recall: 76% [n=120]

Overall process

- Protein-Protein Interaction network
  - Reactome
- Phenotype-genotype association
  - PhenoGO



What do we have data on?

Acknowledgements

- **University of Chicago**
  - Yang Liu
  - Jianrong Li
  - Tara Borlawsky
  - Yves A. Lussier
  - Rosie H Xing

- **Columbia University**
  - Carol Friedman

- **Synergistic Collaborations:**
  GO/PATO consortium
  - Michael Ashburner, Flybase
  - Judith Blake, MGI
  - Suzanna Lewis, UB
  - Joanna Amburger, OMIM

- **Grants**
  - NLM, 1K22 LM008308-01 (YL)
  - NLM, R01 LM007659-01 (CF)
  - NLM 1U54 CA121852-01A1 National Center: Multi-Scale Study of Cellular Networks (YL/Phenotypes & CF/NLP Team Leaders)

Probing genetic overlap among complex human phenotypes

Andrey Rzhetsky*†‡, David Wajngurt*, Naeun Park*, and Tian Zheng§

*Department of Biomedical Informatics, Center for Computational Biology and Bioinformatics and Joint Centers for Systems Biology, and †Judith P. Sulzberger, M.D., Columbia Genome Center, Columbia University, New York, NY 10032; and §Department of Statistics, Columbia University, New York, NY 10027

11694–11699 | PNAS | July 10, 2007 | vol. 104 | no. 28

AR

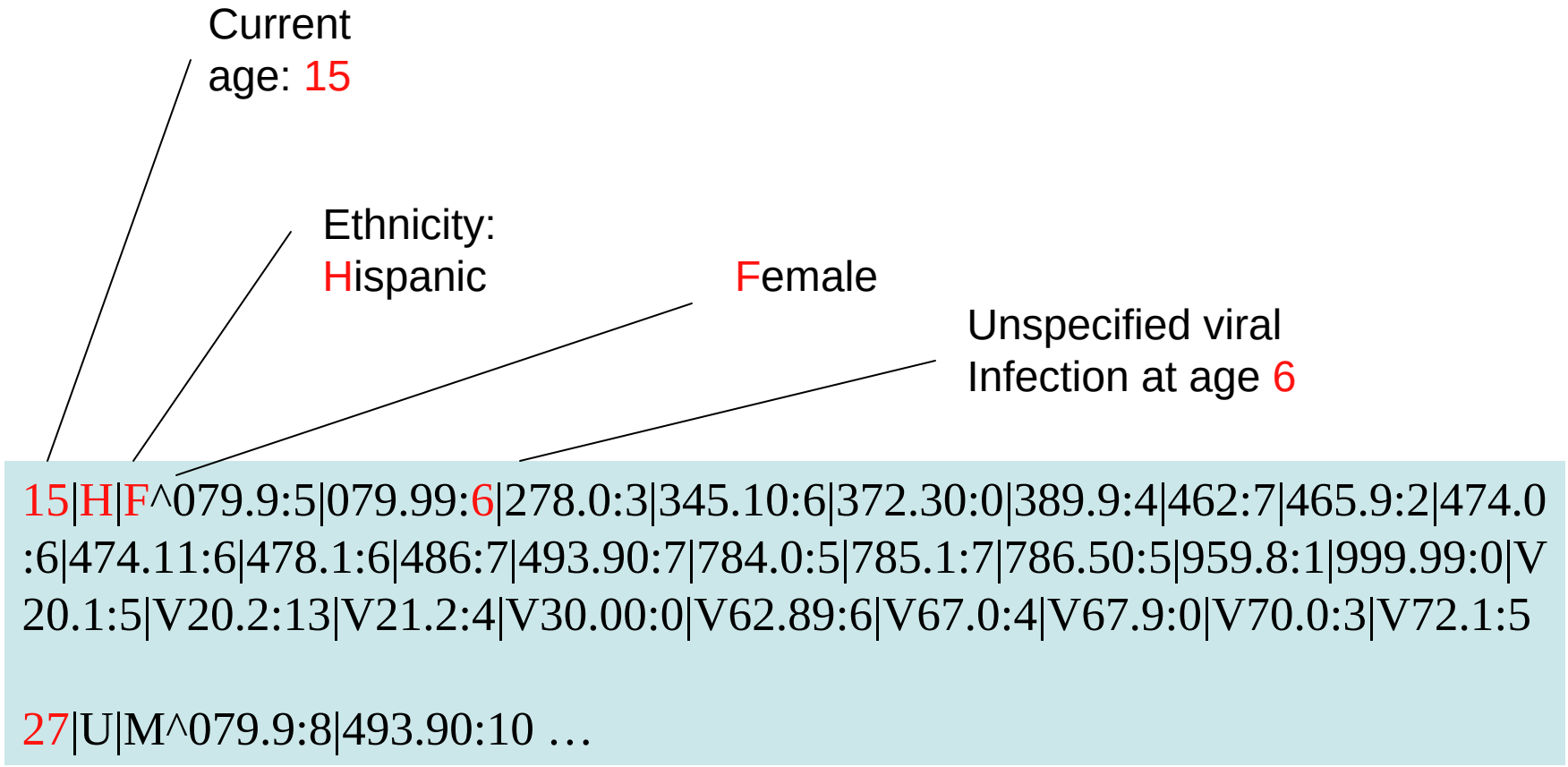
David Wajngurt

Naeun Park

Tian Zheng

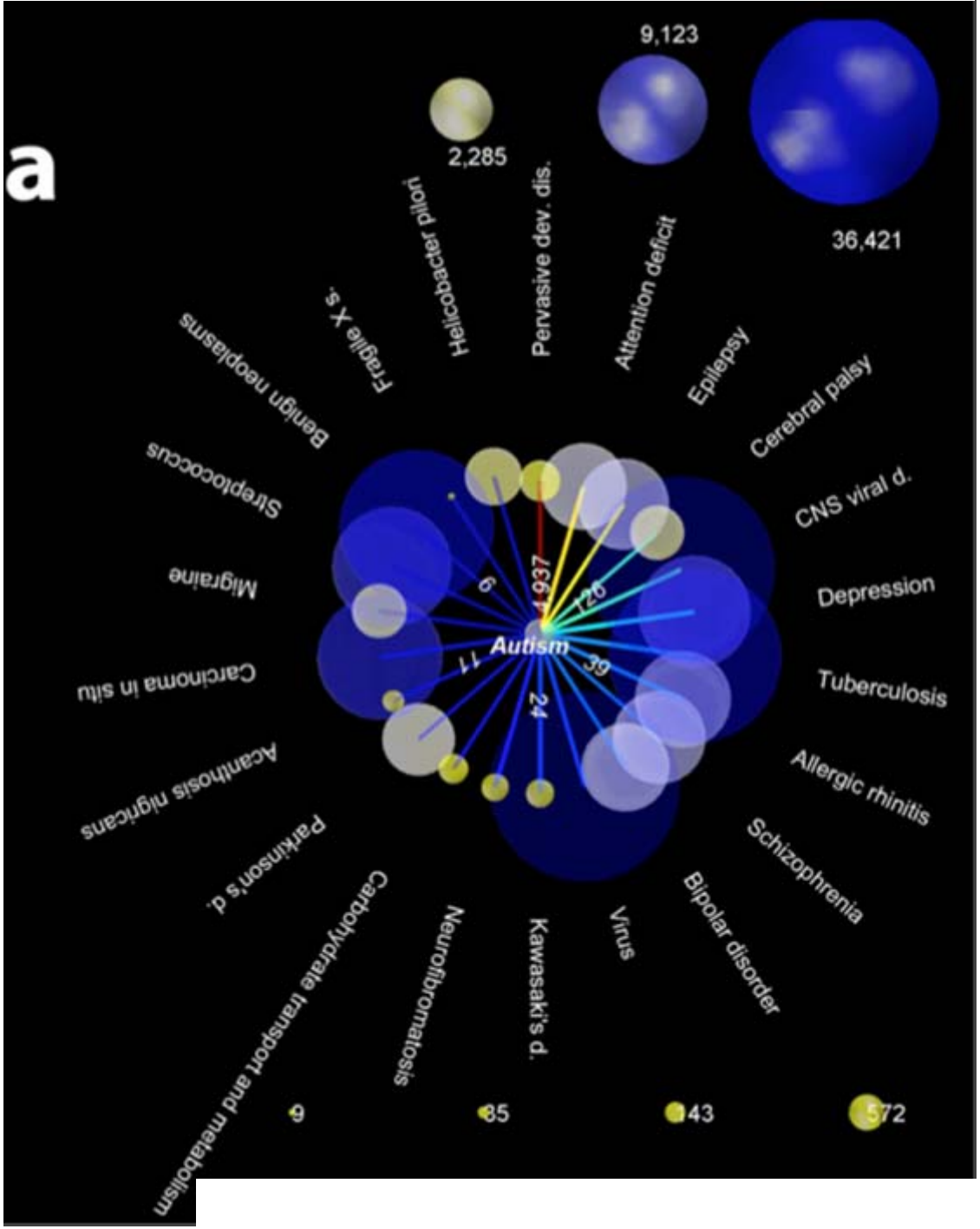
Data

$\sum = 1.5 \times 10^6$ patient records

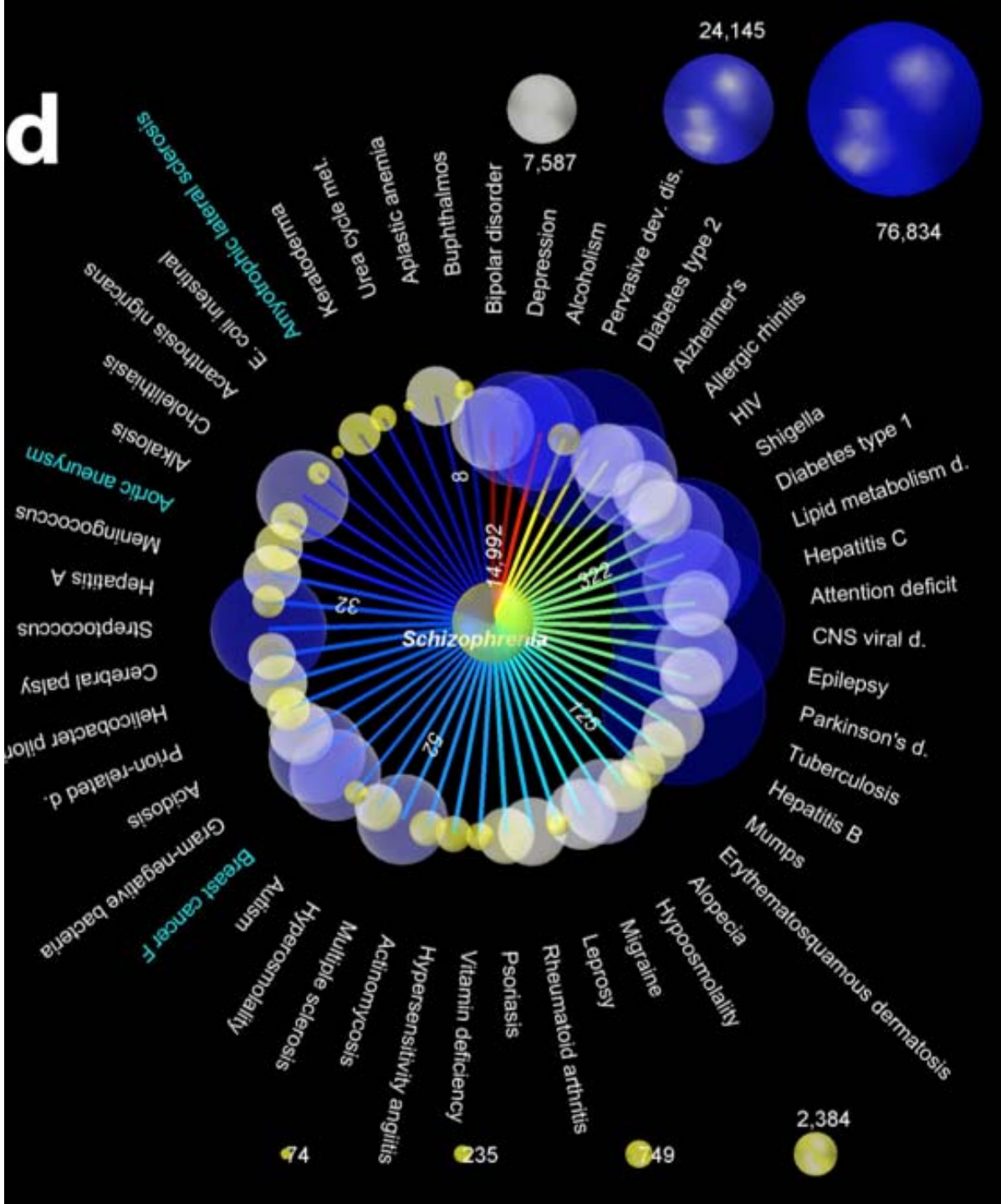


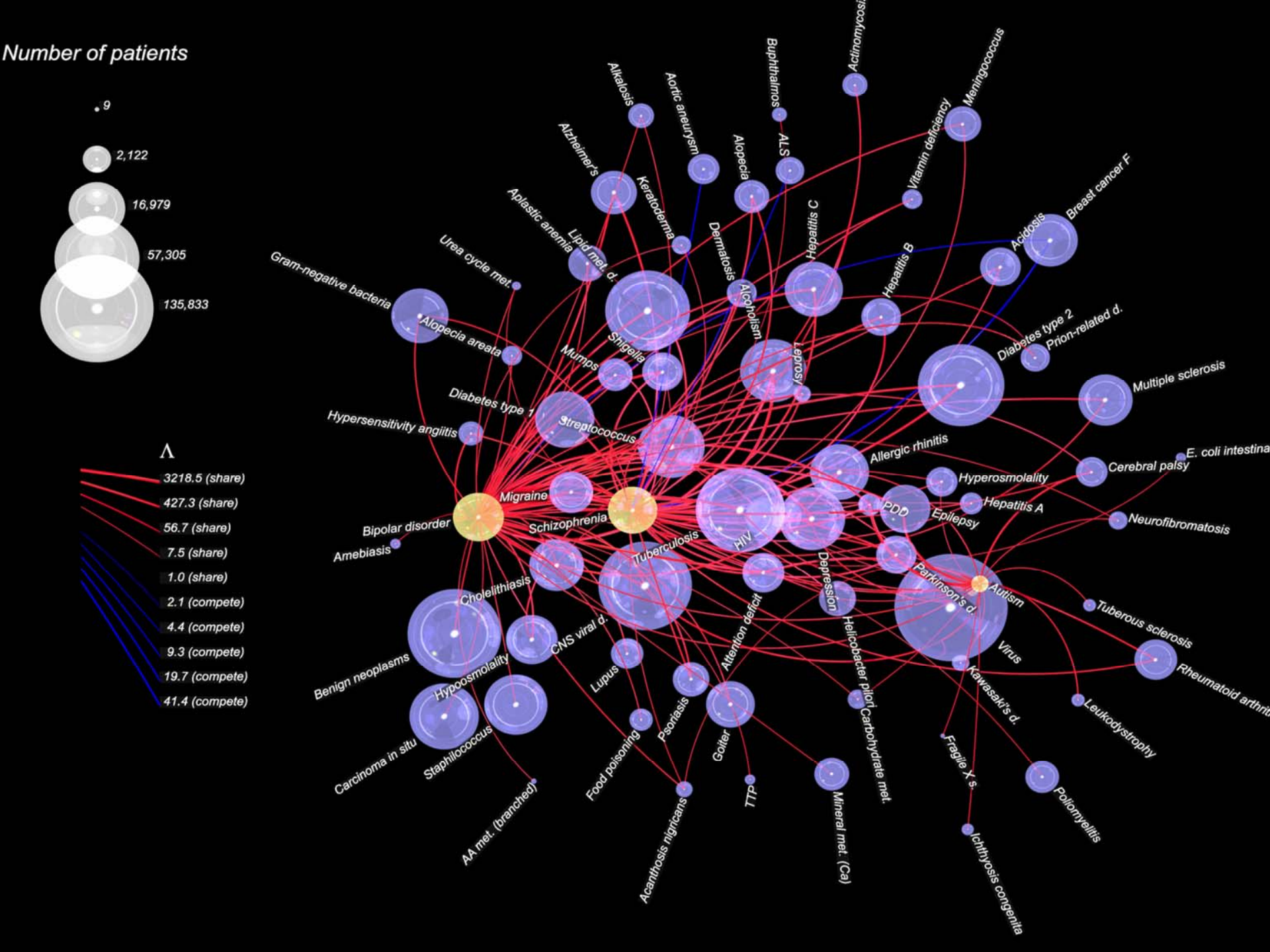
Data: ICD9 codes in Columbia University clinical database

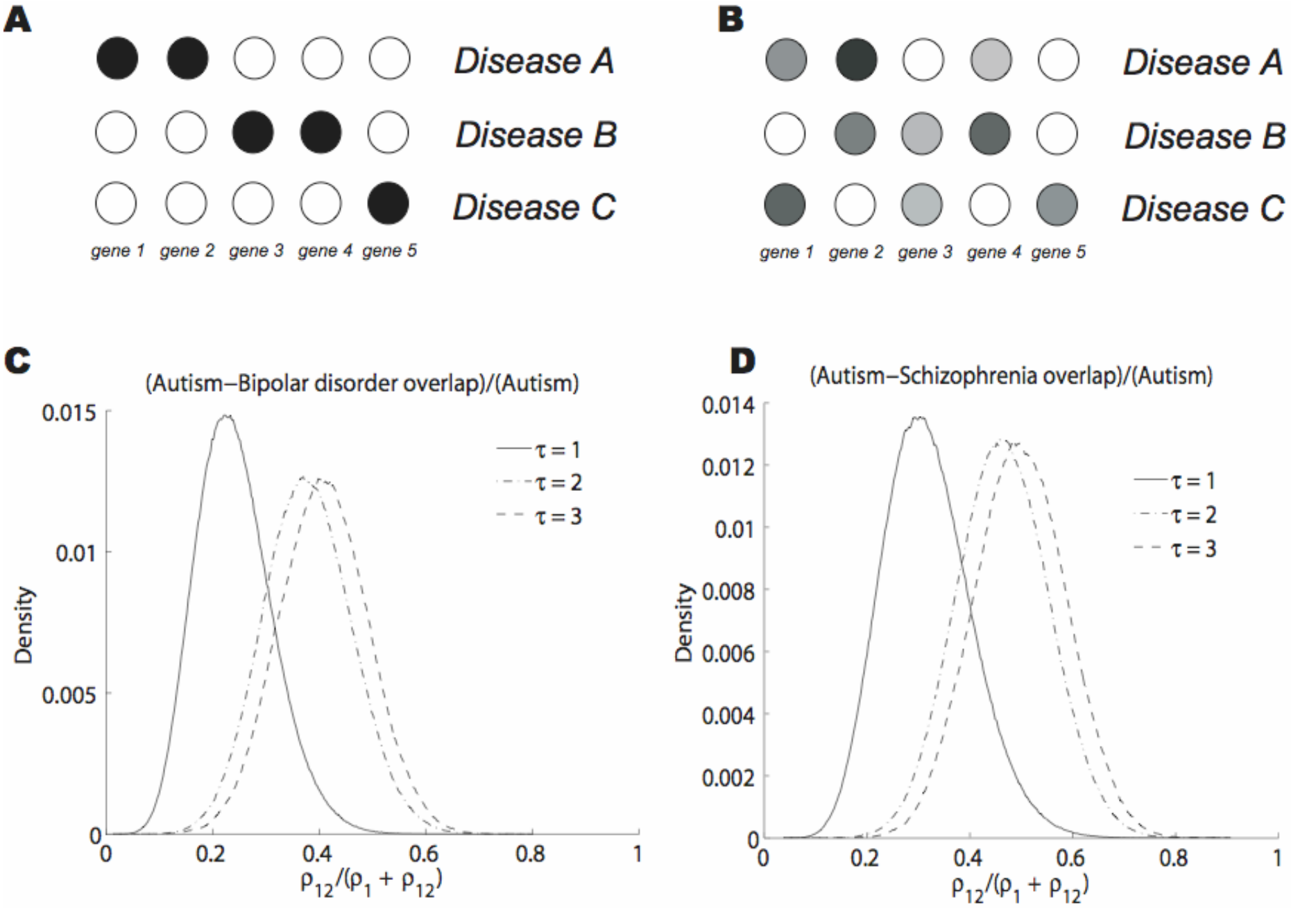
Results: Autism



Results: Schizo-phrenia




Number of patients
9
2,122
16,979
57,305
135,833
Λ
3218.5 (share)
427.3 (share)
56.7 (share)
7.5 (share)
1.0 (share)
2.1 (compete)
4.4 (compete)
9.3 (compete)
19.7 (compete)
41.4 (compete)
Actinomycosis
Meningococcus
Buphthalmos
Alkalosis
Aortic aneurysm
Alzheimer's
Alopecia
ALS
Vitamin deficiency
Keratoderma
Aplastic anemia
Lipid met. d.
Urea cycle met.
Dermatosis
Hepatitis C
Breast cancer F
Acidosis
Hepatitis B
Gram-negative bacteria
Alcoholism
Alopecia areata
Shigella
Mumps
Leprosy
Diabetes type 2
Prion-related d.
Multiple sclerosis
Diabetes type 1
Hypersensitivity angiitis
Streptococcus
Allergic rhinitis
E. coli intestina
Cerebral palsy
Hyperosmolality
Migraine
Hepatitis A
PDD
Epilepsy
Neurofibromatosis
Bipolar disorder
Schizophrenia
Amebiasis
Tuberculosis
HIV
Depression
Parkinson's d.
Autism
Tuberous sclerosis
Cholelithiasis
Helicobacter pilori
Attention deficit
Virus
Rheumatoid arthriti
Benign neoplasms
CNS viral d.
Lupus
Hypoosmolality
Kawasaki's d.
Leukodystrophy
Psoriasis
Carbohydrate met.
Goiter
Fragile X s.
Carcinoma in situ
Staphilococcus
Food poisoning
TTP
Mineral met. (Ca)
Poliomyelitis
AA met. (branched)
Acanthosis nigricans
Ichthyosis congenita


A
Disease A
Disease B
Disease C
gene 1
gene 2
gene 3
gene 4
gene 5
B
Disease A
Disease B
Disease C
gene 1
gene 2
gene 3
gene 4
gene 5
C
(Autism–Bipolar disorder overlap)/(Autism)
0.015
0.01
0.005
0
Density
τ = 1
τ = 2
τ = 3
0
0.2
0.4
0.6
0.8
1
ρ12/(ρ1 + ρ12)
D
(Autism–Schizophrenia overlap)/(Autism)
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
Density
τ = 1
τ = 2
τ = 3
0
0.2
0.4
0.6
0.8
1
ρ12/(ρ1 + ρ12)

CIQR ("Seeker"): Context-Initiated Question and Response

Eneida Mendonca, MD, PhD

History

- Linking medical records to information resources
- Making retrieval specific to a particular patients
- Using statistical and semantic models to identify relevant information in patient's records
- Re-ranking retrieval of scientific literature based on the patient's map
- Problems: not a good time for retrieval, questions not always related to the part of the record the physician is looking at.

CIQR: Objectives

- Capture information needs when they occur, without disrupting workflow
  - Deploy mobile devices using data and voice input
- Translate high-level information needs into search strategies adapted to user needs capabilities of resources
  - Develop models of search strategies using human search expertise (reference librarians)
  - Study how librarians classify, clarify and refine questions
  - Automate using speech processing and natural language parsing
- Deliver materials relevant to information needs in an accessible format and in a timely manner
  - Organize materials retrieved by librarians and transmit them to clinicians for display on mobile devices

Where we are going?

- Improved training
- Testing new devices
- Text input vs. voice input
- Full text analysis
- Delivery of information

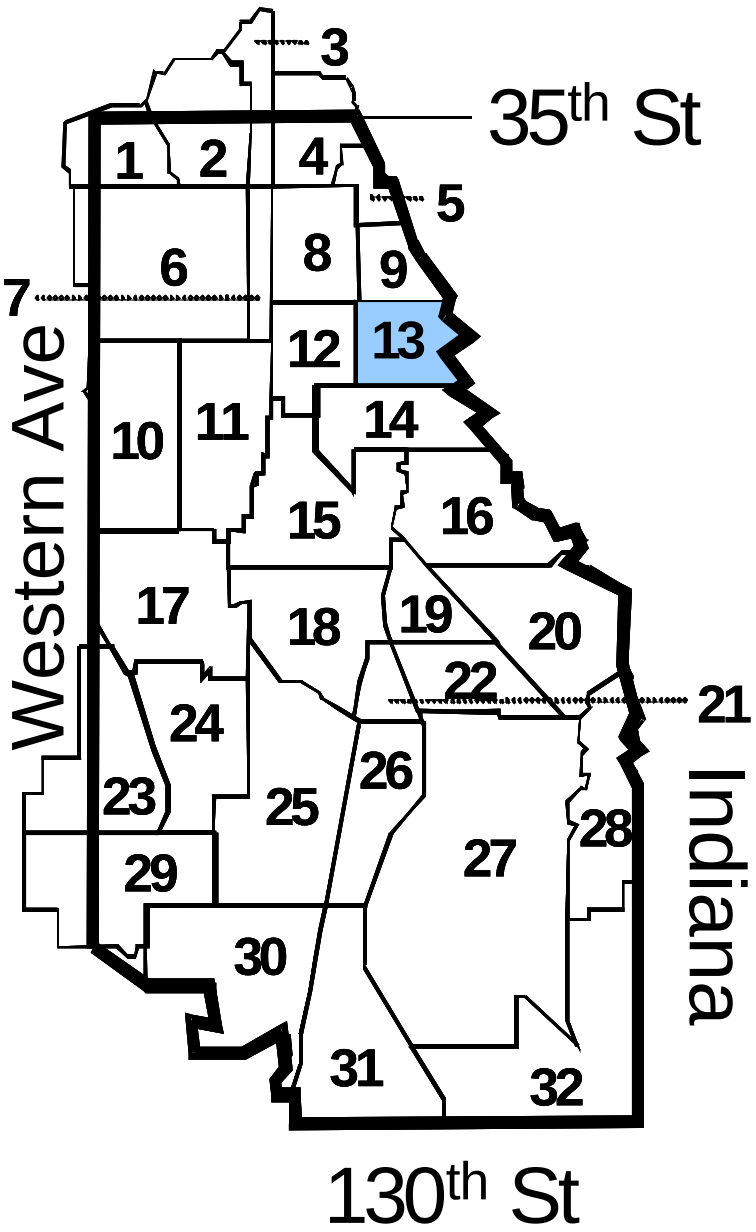
From Bench to Bedside:
Lessons Learned in the University of Chicago CTSA

Re-Engineering Translational Research at The University of Chicago
Clinical and Translational Science Award U54 RR023560

Julian Solway, MD
University of Chicago

South Side of Chicago

Univ of Chicago Medical Center Primary Service Area (PSA) – 1.1 M residents



#	Community
1	McKinley Park
2	Bridgeport
3	Armour Square
4	Douglas
5	Oakland
6	New City
7	Fuller Park
8	Grand Boulevard
9	Kenwood
10	West Englewood
11	Englewood
12	Washington Park
13	Hyde Park
14	Woodlawn
15	Greater Grand Crossing
16	South Shore
17	Auburn Gresham
18	Chatham
19	Avalon Park
20	South Chicago
21	Burnside
22	Calumet Heights
23	Beverly
24	Washington Heights
25	Roseland
26	Pullman
27	South Deering
28	East Side
29	Morgan Park
30	West Pullman
31	Riverdale
32	Hegewisch

The health status of the 1.1 M residents of the UCMC PSA is extremely poor, as reflected in extraordinarily high rates of common complex diseases and of infant mortality. Furthermore, 10-15% of UHI adult residents are disabled.

Description	PSA	Illinois	PSA / IL
HEART FAILURE & SHOCK	10.5	5.3	199%
DIABETES AGE >35	3.4	1.2	285%
RENAL FAILURE	3.1	1.5	213%
BRONCHITIS & ASTHMA	1.6	0.7	219%
HYPERTENSION	1.6	0.6	262%
All Adult Med/Surg DRGs	**169.0**	**125.2**	**135%**

It is in this context that the University of Chicago CTSA program seeks to translate research discoveries into real, effective therapies.

Community	Area	% Infant Mortality
Grand Boulevard	PSA	3.1%
Riverdale	PSA	2.2%
Clearing	Other	1.9%
West Englewood	PSA	1.9%
Douglas	PSA	1.9%
Washington Park	PSA	1.8%
Chatham	PSA	1.8%
West Garfield Park	Other	1.7%
North Lawndale	Other	1.6%
Humboldt Park	Other	1.6%
East Garfield Park	Other	1.6%
Hyde Park	PSA	1.6%
Englewood	PSA	1.6%
Austin	Other	1.5%
Pullman	PSA	1.5%
Roseland	PSA	1.4%
Ashburn	Other	1.4%
Loop	Other	1.4%
West Pullman	PSA	1.3%
Kenwood	PSA	1.3%
South Shore	PSA	1.2%
Morgan Park	PSA	1.2%
Chicago Average		**0.9%**
Illinois Average		0.73%

A comprehensive approach to the challenges:

1) ***Institute for Translational Medicine (ITM)*** – a new University structure to collect, integrate, and disseminate the intellectual, organizational, and resource infrastructure needed to reduce barriers to translational research interactions among UC investigators. The ITM:
   - provides *new modes of "research navigation" assistance* to help UC and Community faculty and trainees identify and contact collaborators
   - will *incentivize multidisciplinary collaborations* with pilot and collaborative seed grant funding
   - *support the actual research* with a wide spectrum of core and intellectual capabilities

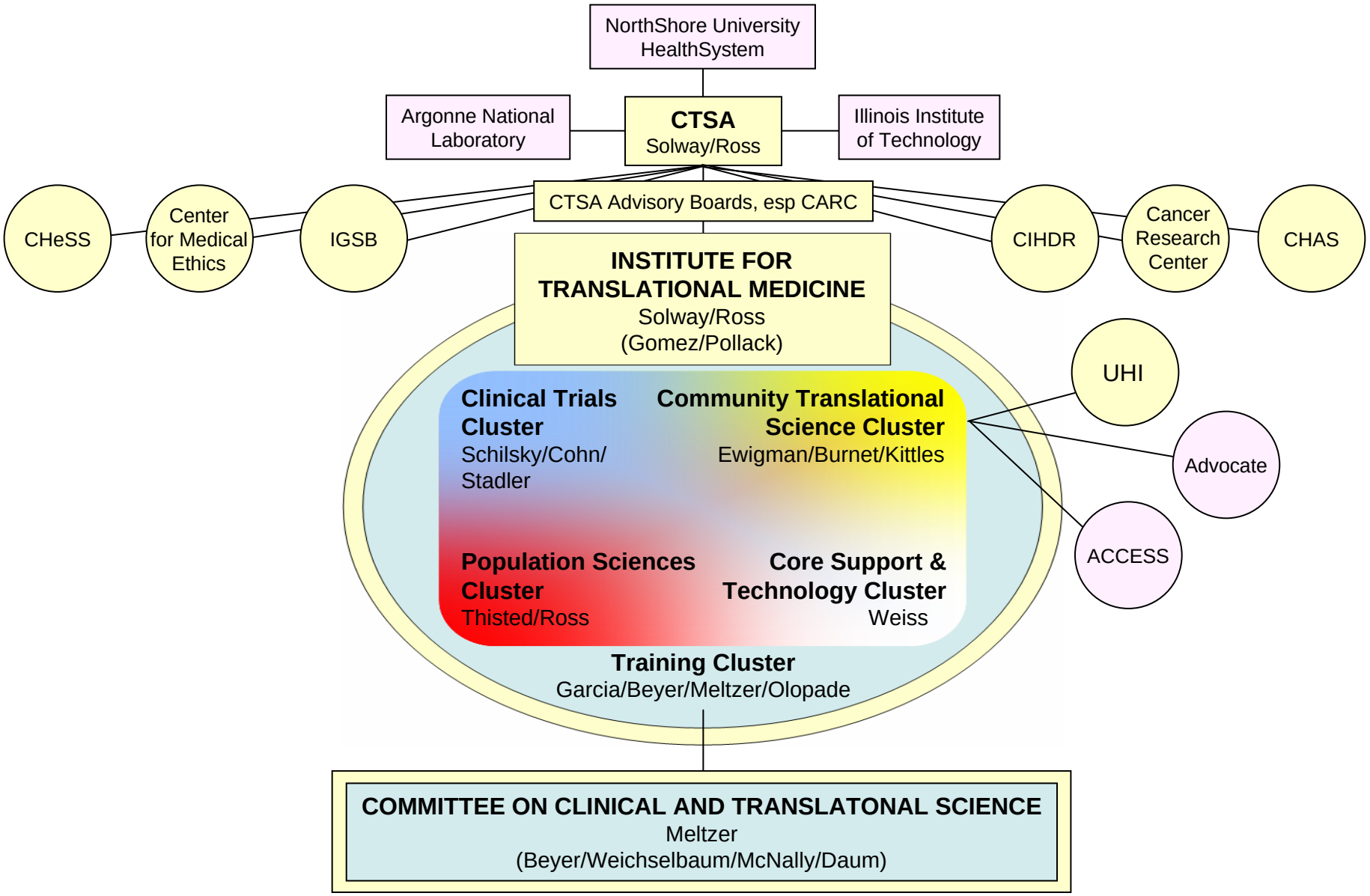
2) ***Urban Health Initiative (UHI)*** – principal goals are:
   - fully engage our Community in *developing clinical and community research agendas*
   - involve Community organizations and practices in the *conduct, interpretation and dissemination of that research*
   - *accelerate the translation of health knowledge* into and out of our Community
   - most importantly, *reduce the marked health disparities* in our Community through a *combination of service, education, and research initiatives*. **CTSA Community Translational Science Cluster *is* the principal research infrastructure component of the UHI.**

Three 3 bold steps that will overcome these obstacles.

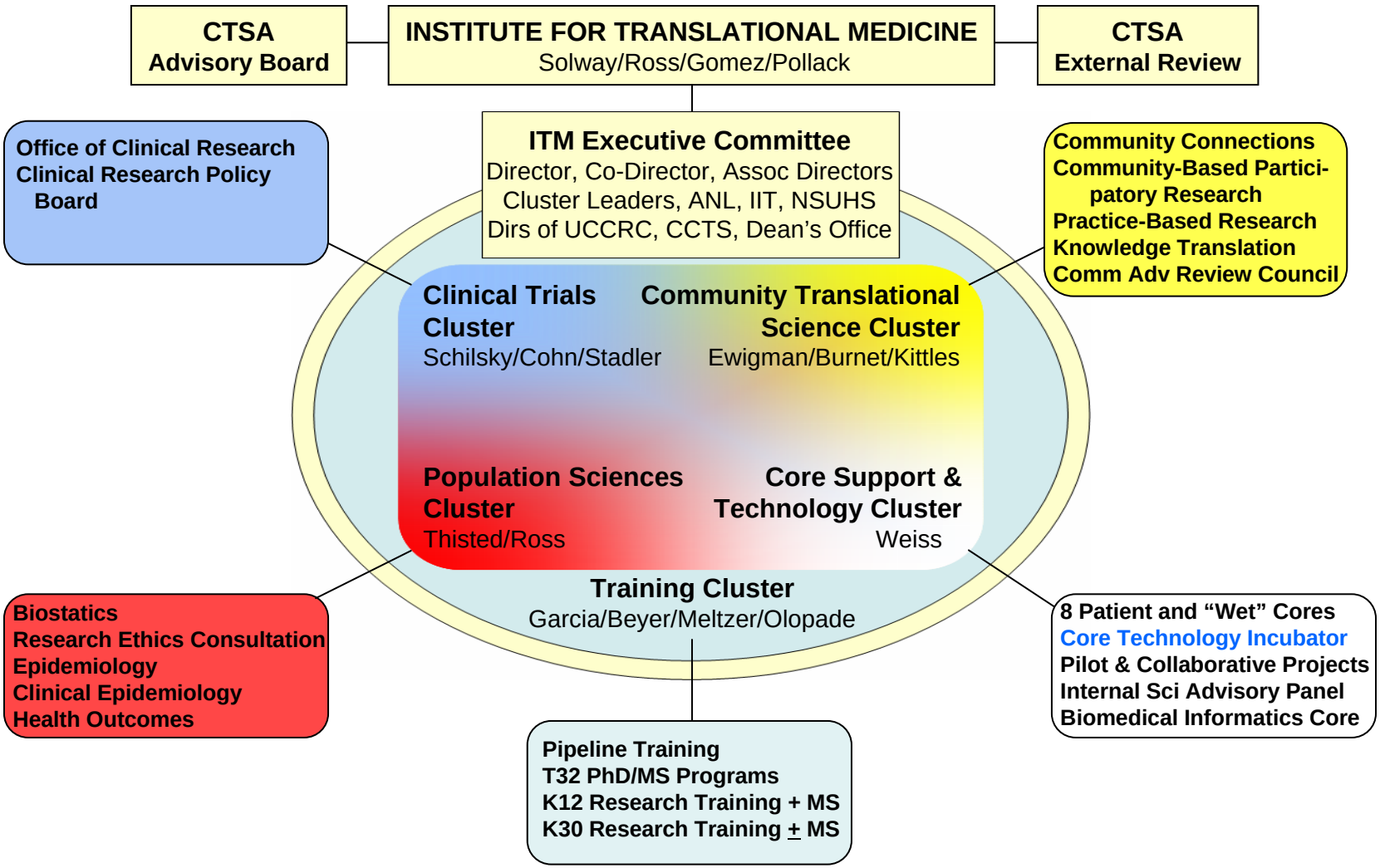
3) Training in Clinical and Translational Science

- Greatly expanded our training for careers in clinical and translational research, now providing research training and career development opportunities for physician and non-physician scientists, allied health professionals, undergraduates, and high school students, both at UC and in our Community.
- Previous barrier to such research training goal as one of "activation energy", in that *we have had the essential capability for such training and career development*, but failed to realize our full potential due to inadequate mentor incentives, inadequate course offerings, and inadequate recognition of the need for comprehensive training for careers throughout the translational research spectrum.
- *ITM Training Cluster* – broad research training/career development mission, enhanced faculty/mentor incentives, more clearly defined training pathways, and wide buy-in throughout the CTSA community, operating across divisional, departmental, professional school, and university lines to bring together CTSA faculty and students from UC, our allied institutions, and the Community.
- *Committee on Clinical and Translational Science* – new academic entity to advance multidisciplinary PhD/MS training in clinical and translational research.

The University of Chicago CTSA



The University of Chicago ITM



CTSA FACULTY

Medicine

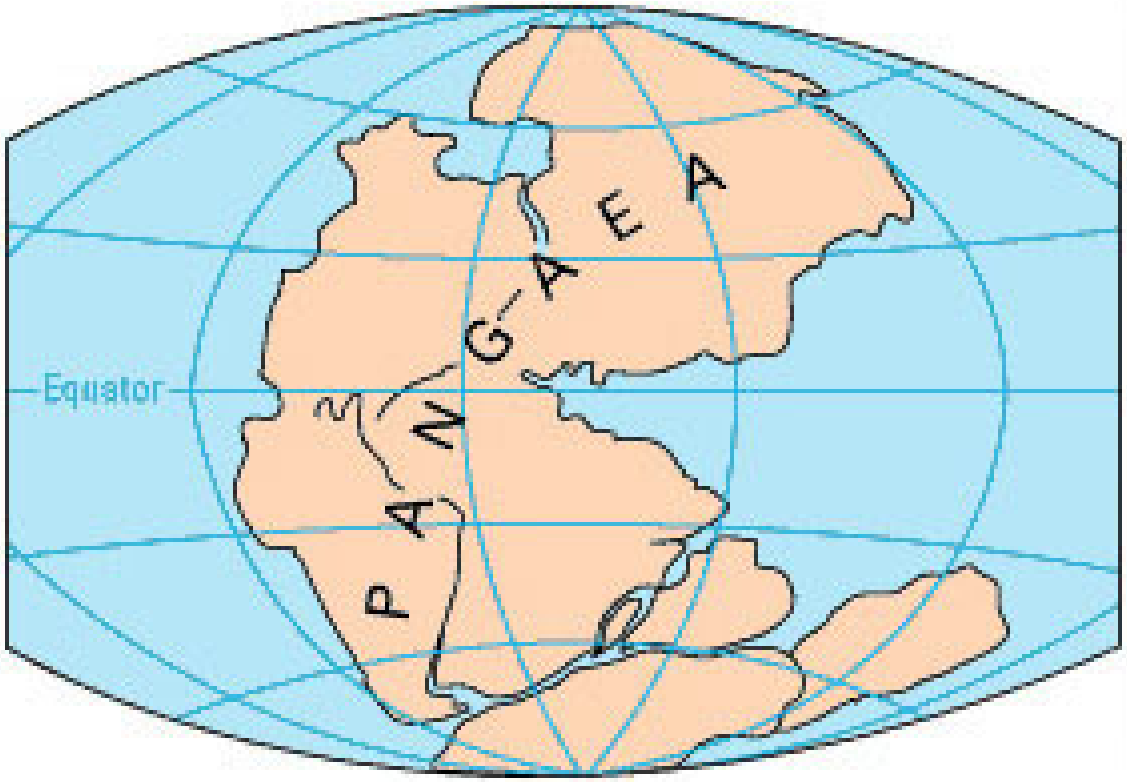
- Solway, Julian
- Soni, Nilam
- Sorrentino, Matthew
- Spencer, Kirk
- Spergel, Daniel
- Sperling, Anne
- Stadler, Walter
- Stankus, Nicole
- Stein, Sarah
- Stern, Scott
- Stock, Wendy
- Strek, Mary
- Sugeng, Lissa
- Sun, Xiao
- Svensson, Eric

Solway, Julian has 519 meshes.	MeSH Description
D015060	1,2-Dipalmitoylphosphatidylcholine
D019869	1-Phosphatidylinositol 3-Kinase
D020413	3' Untranslated Regions
D000081	Acetamides
D000109	Acetylcholine
D000199	Actins
D021581	Active Transport, Cell Nucleus

MeSH MATCHES

ITSS was run on 2/4/2009 using 0.7 as the ITSS t threshold.
The faculty highlighted in cyan have not yet published with Solway, Julian as of 5/4/2009

Faculty Name	Search	Department	Score
Leff, Alan	Search	Medicine	0.698467168530551
Fu, Yang-Xin	Search	Pathology	0.639864608394339
Garcia, Joe	Search	Medicine	0.610301821531312
Rowley, Janet	Search	Medicine	0.605079066764816
Rosner, Marsha	Search	Ben May Department for Cancer Research	0.589511590435706
White, Steven	Search	Medicine	0.58614106553857
Ober, Carole	Search	Human Genetics	0.568428212206307
Zhu , Xiangdong	Search	Medicine	0.559529146821088
Wang , Yu-Gang	Search	Pathology	0.550449584094493
Liu , Jiang	Search	Human Genetics	0.545124820482191
Gajewski, Thomas	Search	Pathology	0.544497471766893
Camoretti-Mercado , Blanca	Search	Medicine	0.543986252380127
Xu, Ming	Search	Anesthesia & Critical Care	0.537551675694489
Wang , Hongwei	Search	Medicine	0.537374715807021
Musch , Mark W.	Search	Medicine	0.535616426944619
Li , Ji	Search	Radiology	0.532655067392323
Li, Wen-Hsiung	Search	Ecology & Evolution	0.527050615271014
Chang, Eugene	Search	Medicine	0.525778077929825
Dawson, Glyn	Search	Pediatrics	0.521100773142236
Cox, Nancy	Search	Medicine	0.519673489242539
Lee , Charles	Search	Neurobiology	0.518484613883866
Chen , Jianjun	Search	Medicine	0.512764968194002



PERMIAN
225 million years ago

Informaticians and other related contributors at UofC

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THE UNIVERSITY OF CHICAGO

May 2009

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