

T E P R 2 0 0 6

Mendocino Health Records Exchange



Will Ross

May 2006

wross@minformatics.com

[a]



Rural Health Information Technology

Connecting for Health

Record Locator Service

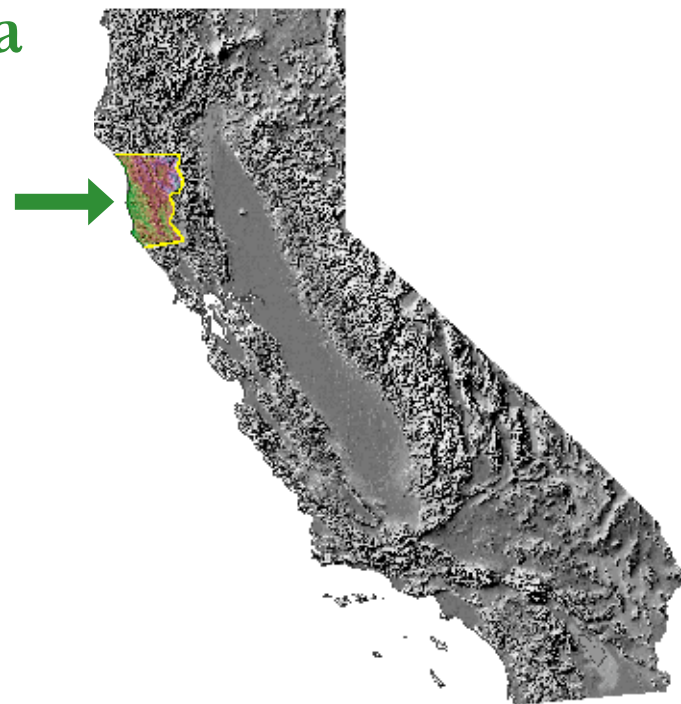
OpenHRE Software

Mendocino HRE



Mendocino County, California

- 100 miles north of San Francisco
- 3,500 square miles > (DE + RI)
- Population 89,000 (26 / sq. mi.)
- Largest city 15,000 inhabitants
- No Interstate Highway
- 3 hospitals, 165 total beds
- Long distances between small towns (1 hour anywhere)





Mendocino County typifies the challenges of rural health care

- Provider shortage, both Family Practice and Specialists
- Provider mix dominated by safety net facilities (over 60% of encounters are Medi-Cal + Medicare)
- Small hospitals losing money, threatening to close
- Fixed costs similar to urban areas, but smaller patient populations mean high unit costs for the same services
- Limited opportunities for growth or expansion means urban business models won't work



Mendocino County typifies the challenges of rural Health Information Technology (HIT)

- Low public health status indicators
(Ranks in bottom 25% of counties in California)
- Small hospitals as satellite operations with HIT data centers hundreds of miles away
- Few enterprise HIT installations among hospitals, clinics and other healthcare sites
- Minimal broadband availability
- Minimal cell phone reception



ASP Solutions Are Not Always Practical in Mendocino County

- Local loop split between AT&T and Verizon, which creates unaffordable circuit costs if these utility service boundaries must be crossed
- Dependable broadband only available in the larger towns, and not at all sites of health care
- Shortage of qualified tech support



Dismantling an Enterprise ASP

January 2002

- In 2000 six ambulatory practices in Mendocino County formed an alliance to build an enterprise ASP to host a Practice Management Software system
- In 2001, after careful planning, the first phase brought three practices on line
- Unable to discover how to shared management of the ASP, the practices decided to dismantle the enterprise
- I was hired to dismantle the ASP



Proposing a Health Information Exchange

August 2003 -- "Mendocino SHARE"

- Thirteen community stakeholders in Mendocino County formed a collaborative to demonstrate a virtual case management system for chronic disease
- Technology component of the system will require a community Master Person Index with a records exchange sharing feature
- Proposal funded by HRSA in November 2003



Buy or Build MPI Software?

December 2003 -- "Mendocino SHARE"

- Asked HRSA for software vendors who previously provided MPI solutions to other communities
- HRSA provided list of 77 vendors
- Called a dozen vendors, found no reusable components, only an opportunity to re-purchase
- Began searching for an open source alternative so that our technology investment can be leveraged towards the common good for all rural communities



Finding an Open Source Software Developer

April 2004 -- "Mendocino SHARE"

- Discovered open source projects with some of our technical needs
- Released a detailed RFP soliciting vendors to provide an open source MPI tool kit
- 12 vendor proposals received
- 5 vendor demonstrations
- **Browsersoft** selected to build our open source tool kit



Open Health Records Exchange

August 2004 -- “Mendocino SHARE”

- Proof of concept release of **OpenHRE**, our open source tool kit from which a community MPI and records exchange can be built
- During the project we adopted the **Connecting for Health** Technical Roadmap, which specifies a Record Locator Service (RLS)
- Demonstrations of the completed software provided to HRSA, CMA, Connecting for Health



Connecting for Health RLS Demonstration

June 2005 -- “Mendocino HRE”

- Renamed community project **Mendocino Health Records Exchange** (HRE)
- Invited to participate as one of three communities in the Connecting for Health **RLS Demonstration**
- Connecting for Health **Common Framework** as the basis for the RLS demonstration
- Worked with **MA-SHARE** (Massachusetts) and **IHIE** (Indiana)



Connecting for Health NHIN Prototype

July 2005 -- “Mendocino HRE”

- Connecting for Health **Common Framework** as the basis for an **NHIN Prototype** proposal to ONC
- **Computer Sciences Corp.** (CSC) selected as general contractor on the Connecting for Health proposal
- **Mendocino HRE** invited as one of three communities in the prototype, along with **Indiana** and **Massachusetts**
- Contract awarded by ONC in November 2005



Rural Health Information Technology

Connecting for Health

Record Locator Service

OpenHRE Software

Mendocino HRE



What is Connecting for Health?

- Broad-based, public-private collaborative
- Over 100 stakeholders on Steering Committee
- Founded and supported by the Markle Foundation
- Additional support from the Robert Wood Johnson Foundation

MARKLE FOUNDATION

<http://www.connectingforhealth.org>

THE
ROBERT WOOD
JOHNSON
FOUNDATION®



Connecting for Health Recommendations

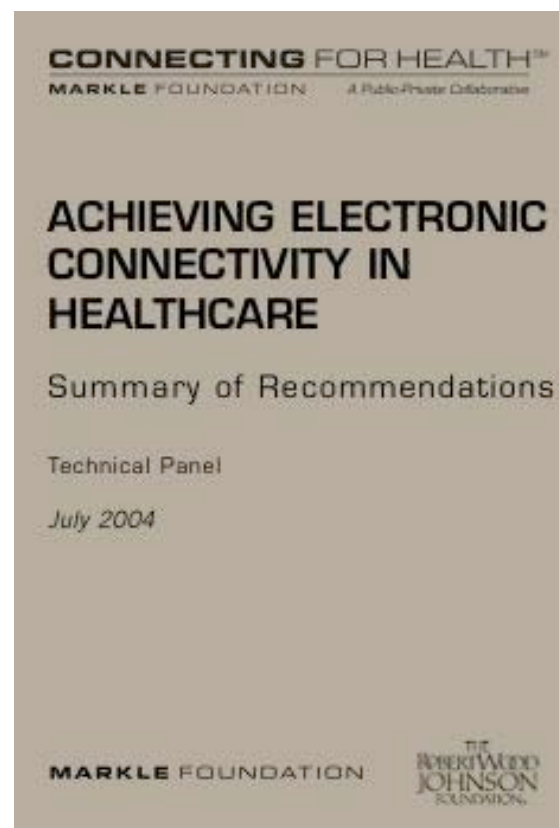
- Implement information exchange now over the current Internet -- no new network is needed
- Use incremental steps, no “big bang” approach
- Achieve interoperability with open, consensus-driven and non-proprietary standards
- Build the NHIN by conforming to a **Common Framework** of technical components, standardized methodologies and explicit policies



Connecting for Health Technical Roadmap

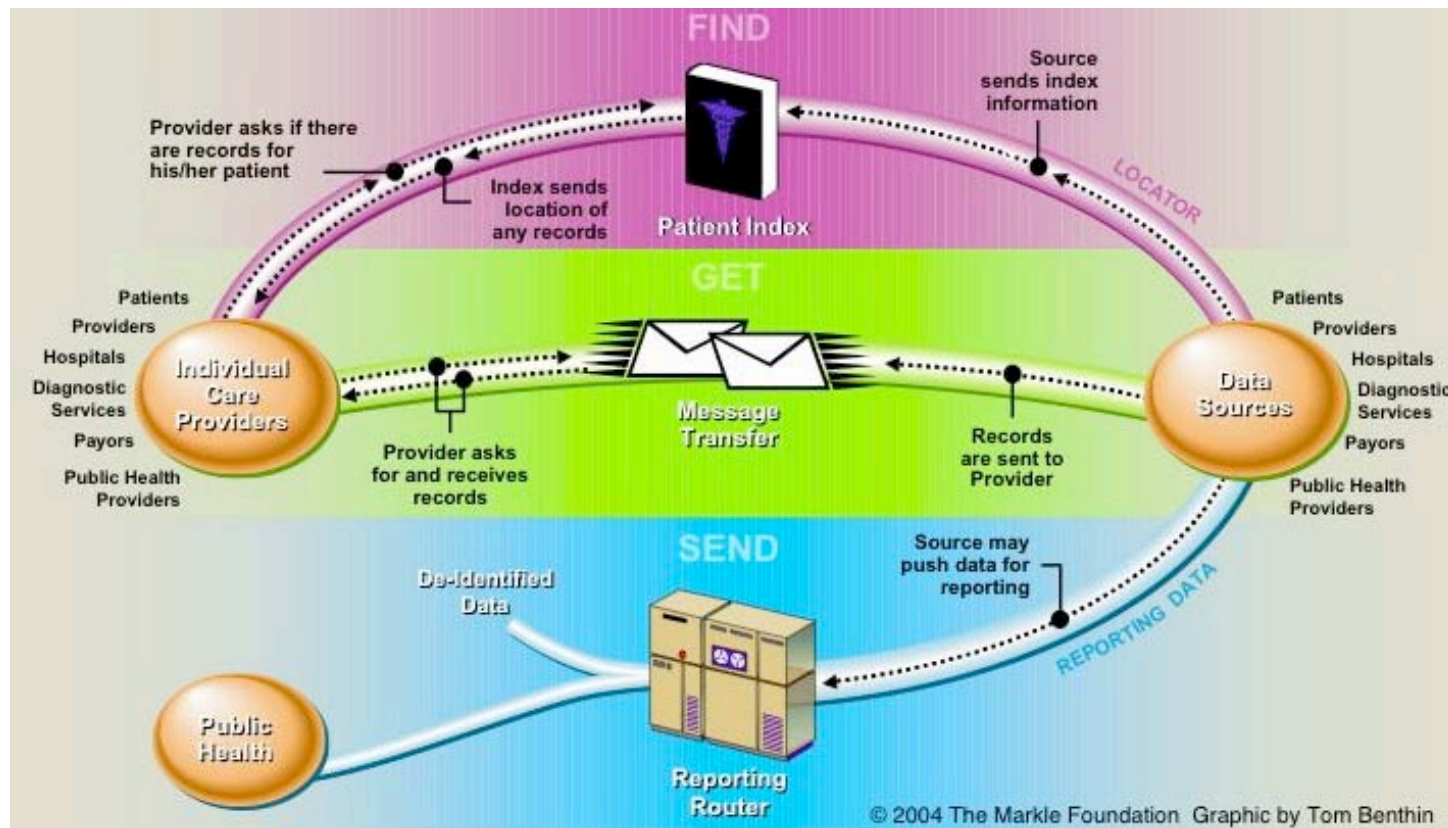
July 2004

- Shared vision of next steps
- Developed and agreed to by all major stakeholders
- Practical goals achievable in 1 to 3 years
- Build incrementally from where we are, not overhauling everything at once





Connecting for Health Schematic





Connecting for Health Common Framework: Overview and Principles

Policy Guides: How Information is Protected

P1	The Architecture for Privacy in a Networked Health Information Environment
P2	Model Privacy Policies and Procedures for Health Information Exchange
P3	Notification and Consent When Using a Record Locator Service
P4	Correctly Matching Patients with Their Records
P5	Authentication of System Users
P6	Patients' Access to Their Own Health Information
P7	Auditing Access to and Use of a Health Information Exchange
P8	Breaches of Confidential Health Information

Technical Guides: How Information is Exchanged

T1	The Common Framework: Technical Issues and Requirements for Implementation
T2	Health Information Exchange: Architecture Implementation Guide
T3	Medication History Standards
T4	Laboratory Results Standards
T5	Background Issues on Data Quality
T6	Record Locator Service: Technical Background from the Massachusetts Prototype Community

Model Contractual Language

M1	Key Topics in a Model Contract for Health Information Exchange	M2	A Model Contract for Health Information Exchange
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Common Framework Requirements

- No specific software application is needed
Example -- different email applications all read the same email data standards
- Technical infrastructure can be built on any secure platform as long as it produces and consumes the common data standards



RHIO renamed Sub Network Organization (SNO)

- SNO defined as a group of entities -- regional or non-regional -- that share a single RLS
- Potential examples of non-regional SNOs
 - CDC, state health departments, pharmacy chains, the VHA, health plans
- NHIN defined as the interoperation of SNOs



Rural Health Information Technology

Connecting for Health

Record Locator Service

OpenHRE Software

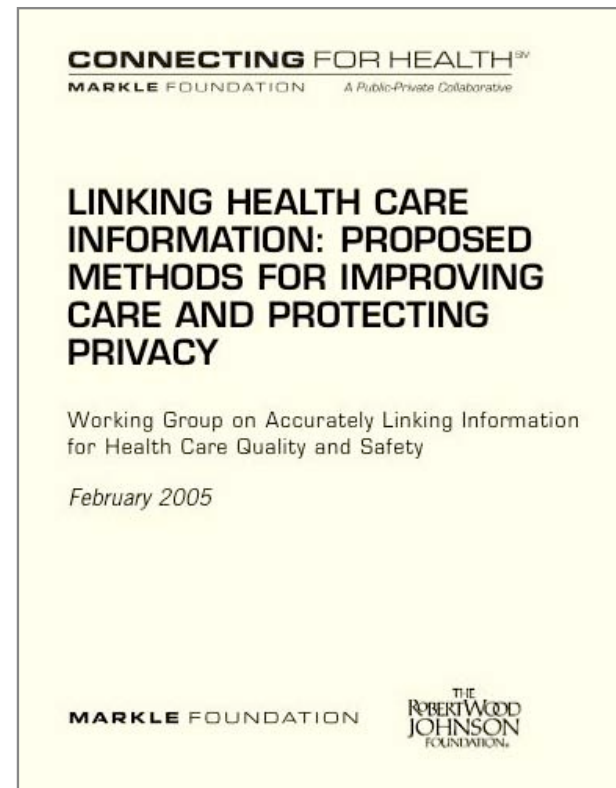
Mendocino HRE



Record Locator Service (RLS)

February 2005

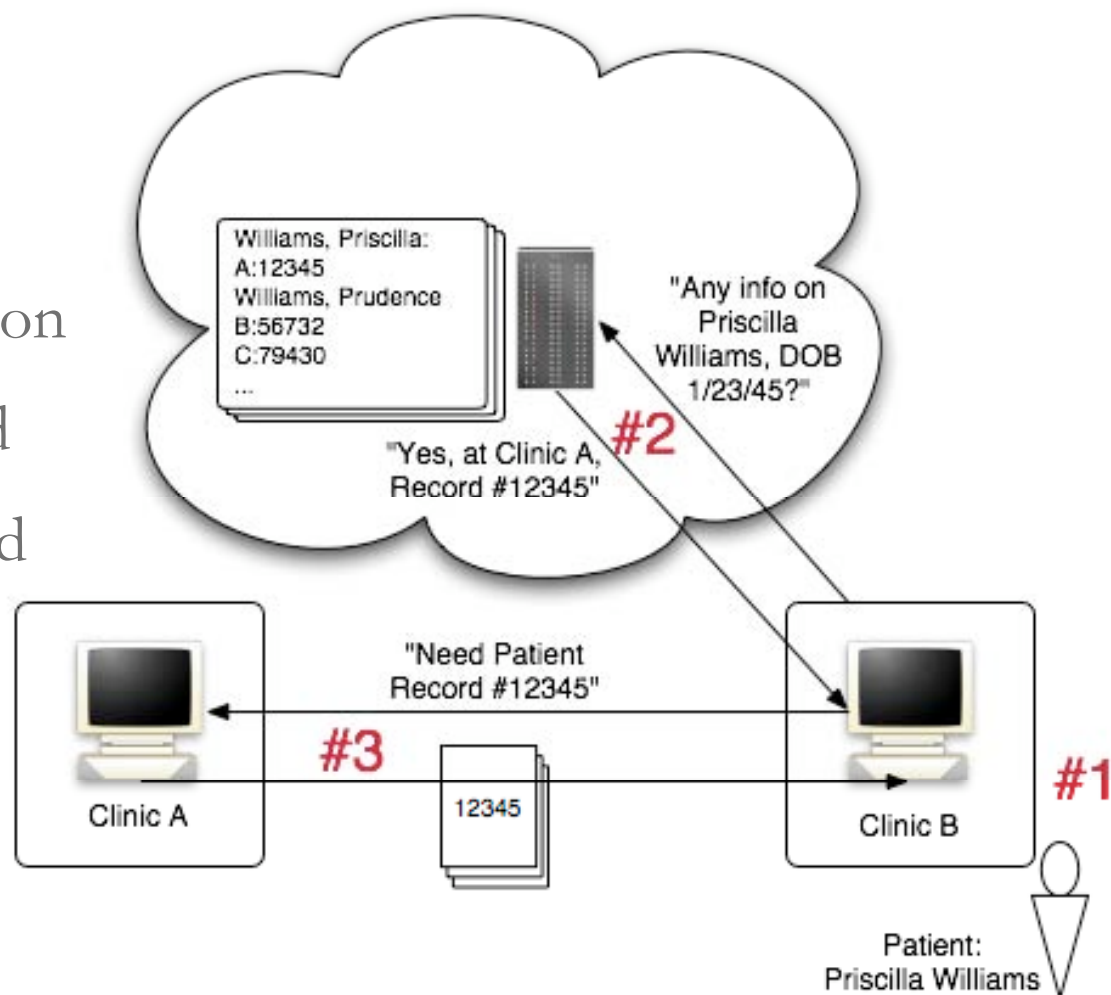
- Separates knowing where information is located from knowing the information
- Enables security, privacy and autonomy for all participants in the process
- Release of information subject to authorization requirements





RLS Simplified

- **Ask** for a location
- **Receive** the location
- **Ask** for the record
- **Receive** the record





RLS Prototype Assumptions

- TCP/IP across standard Internet
- SSL session
- SOAP wrapper around HL7 payload in XML
- HL7 Bilingual (*2.4 or 3.0*)
- Display Neutral
- Minimum data field set for demonstration



Common Framework Enables Local Variations

HL7 Version Neutral

- All sites will support HL7 2.4 messaging
- Optional support for HL7 3.0 messaging

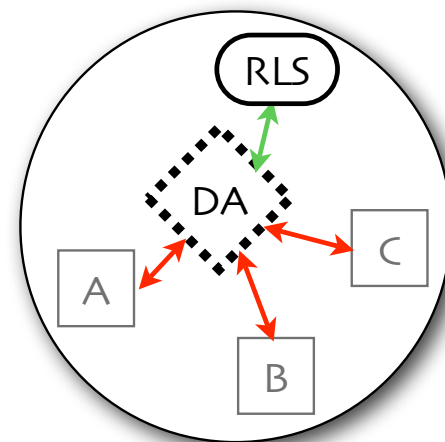
If both support 3.0, then 3.0, else 2.4



Common Framework Enables Local Variations

RLS at Indiana HIE

- Java Platform (J2EE)
- Distributor Aggregator (DA)
- DA talks to RLS
- HL7 2.4 messaging



Indiana HIE

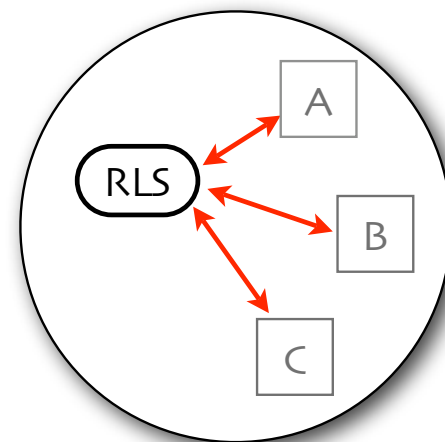
<http://www.ihie.com>



Common Framework Enables Local Variations

RLS at Massachusetts SHARE

- BizTalk on Microsoft .NET
- Gateway mediation at each node
- RLS as central service
- HL7 3.0 messaging



*Massachusetts
SHARE*

<http://www.mahealthdata.org/ma-share>

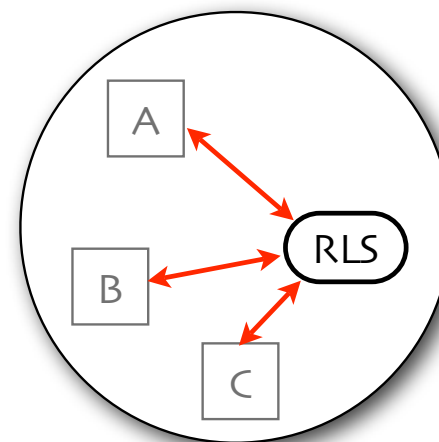


Common Framework Enables Local Variations

RLS at Mendocino HRE

- Java Platform (J2EE)
- OpenHRE provides RLS
- HL7 2.4 or 3.0 messaging

<http://mendcinohre.org>

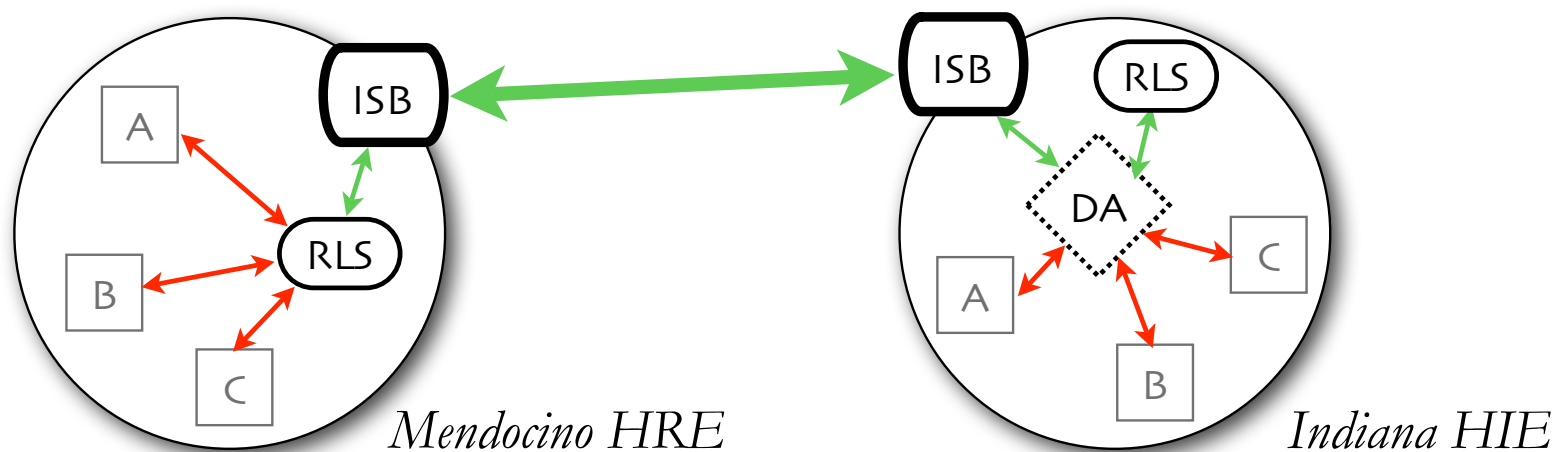


Mendocino HRE



Inter-SNO Bridge (ISB)

- Traffic from outside a SNO passes through an Inter-SNO Bridge
- ISB acts as an application, taking queries and returning aggregated pointers to record locations

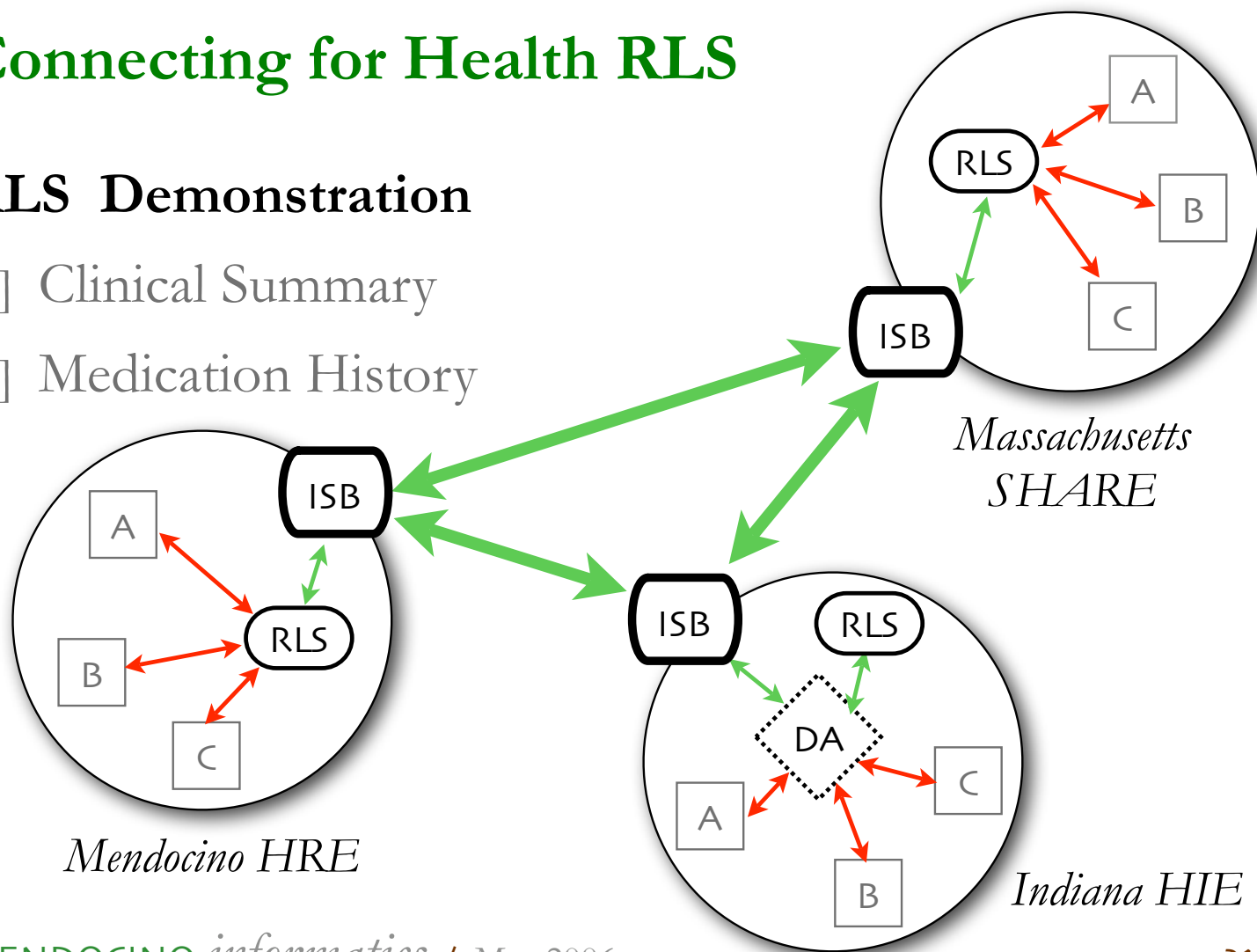




Connecting for Health RLS

RLS Demonstration

- [1] Clinical Summary
- [2] Medication History





Rural Health Information Technology

Connecting for Health

Record Locator Service

OpenHRE Software

Mendocino HRE



What is OpenHRE?

- **OpenHRE**, short for Open Health Records Exchange
- **OpenHRE** is open source software, released under the GPL
- **OpenHRE** is not an EHR
- **OpenHRE** is a standards-based, scalable multi-level record locator service with federated records exchange and secure access control
- **OpenHRE** implements the NHIN prototype as defined by the Connecting for Health Common Framework



With OpenHRE only a browser is needed to:

- Positively identify an individual patient
- Assemble an index of a patient's health records
- Securely retrieve clinical data, within HIPAA compliant security policies
- Display retrieved data, including longitudinal expressions assembled from separate sources

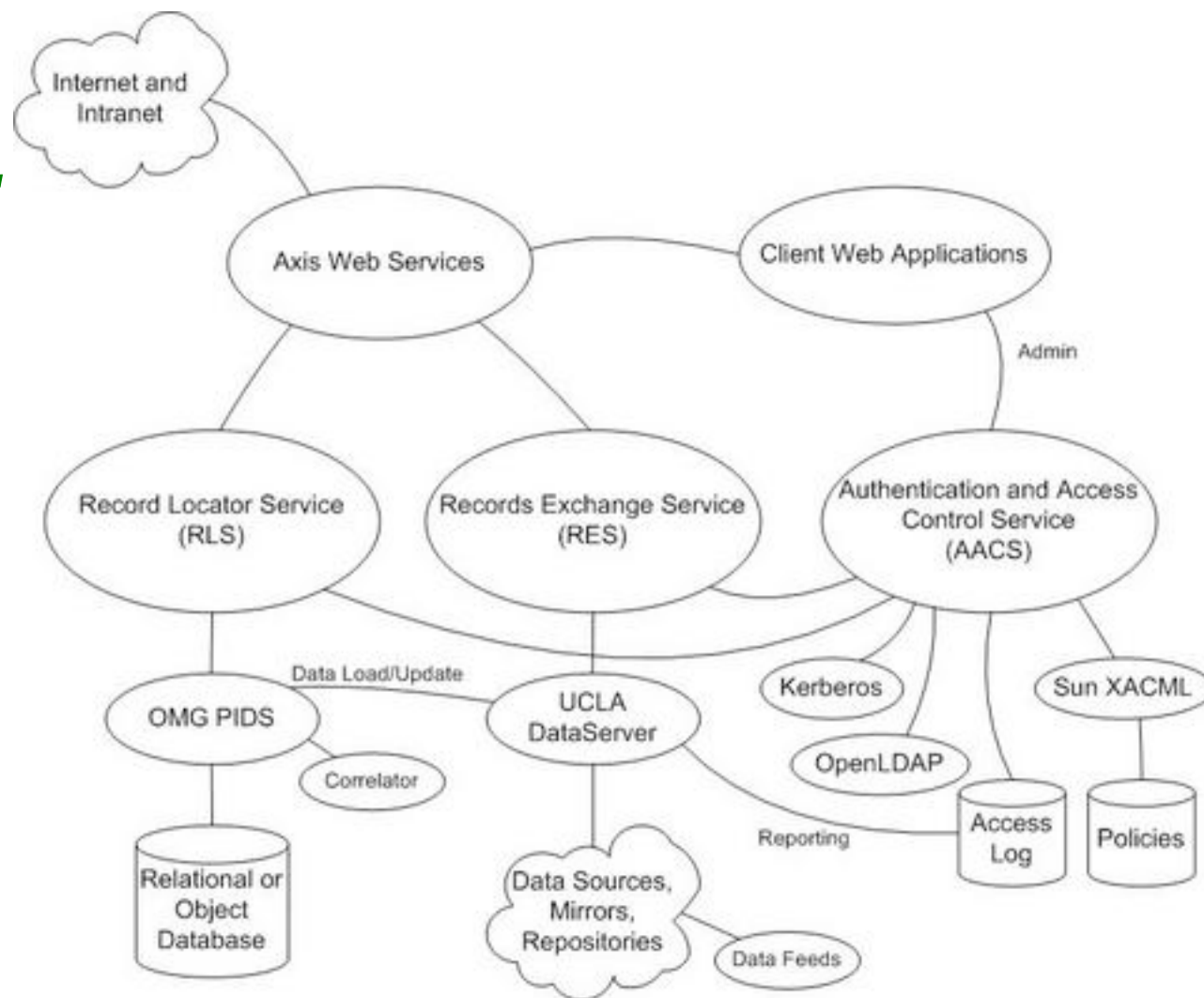


OpenHRE Software Services

- **Record Locator Service** (RLS)
- **Record Exchange Service** (RES)
- **Authentication/Access Control Service** (AACCS)
- **Lexical Translation Service** (*planned*)



OpenHRE



Browsersoft, Inc



OpenHRE Record Locator Service (RLS)

- Use RLS within a network to build an enterprise Master Person Index (MPI)
- Use RLS across enterprise networks to build a community MPI for a SNO
- Available as a J2EE-based CORBA service
- Available as an Apache Axis web service

<http://openhre.org>



Indexing Patient Records

- OpenHRE uses a Patient ID Server (PIDS) to index demographic and record location details
- Data streams set up for initial data load and for incremental updates
- Any relational or object database can host the PIDS data



Matching Patient Records

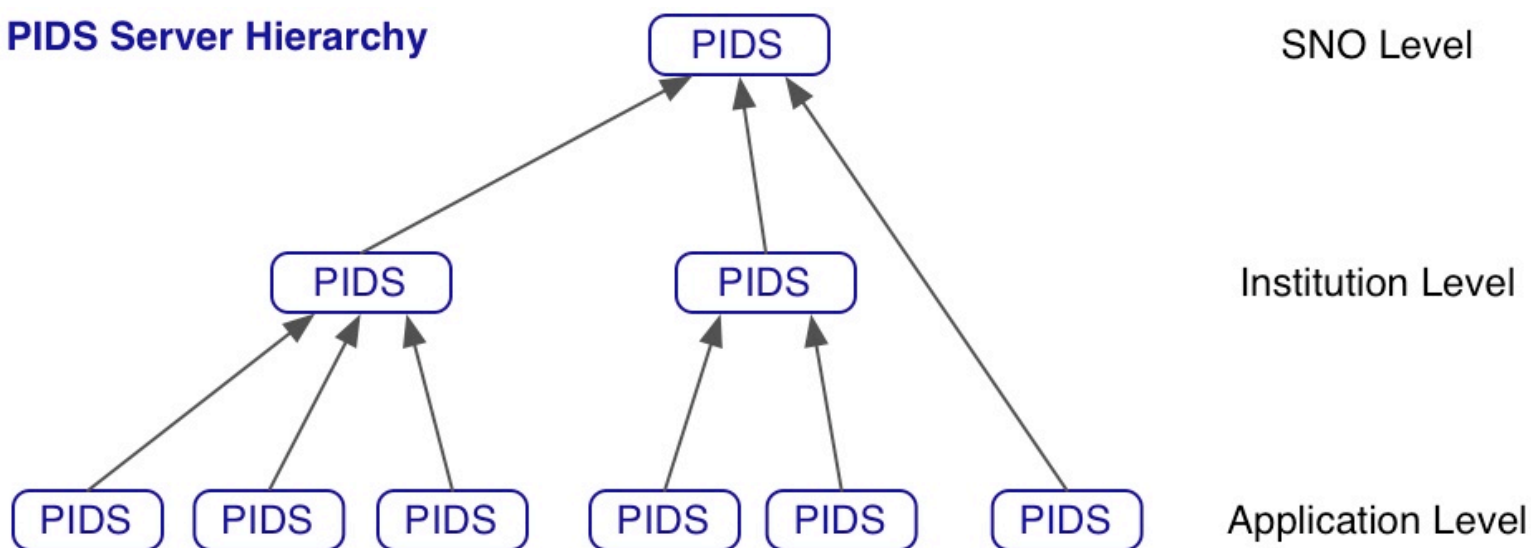
- OpenHRE can match patient identities from one or more PIDS repositories
- A combination of preprocessing steps and on-the-fly analysis produces matches
- OpenHRE uses Data Cleaning, Standardization, Transformation, Probabilistic Weighting, Deterministic Algorithms and Blocking steps to produce a match
- Matching goal is **no false positives**



Community Indexing

- PIDS repositories roll up multiple levels
- Federated queries are an option for increased security

PIDS Server Hierarchy





OpenHRE Record Exchange Service (RES)

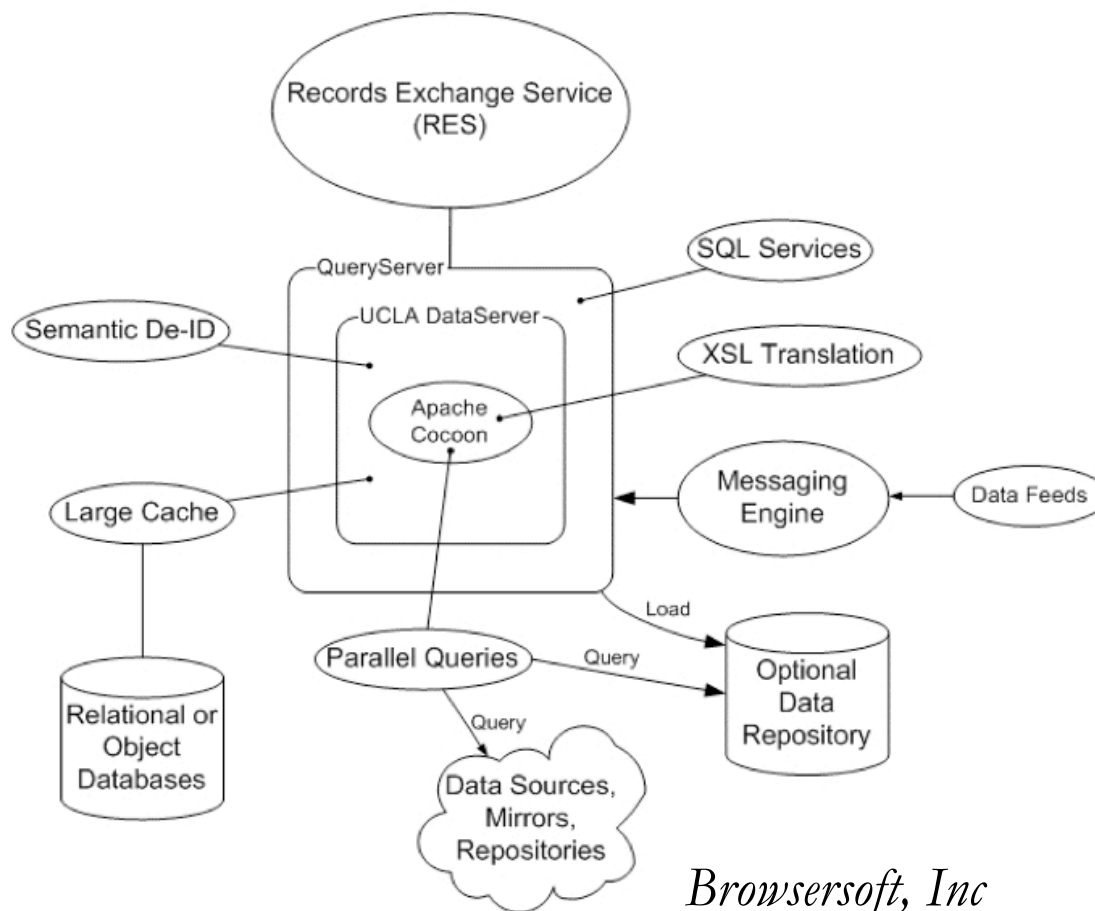
- Retrieve patient health record from EHR system (or its proxy) using federated queries within a SNO
- Retrieve patient health record from an external SNO
- Health record can be cached, de-identified and formatted for presentation
- Parallel query, caching, de-identification and transformation services via UCLA's DataServer -- an open source service built on Apache Cocoon

<http://www.mii.ucla.edu/dataserver/>



Records Exchange Service

- Basically a pass through middleware solution
- Robust caching capabilities



Browsersoft, Inc



OpenHRE Authorization/Access Control Service (AACCS)

- Kerberos and LDAP-based user authentication, encryption and password management
- Authorization based on roles and groups
- Sun XACML access control service implementing complex policies, including content-based authorization
- OpenHRE web-based security administration tool available

<http://sunxacml.sourceforge.net/>



OpenHRE Portal

- Use Cases
- Presentations
- Demonstration
- Software Plan
- Software to download

The screenshot shows the OpenHRE.org website. At the top, there is a blue header with the text 'OPENHRE.ORG' on the left and 'MAY 08, 2005 - 10:55 AM' on the right. Below the header is a large blue banner with the 'OpenHRE™ .org' logo and the tagline 'Open Source Health Records Exchange'. To the right of the banner is a photo of four healthcare professionals. Below the banner is a vertical sidebar on the left with the word 'POSTNUKE' written vertically. The main content area is divided into several sections: a 'Main Menu' with links to Home, FAQ, News, Topics, Downloads, Discussions, and Web Links; an 'Online' section showing 1 guest and 0 members; a 'Welcome Guest' message; a 'Login' form with fields for Username and Password, a 'Remember me' checkbox, and a 'Login' button; a 'Categories Menu' with links to Discussions, Electronic Health Records, General, Health Records Exchange, Master Patient Index, National Health Information Network, Product Reviews, and Security; and a 'Mission' section with bullet points. A recent post titled 'RLS versus MPI' is also visible.

<http://openhre.org>



OpenEMed

The RLS from OpenHRE uses the OpenEMed implementation of the CORBAmed PIDS

OpenEMed is an open source J2EE software project originally developed at Los Alamos National Laboratory



<http://openemed.org/>



UCLA DataServer

OpenHRE's RES uses UCLA's DataServer, an open source service built on Apache Cocoon

DataServer provides parallel queries, caching, de-identification and transformation services



<http://www.mii.ucla.edu/dataserver>



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Mendocino Health Care Stakeholders

- Redwood MedNet -- a nonprofit network of solo and small group physician practices
- Alliance for Rural Community Health -- local consortium of 6 Community Health Centers
- 3 Indian Health Service Clinics
- 1 Veterans Administration Clinic
- 3 small rural Hospitals (165 beds total)
- Mendocino County Department of Public Health
- Laboratory, Radiology & Pharmacy



Projects Completed

- Mendocino SHARE -- a prototype demonstration of health records exchange between safety net clinics
- Record Locator Service -- a demonstration of the Connecting for Health Common Framework



Projects Underway

- NHIN Prototype -- Mendocino HRE is the open source implementation of the Connecting for Health Common Framework -- *contract with ONC*
- Clinical Messaging -- implementation of a community infrastructure to deliver lab results electronically to 24 physicians -- *grant from Blue Shield of California Foundation*
- Community Governance -- planning project led by the Mendocino County Department of Public Health -- *grant from the Robert Wood Johnson Foundation*



Investigation of Business Case

- NHIN Prototype -- business case analysis for this prototype scheduled for second half 2006
- Clinical Messaging -- business case development underway



Links to Projects & Project Management

<http://mendocinohre.org>

<http://www.redwoodmednet.org>

<http://www.openhre.org>

<http://www.connectingforhealth.org>

<http://minformatics.com>

Will Ross / wross@minformatics.com

