

Making Clinical Data Agile



Ambulatory Community Health Organization Task Force
February 27, 2009



Will Ross, Project Manager

Making Clinical Data Agile

About Redwood MedNet

Clinical Data Sharing Challenges

Clinical Data Agility Service

Redwood MedNet HIE

Health information
exchange (HIE)

Located two hours north of
San Francisco

Rural region

6,000 square miles

200,000 population

6 rural hospitals, 247 beds

8 FQHCs, 12 RHCs, 3 IHS clinics



Redwood MedNet Directors

Mark Apfel, MD -- Medical Director, FQHC

Peter Cho, MD -- Family Practice

Jed Gladstein, JD -- Attorney

Carl Henning, MD -- Surgeon, RHC

Jeff King -- Executive Director, FQHC

Tom Reidenbach, PharmD -- Independent Pharmacy

Robert Rushton, MD -- Family Practice, RHC

Marvin Trotter, MD -- County Health Officer

Mark Turner -- Rural Hospital IT Manager

Redwood MedNet, Inc.

501(c)(3) nonprofit corporation established in 2005

Currently in grant funded startup phase

All data services free through 2009

Technology focus on making health data agile across the entire health care community

Sustainability model designed as a cooperative health data delivery service

When business office is launched, each participant will pay small fees to support the data services

Redwood MedNet Operations

Will Ross -- *Project Manager*

Gary Teichrow -- *Technology Advisor*

Michael Hogarth, MD -- *Health Informatics Advisor*

Lori Hack, MBA -- *Privacy Advisor*

Davis Wright Tremaine -- *Legal Counsel*

Redwood MedNet Services

April 2008 -- Electronic laboratory result delivery service launched from first lab to first clinic

January 2009 -- Delivered 4,500 test results from 2 laboratories to 20 physicians / midlevels

December 2009 -- Plan to deliver 10,000 test results per month from 7 laboratories to 75 physicians / midlevels

Radiology delivery in pilot testing

e-prescribing service in development

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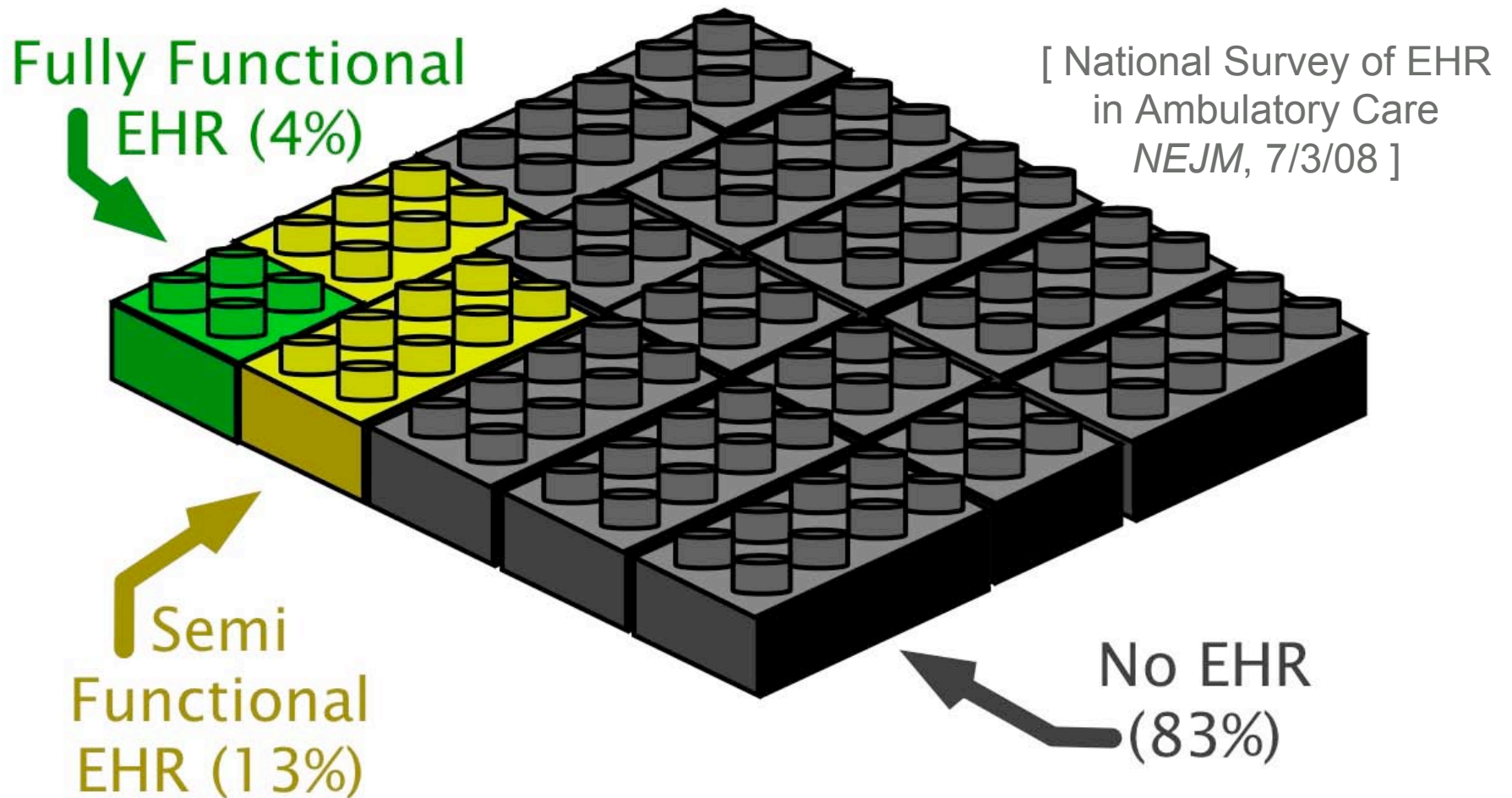
EHR Reality Check

4% of American ambulatory physicians have an extensive, fully functional electronic health record (EHR), while 13% have a basic EHR system

DesRoches, Campbell, Rao, et al., "EHR in Ambulatory Care: A National Survey of Physicians." *New England Journal of Medicine*, July 3, 2008

75% of installed EHRs fail to deliver decision support and clinical data interoperability

EHR Reality Check



Certification Reality Check

Massachusetts eHealth Collaborative

- \$50 million project budget
- 5 year project timeline
- EHR installed for 500 physicians
- The only full scale mass deployment of EHR

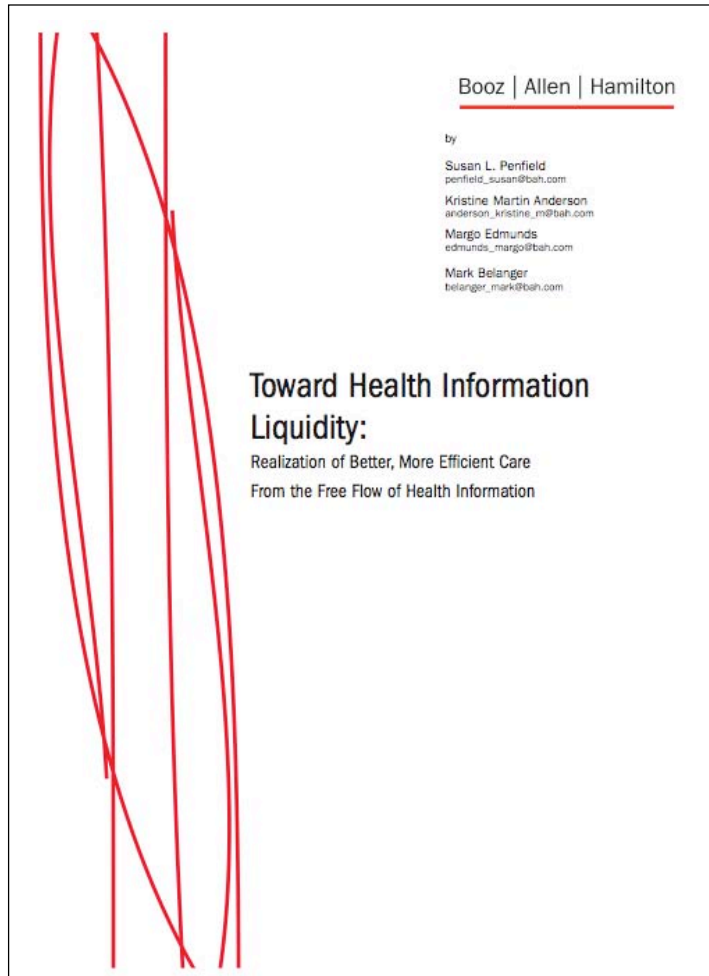
Goroll, Simon, Tripathi, et al., “Community-wide Implementation of Health Information Technology: The Massachusetts eHealth Collaborative” *Journal of the American Medical Informatics Association*, January-February 2009

Certification Reality Check

“Despite extremely positive national activity in the areas of vendor certification and system standards, the current rudimentary state of standards means they are still insufficiently specific for routine everyday use by practices and communities, especially in regard to ensuring interoperability and ease of use for reviews in quality of care.”

Goroll, Simon, Tripathi, et al., “Community-wide Implementation of Health Information Technology: The Massachusetts eHealth Collaborative” *Journal of the American Medical Informatics Association*, January-February 2009

Health Information Liquidity



Realization of Better, More Efficient Care From the Free Flow of Health Information

White paper released by
Booz Allen Hamilton,
January 2009

Penfield, Anderson, Edmunds
& Belanger

Health Information Liquidity

“The market is not demanding robust EHRs, as shown by low adoption rates, especially in small office-based practice settings.”

“RxHub/SureScripts have shown it is possible to create a patient-centric medication and allergy history outside the EHR.”

“The goal is more than full EHR adoption. Free flowing health information, communication among care teams, and all the benefits of interoperable health information do not come automatically with EHR adoption.”

Penfield, Anderson, et al., “Toward Health Information Liquidity”

Standards Reality Check

“Information technology is a tool, not a goal.”

“If you computerize an inefficient system, you will simply make it inefficient, faster.”

“Technology and standards alone will not lead to health IT adoption, let alone transform health care.”

“You can’t ‘make’ standards any more than you can ‘make’ friends.”

Diamond & Shirky, “Health Information Technology: A Few Years of Magical Thinking?” *Health Affairs*, August 19, 2008

Incentive to Share Data

“Current legal and financial incentives provide little motivation to share information across institutions,
which is critical to improving patient outcomes.”

“Information won’t be shared until there is a compelling reason to share it and until the parties that need to share it trust each other.”

“People adopt standards after they have a reason to share.”

Diamond & Shirky, “Health Information Technology: A Few Years of Magical Thinking?” *Health Affairs*, August 19, 2008

Redwood MedNet Strategy

Early EHRs designed as institutional silos to organize local clinical data

Next generation, network-aware EHRs will co-evolve with health data interoperability networking services based on emerging federal standards

Redwood MedNet is building an HIE network service to automate and accelerate the community-wide agility of clinical data

HIE services focus on provisioning secure and appropriate access to standards-based clinical data

Making Clinical Data Agile

About Redwood MedNet

Clinical Data Sharing Challenges

Clinical Data Agility Service

Redwood MedNet Tactics

Capture clinical data while still electronic, before it is printed or faxed

Transport clinical data in a standards based format via a secure electronic service

Deliver clinical data to the health care provider expecting the data

Provide appropriate delivery options to match site level clinical workflows

Create an agile, minimalist clinical data network



Home Administration

Lab Reports Patients

Search Lab Reports...

Lab Report Actions

Refresh List

Announcements

This static site demonstrates the functionality of the Redwood MedNet clinical data results delivery service.

Support / Help

Send questions to support@redwoodmednet.org

Lab Reports

Page 3 of 7 | Displaying Items 41-60 of 122

Flags	Patient Name	Report ID	Provider	Received	Lab	Tests
	KBQSKRZ, EDUARDO	617011	ESYR, P.	06/18/08 03:54	DLS	CMP TSH LIP URIC LDH...
	QBWTBAROO, MARIA	616809	ESYR, P.	06/18/08 03:54	DLS	A1C
	QFZBB, KATHY	617006	ESYR, P.	06/18/08 03:54	DLS	RA CBC
	KOTKSWHRZ, NOHEMI	537007	ESYR, P.	06/18/08 03:53	DLS	CBC
	BWHSKR, YESENIA	537004	ESYR, P.	06/18/08 03:53	DLS	CMP TSH LIP URIC LDH...
	QFZBB, KATHY	617007	ESYR, P.	06/18/08 03:52	DLS	ESR
	AOIRZ, LEONOR	536725	ESYR, P.	06/18/08 03:51	DLS	CHPROB GCPCROB
	QOKB, JENNIFER	536991	ESYR, P.	06/18/08 03:51	DLS	LEAD
	NBQBBO, ALEJANDRA	536865	ESYR, P.	06/18/08 03:50	DLS	CHPROB GCPCROB
	KBQSKRZ, DOLORES	536775	JSN, P.	06/18/08 03:50	DLS	CHPROB GCPCROB
	BKKRWHSO, RUBEN	537027	ESYR, P.	06/18/08 03:50	DLS	CMP LIP TPSA TSH CBC
	YBKWBJ, NORMA	536864	ESYR, P.	06/18/08 03:49	DLS	CHPROB GCPCROB
	EAOKRJ, ELIA	617098	ESYR, P.	06/18/08 03:49	DLS	URIC LDH FE CBC CMP ...
	WBKFSB, DAVID	537051	JSN, P.	06/18/08 03:48	DLS	A1C CMP LIP
	FOKOOB, ROXANA	537065	JSN, P.	06/18/08 03:48	DLS	CBC TBIL DBIL
	XSQRORZ, FRANCISCA	537039	JSN, P.	06/18/08 03:48	DLS	HEP ANA RA LIP URIC ...
	KOVRKNJ, MARIE	536565	JSN, P.	06/18/08 03:47	DLS	TRIG
	ZSOW, JOHN	537042	JSN, P.	06/18/08 03:47	DLS	URALB A1C LIP TPSA T...
	BQSOS, BEHZAD	537081	ESYR, P.	06/18/08 03:47	DLS	TPSA
	YRKB, CESAR	537102	ESYR, P.	06/18/08 03:46	DLS	TEST TPSA

Flag Legend: = Needs Review = Preliminary results = Critical Results = Archived



Home Administration

Lab Reports Patients

Report 41 of 122 | Displaying Report 41 of 122

Report Actions

- Back to List
- Download Lab Report
- Print Lab Report
- Archive Lab Report
- View Report Accesses

Announcements

This static site demonstrates the functionality of the Redwood MedNet clinical data results delivery service.

Support / Help

Send questions to support@redwoodmednet.org

Report General Information

Patient Name	Patient Lab ID	Encounter ID	Date Of Birth	Gender	Phone Number
KBQSKRZ, EDUARDO	044435211	617011	01-01-1999	M	(123) 456-7890

Ordering Provider	Collection Date	Reported Date	Received From Lab	Status
ESYR, PROVIDER ()	05-29-2008 15:51:00	05-29-2008 16:41:49	06-18-2008 03:54:50	F

Clinical Procedure Results

Diagnostic Procedure	Normal	Abnormal	Units	Ref Range	Status	Lab ID
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Performing Labs

CLF12345 - Demo Lab Source - 123 Fake Street Nowhere, CA 91234 US

COMP METABOLIC P14 (3548500)

GAYLE KUTNICK notified FAXED TO ALLIANCE on 5/29/08 at 17:15

GLU		108	mg/dl	70-100	F	CLF12345
BUN	15		mg/dl	7-20	F	CLF12345
CREA	1.1		mg/dl	0.6-1.3	F	CLF12345
NA	140		mmol/L	136-145	F	CLF12345
K	4.0		mmol/L	3.5-5.0	F	CLF12345
CL	102		mmol/L	96-108	F	CLF12345
CO2	28		mmol/L	21-32	F	CLF12345
CA	9.7		MG/DL	8.5-10.7	F	CLF12345
TBIL	0.6		MG/DL	0.1-1.9	F	CLF12345
TPRO	7.4		GM/DL	6.0-8.2	F	CLF12345
ALB	4.2		GM/DL	3.4-5.0	F	CLF12345
AST		156	IU/L	15-37	F	CLF12345
ALT		187	IU/L	30-65	F	CLF12345

Example:
Printed lab
result showing
out of range
and critical
values

Note: In
production,
each printout
is branded
with specific
laboratory
identity

Patient Name	MRN	Encounter Id	Date Of Birth	Sex	Age	Phone No.
KBQSKRZ, EDUARDO	044435211	617011	01/01/1999	M	9 Y	(123) 456-7890
Physician	Received Date	Reported Date	Collected Date	Status	Page	
ESYR, PROVIDER	6/18/2008 3:54	5/29/2008 16:41	5/29/2008 15:51	F	1 of 2	

Diagnostic Procedure	Normal	Abnormal	Units	Ref Range	Status	Site Code
COMP METABOLIC P14 (3548500)						
GAYLE KUTACH notified FAXED TO ALLIANCE on 5/29/08 at 17:15						
GLU		108	mg/dl	70-100	F	CLF12345
BUN	15		mg/dl	7-20	F	CLF12345
CREA	1.1		mg/dl	0.6-1.3	F	CLF12345
NA	140		mmol/L	136-145	F	CLF12345
K	4.0		mmol/L	3.5-5.0	F	CLF12345
CL	102		mmol/L	96-108	F	CLF12345
CO2	28		mmol/L	21-32	F	CLF12345
CA	9.7		MG/DL	8.5-10.7	F	CLF12345
TBIL	0.6		MG/DL	0.1-1.9	F	CLF12345
TPRO	7.4		GM/DL	6.0-8.2	F	CLF12345
ALB	4.2		GM/DL	3.4-5.0	F	CLF12345
AST		156	IU/L	15-37	F	CLF12345
ALT		187	IU/L	30-65	F	CLF12345
ALKP	84		IU/L	50-136	F	CLF12345
ANIONGAP	10		MEQ/L	10-17	F	CLF12345
GFR	90		ML/MIN	60-125.0	F	CLF12345
TSH HIGHLY SENSITIVE (3548600)						
TSH	1.11		uIU/ML	0.34-4.85	F	CLF12345
LIPID PANEL (3548700)						
CHOL		201	MG/DL	100-200	F	CLF12345
TRIG		221	MG/DL	20-200	F	CLF12345
HDL	42		MG/DL	35-60	F	CLF12345
LDLC	115		MG/DL	40-130	F	CLF12345
IF TRIG >300 MG/DL THE CALCULATED LDL IS NOT VALID AND A DIRECT LDL WILL BE PERFORMED						
%C/HDL	4.8				F	CLF12345
%HDL%	21		%		F	CLF12345
URIC ACID (3548800)						
URIC		7.5	MG/DL	2.6-7.3	F	CLF12345
LDH (3548900)						
LDH		231	IU/L	100-190	F	CLF12345
IRON (3549000)						
FE	98		UG/DL	35-150	F	CLF12345
H PYLORI AB SCREEN (3549100)						

KBQSKRZ, EDUARDO	Generated: 10/30/2008 10:15	Document ID: 97a0fbc0-c5db-4643-9358-91a453a6285c	Page 1 of 2
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Portal Reality Check

Redwood MedNet is not a web portal

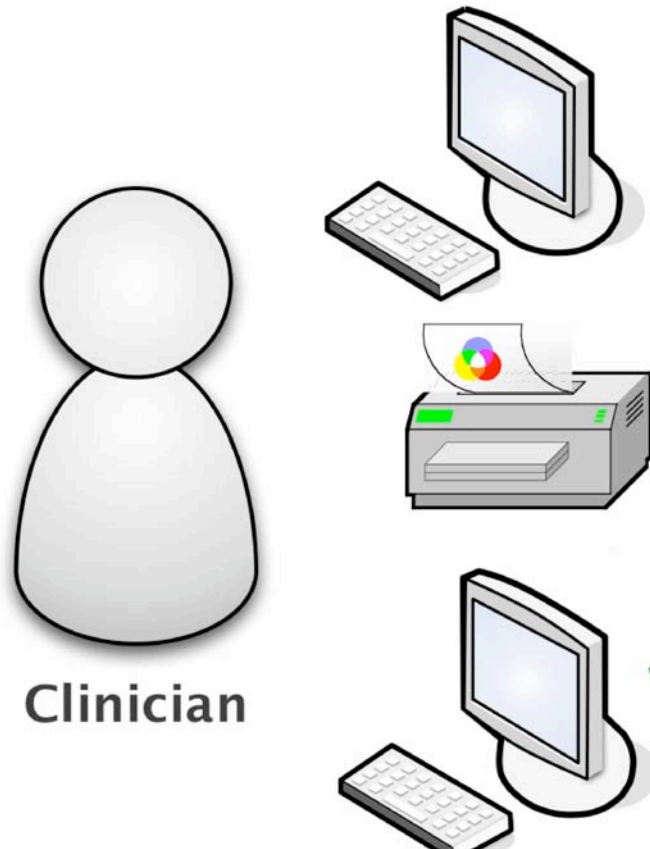
Redwood MedNet is a secure health data delivery service

The web portal is one method of health data delivery

Redwood MedNet also delivers health data by printer and by direct data stream to local healthcare software applications

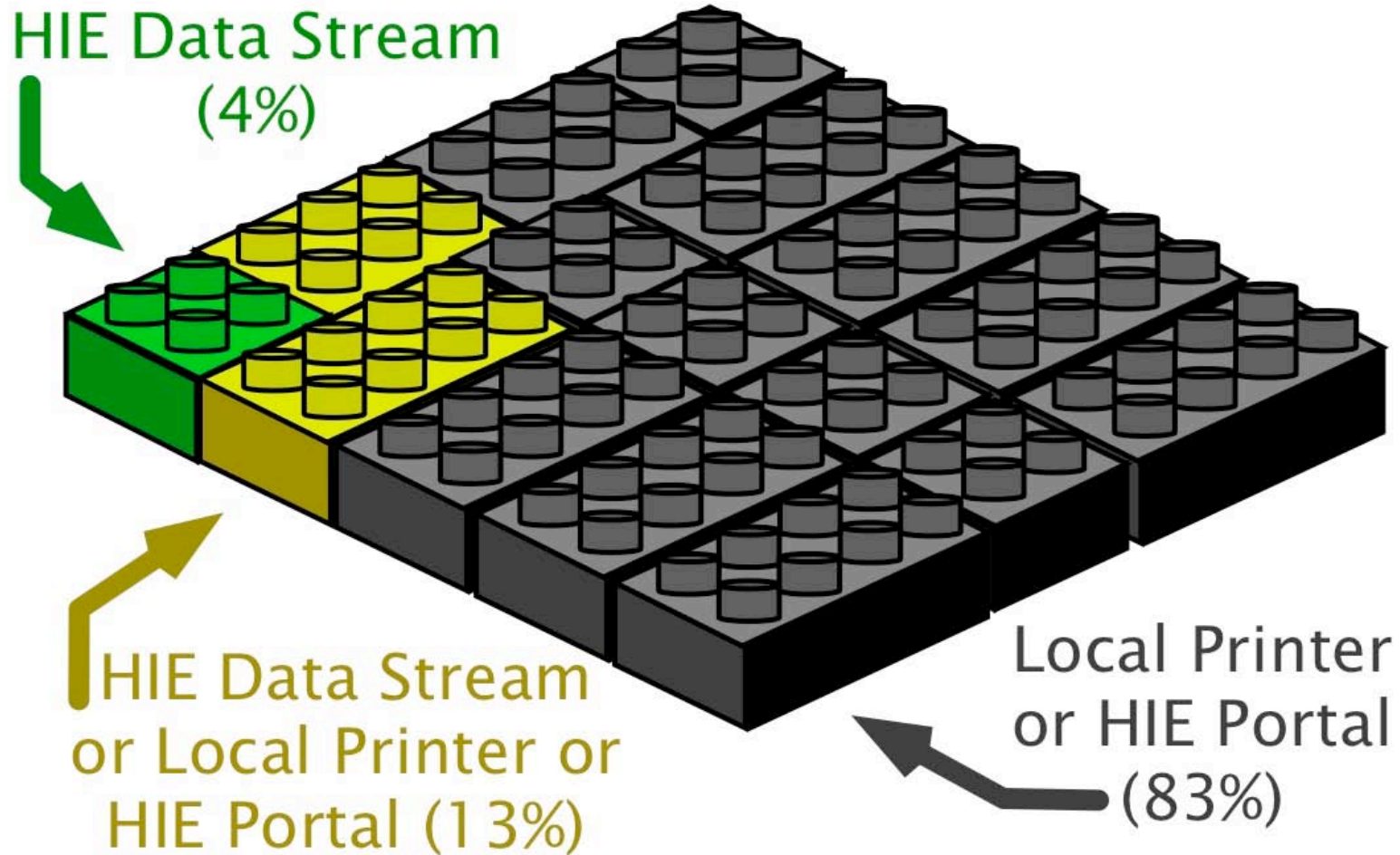
This data agility is necessary to match site level clinical workflows

Electronic Results Delivery



1. Secure Web Portal
2. Direct to printer or fax
3. Flow into EHR / CDMS

Adapting to Local Data Uses



Sample Data Path

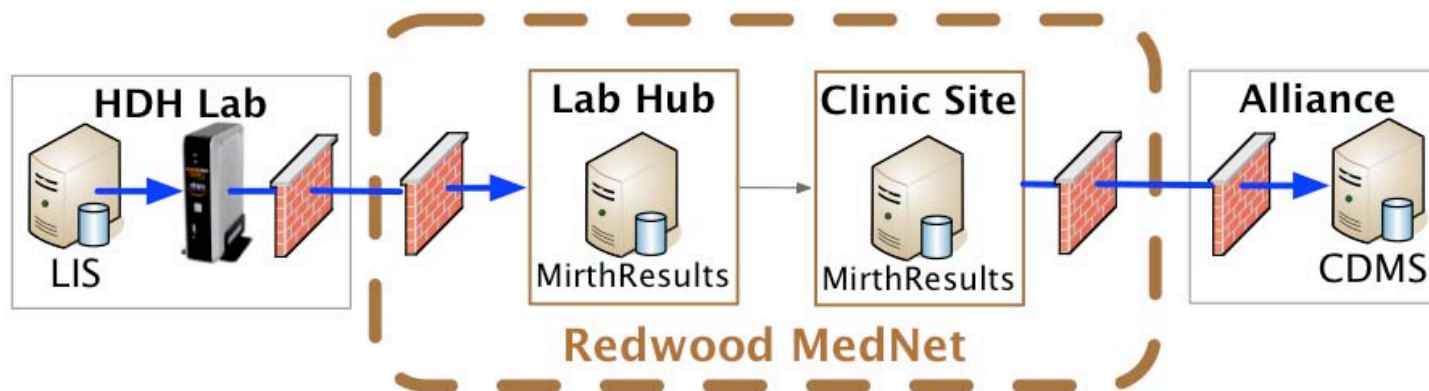
Redwood MedNet uses open source tools to

... transport electronic laboratory test results ...

... from a *Critical Access Hospital* lab ...

... to a Chronic Disease Management System ...

... at an *FQHC*





Mirth HIE Tools

Mirth -- Health data integration engine

MirthResults -- Clinical message service

MirthMatch -- HSSP compliant entity identification service (eMPI or RLUS)

MirthAnalytics -- Business intelligence data cube

Mirth Appliances -- Physical or virtual network nodes for targeted or swarm deployments

BUILT / IN DEVELOPMENT



Mirth

Open source health data integration engine

Understands health data standards

HL7, DICOM, NCPDP, X12, CCD, CCR

Knows standard communication protocols

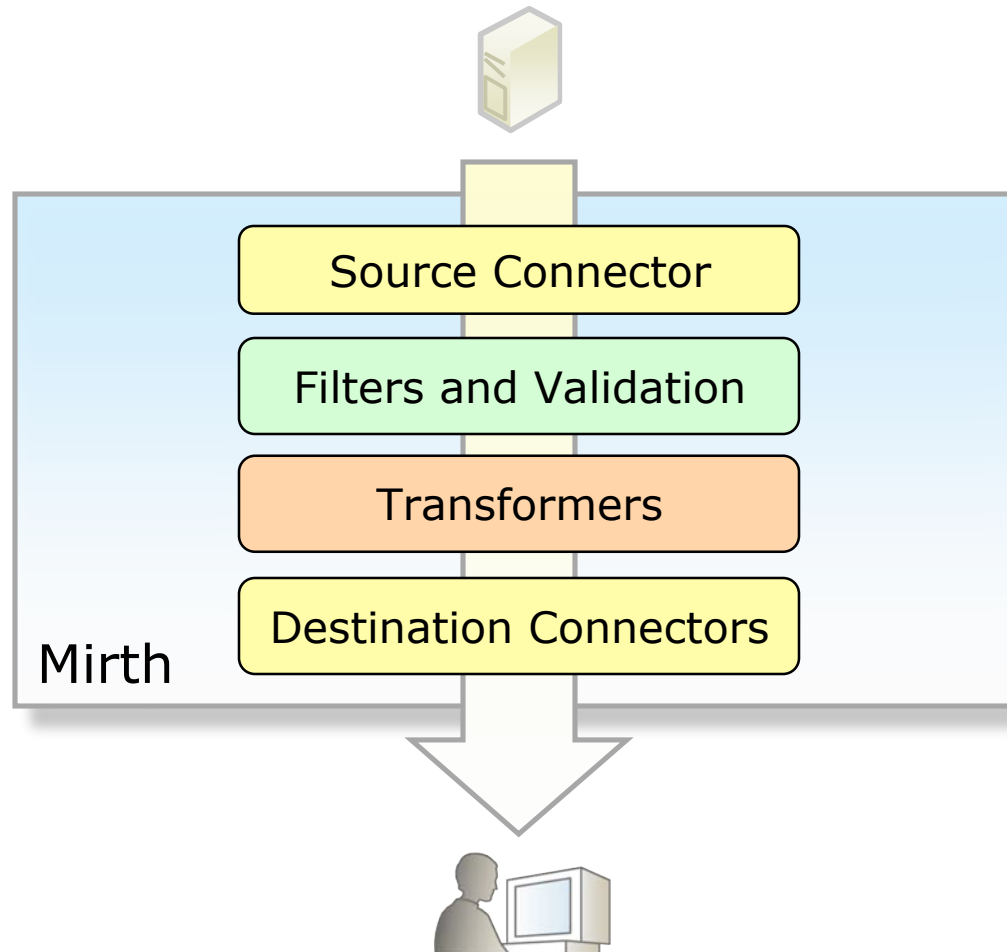
HTTP/S, TCP, LLP, SOAP, S/FTP, PDF, JMS, JDBC, FILE

July 2006 -- v1.0

January 2009 -- v1.8

Commercial support available

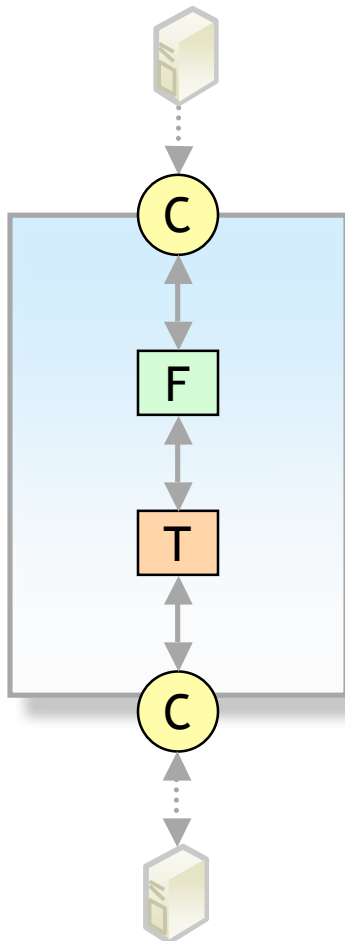
Mirth Channel Overview



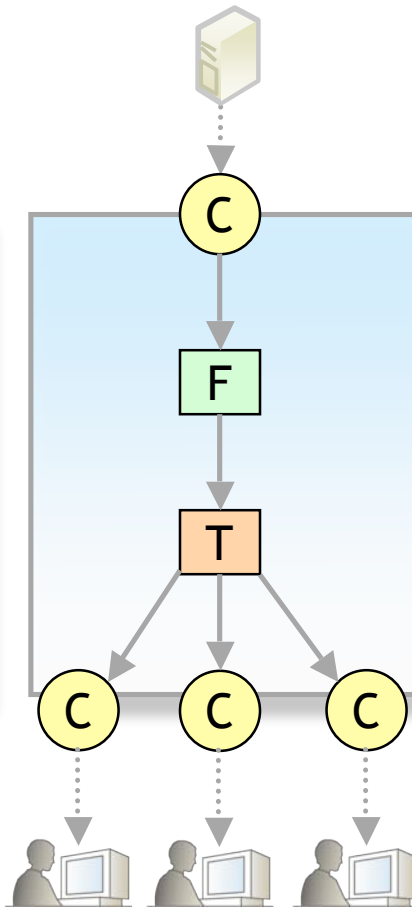
1. Receive HL7 from LIS
2. Over VPN circuit
3. Via LLP listener
4. Filter labs based on delivery list
5. Validate data fields
6. Insert missing data or transform incorrect data elements
7. Push outbound file
8. Over VPN circuit
9. To destination facility

Mirth Channel Options

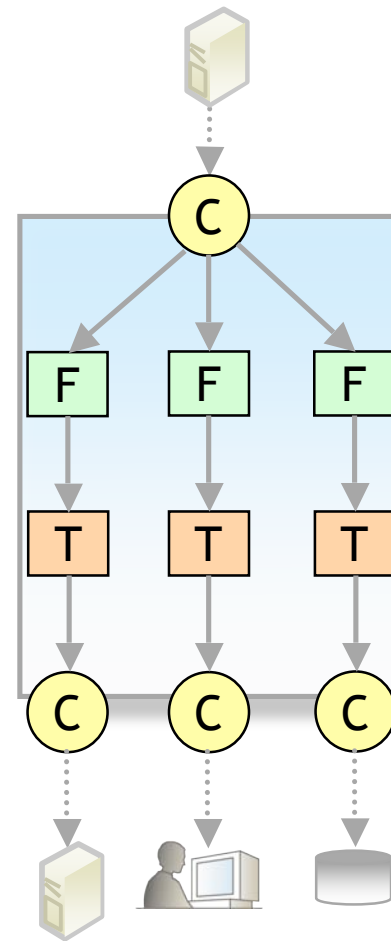
Integration



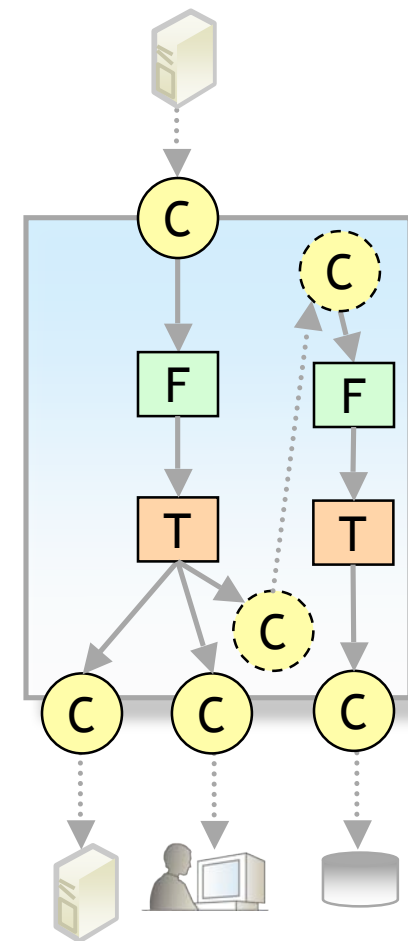
Broadcast



Router



Chaining





MirthResults

Open source, web-based clinical message delivery and data exchange service for HIE

Secure, role-based access, with auditing

Meta-data driven configuration and implementation

Flexible integration with EHRs, LIS, PACS

February 2009 -- v0.8

Commercial support available



MirthMatch

Reference implementation of a HSSP compliant
Entity Identification Service

Healthcare Services Specification Project



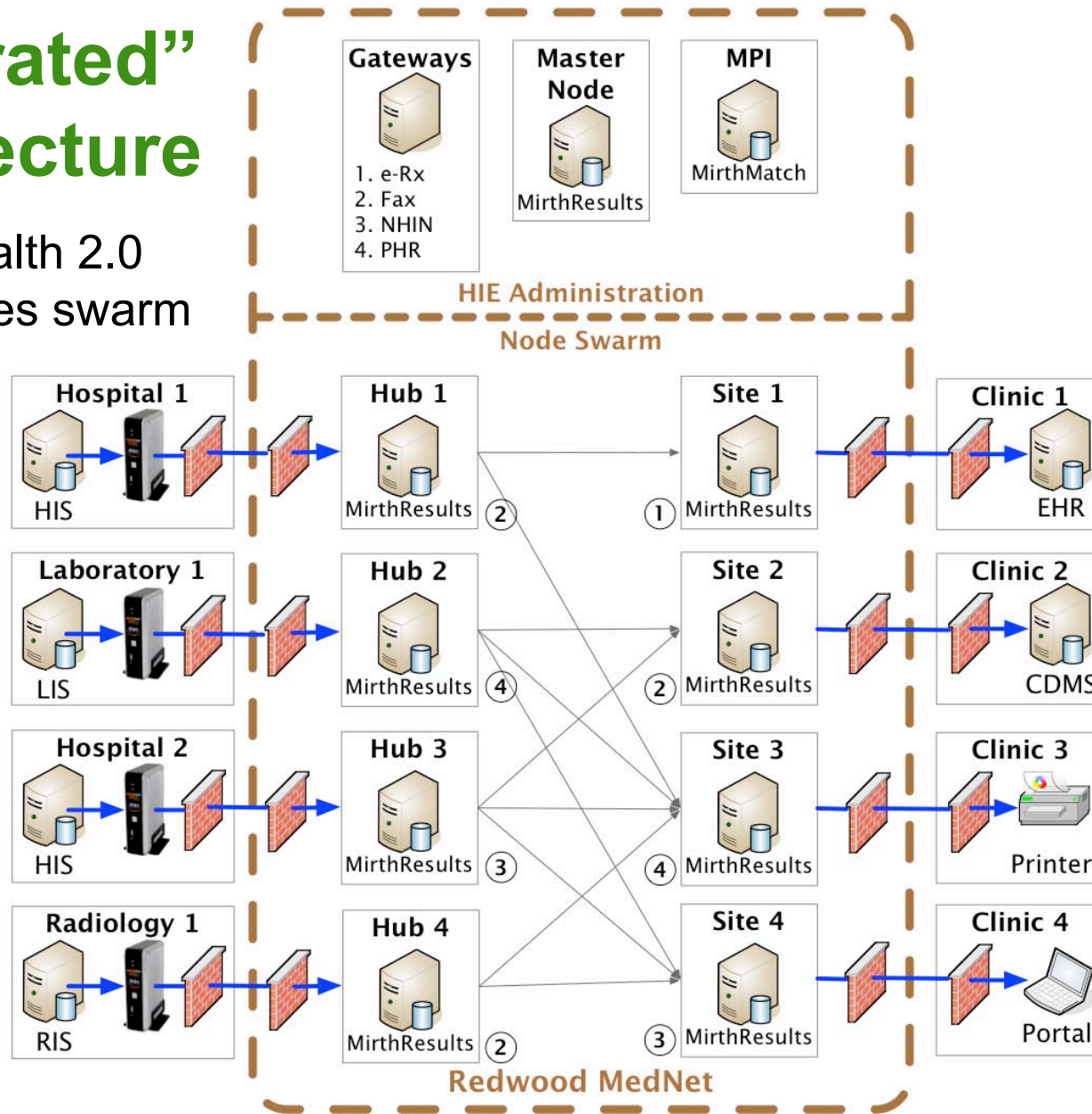
March 2009 -- Alpha test of embedded MPI service
at Redwood MedNet

Real time identity correlation link and merge

Batch de-duplicating

“Federated” Architecture

n-tier health 2.0
web services swarm



built with open source software



Redwood MedNet Roadmap

BUILT

Clinical messaging & results delivery service

NHIN gateway

IN DEVELOPMENT

e-Rx with 340B pharmacy and clinical trials builder

NQF quality measures

Local public health confidential morbidity reporting

NCPHI biosurveillance grid gateway

Making Clinical Data Agile

Next generation network aware
EHRs will co-evolve with HIE data
interoperability networking services



HIEs are the best way to facilitate
broad deployment of interoperable
health data services across an
entire clinical community

An agile clinical data
network is needed to
accelerate communication
among care teams



Redwood MedNet HIE focuses on
making health data agile across the
entire local health care community





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