



Taking a Hard Look at Potential Costs and Benefits of Electronic Data Exchange

Colorado Health Care and the Promise of HIT

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Center for IT Leadership, Boston

April 21, 2006



CITL

- IT research group based at Partners HealthCare, Boston
- Illuminate HIT value proposition for:
 - Providers
 - IT firms
 - Policy makers
- Support from Partners HealthCare, HIMSS, InterSystems, eHealth Initiative

Agenda

- Motivation
- Benefits, costs, and net value →
business case for HIEI
- Conclusions and limitations

Motivation

- An 'unwired' system
 - 90% of the 30B healthcare transactions in the US every year are conducted via mail, fax, or phone Menduno HHN July 1999

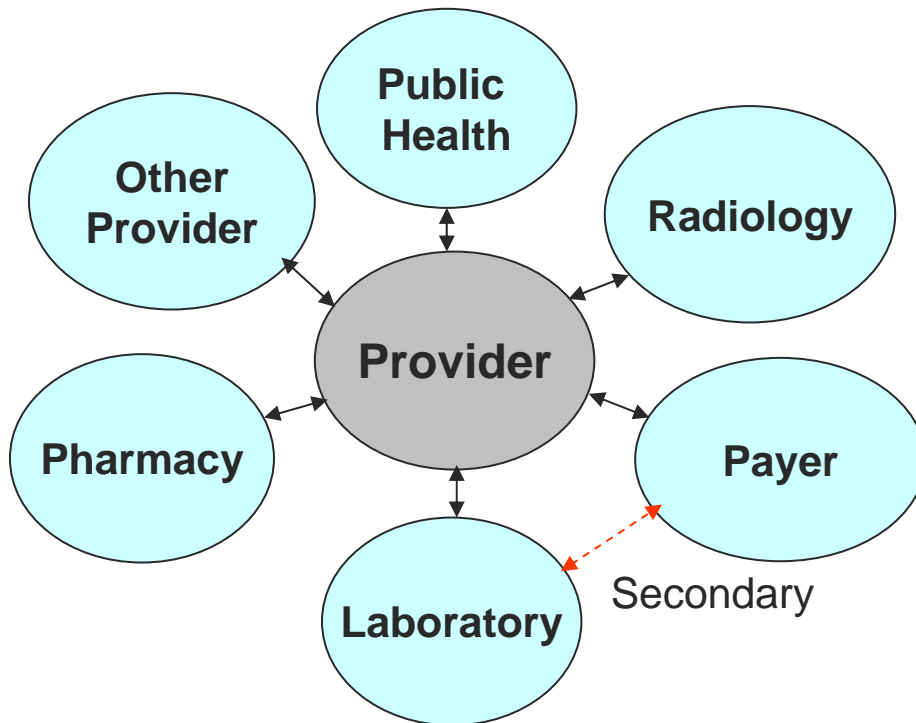
- Fractured delivery system
 - Medicare beneficiaries see 6.4 different providers/yr Berenson Partnership for Solutions 2002
 - Patients' multiple records are scattered

Motivation

- Clinicians have incomplete knowledge of their patients
 - Relevant patient data not available in 81% of ambulatory visits Tang 1994
 - 18% of medical errors that lead to ADEs due to missing patient information. Leape JAMA 1995

Scope of HIEI Assessment

- US health care system is too complex to model. Analysis focuses on data from doctor-patient encounter:



- Providers (hospitals, outpatient offices) & common care partners
- Includes clinical & administrative data

Excluded:

- Secondary transactions
- Transactions within organizations

Analytic Approach

- Literature review
 - > 600 sources reviewed: academic, general
 - Evidence of clinical, financial, organizational value
- Expert panel
 - Leaders of local data sharing initiatives, transaction experts
 - General approach & review, estimated HIEI impact
- Cost-benefit software model

HIEI Expert Panelists

- **David Brailer, MD, PhD**
 - Santa Barbara County Care Data Exchange, Health Technology Center
- **William Braithwaite, MD, PhD**
 - Independent consultant, “Dr HIPAA”
- **Paul Carpenter, MD**
 - Associate Professor of Medicine, Endocrinology-Metabolism and Health Informatics Research, Mayo Clinic
- **Daniel Friedman, PhD**
 - Independent public health consultant
- **Robert Miller, PhD**
 - Associate Professor of Health Economics, UCSF
- **Arnold Milstein, MD, MPH**
 - Pacific Business Group on Health, Mercer Consulting, Leapfrog Group
- **J Marc Overhage, MD, PhD**
 - Regenstrief Institute, Associate Professor of Medicine, Indiana University
- **Scott Young, MD**
 - Senior Clinical Advisor, Office of Clinical Standards and Quality, CMS
- **Kepa Zubeldia, MD**
 - President and CEO, Claredi Corporation

Levels of HIEI

Level	Description	Examples
1	Non-electronic data	No PC/information technology
2	Machine-transportable data	Fax/Email
3	Machine-organizable data	Structured messages, non-standard content/data
4	Machine-interpretable data	Structured messages, standardized content/data

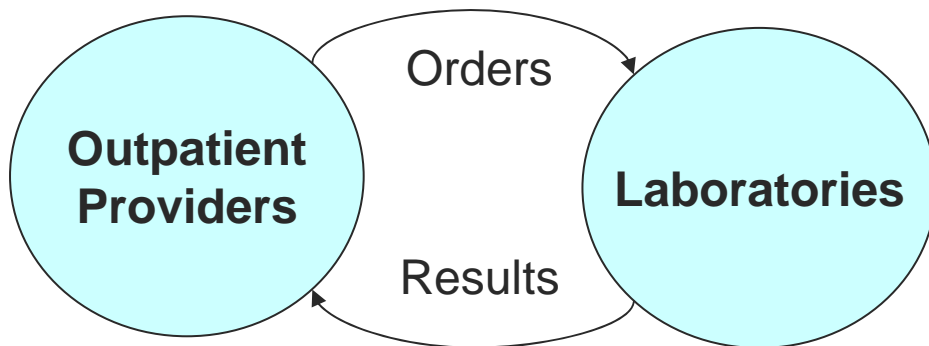
Value of HIEI

Benefits

- Costs

Value of HIEI

Provider-Lab HIEI



Level	
1	Paper laboratory orders carried by patient or courier and results delivered by mail or reported verbally
2	Faxed laboratory orders and results
3	Free text electronic laboratory orders and results
4	Encoded, standardized electronic laboratory orders and results

Provider-Lab HIEI

■ Benefits

- Improve clinician access to longitudinal test results
- Reduce redundant tests
- Eliminate errors from reporting results verbally
- Make cost information available, optimize ordering
- Save time ordering tests, sending and receiving results

■ Evidence re current rate of redundancy

- Experts estimated HIEI impact on redundancy and time

Provider-Lab HIEI

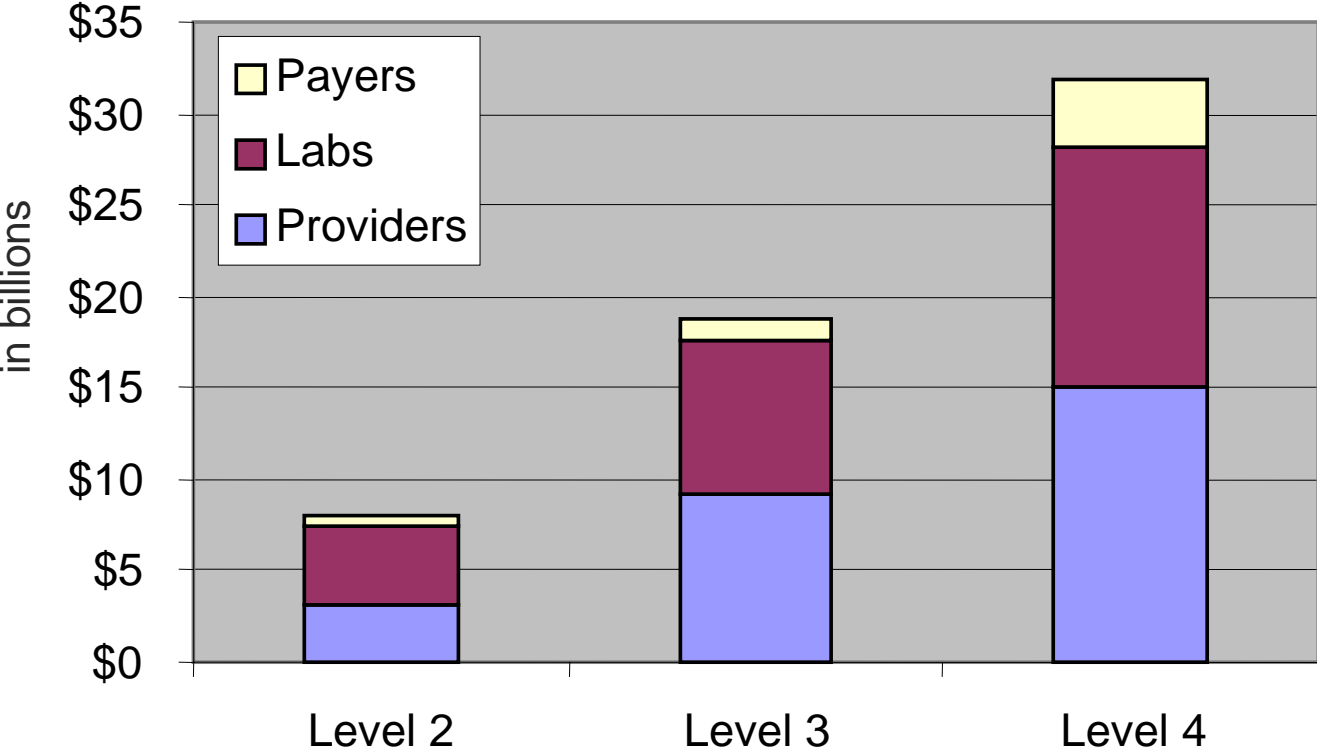
- What proportion of laboratory tests are redundant and avoidable?

- Literature:
 - Bates study 8.6%
 - Brailer Santa Barbara estimate 20%
 - Average 14.3%
 - consistent with Tierney 12-14%

Provider–Lab HIEI

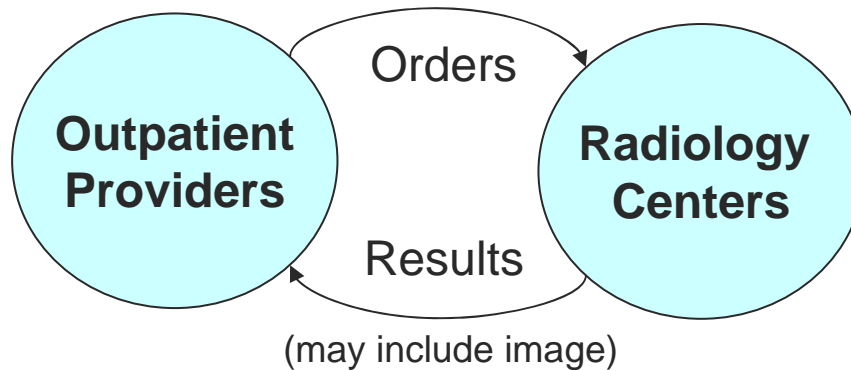
- CCTL: What proportion of redundant laboratory tests would be avoided by HIEI?
- Expert Panelists:
 - Level 1 0%
 - Level 2 18.7%
 - Level 3 27.6%
 - Level 4 95.0%

Provider-Lab Annual Benefit



- Level 4 \$200,000 in clinics in midsize hospital (50-199 beds)
- 14% from avoided tests
- 86% from time savings
- \$31.8B national benefit at Level 4

Provider–Radiology HIEI



Level	Orders and Results	Images
1	Paper radiology orders carried by patients or by courier, and results delivered by mail or verbally reported	Film physically transported by mail or courier
2	Faxed radiology orders and results	Faxed low-resolution copy of the film
3	Free text electronic radiology orders and results	Consumer-grade, (GIF, JPEG, etc.) copy of the image
4	Encoded, standardized electronic radiology orders and results	Fully encoded radiology images (uncompressed image file, TIFF, etc.)

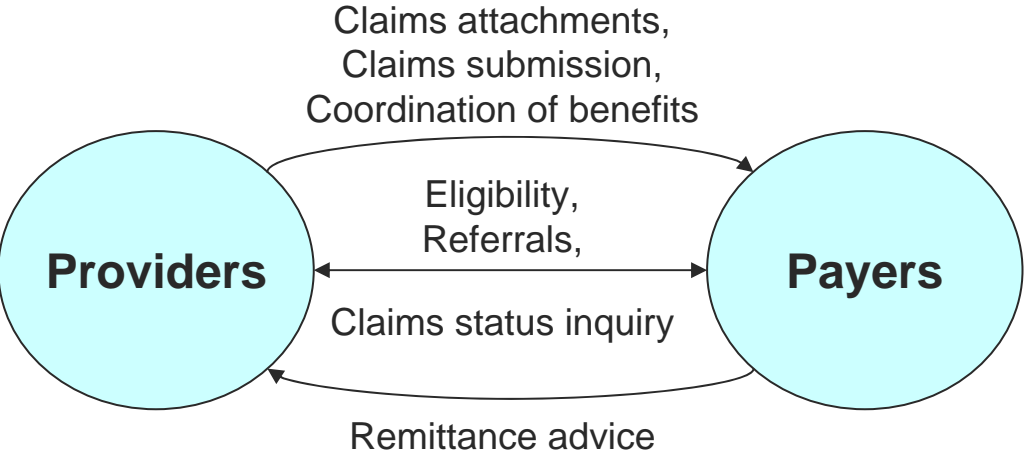
Provider–Radiology HIEI

- Benefits
 - Improve patient safety and optimize ordering by giving radiologist access to relevant clinical information
 - Reduce redundant tests
 - Reduce errors of omission with automated reminders for follow-up studies
 - Reduce environmental impact
 - Save time ordering tests, sending and receiving results/images
- Evidence re current rate of redundancy
 - Experts estimated HIEI impact on redundancy and time

Annual Benefit of Level 4 HIEI

	US	Mid-size Hospital 50-199 beds
Prov-Lab	\$ 31.8b	\$ 200,000
Prov-Rad	26 b	170,000

Provider-Payer HIEI



Level	
1	Paper/phone transactions
2 (not an option)	Fax-based or electronic transmission of image file
3 (not an option)	Non-encoded, non-standardized electronic transactions
4	Encoded, standardized electronic transactions

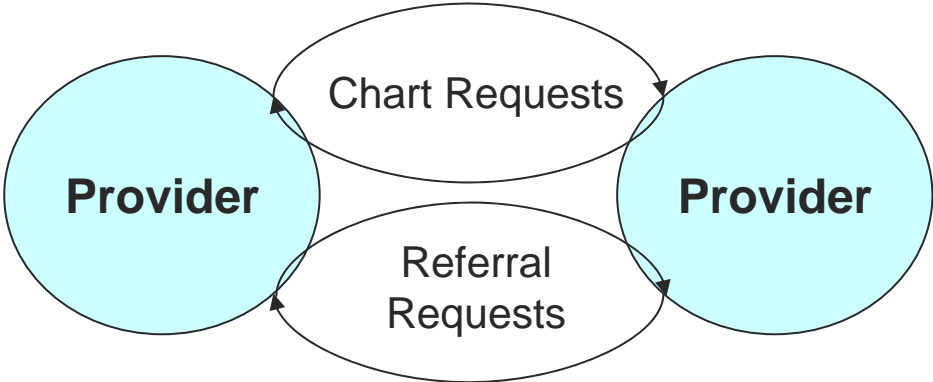
Provider–Payer HIEI

- Benefits
 - Save time
 - Reduce rejected claims
- Evidence re % of transactions already automated due to HIPAA
- Calculated impact of full automation at Level 4
 - Levels 2-3 not allowed by HIPAA

Annual Benefit of Level 4 HIEI

	US	Mid-size Hospital 50-199 beds
Prov-Lab	\$ 31.8b	\$ 200,000
Prov-Rad	26 b	170,000
Prov-Payer	20.1b	250,000

Provider-Provider HIEI



Level	
1	Charts and referrals carried by patient or mail
2	Faxed charts and referrals.
3	Free-text electronic charts and referrals.
4	Encoded, standardized electronic charts and referrals.

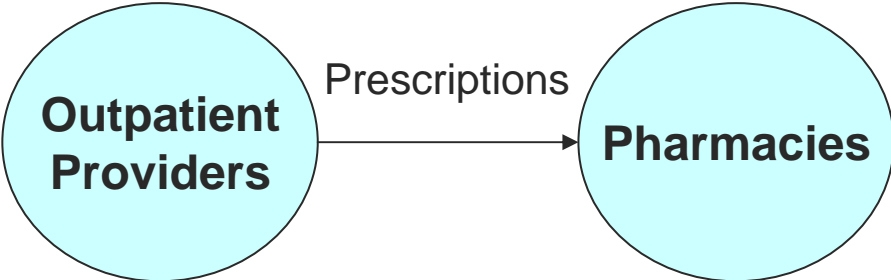
Provider–Provider HIEI

- Benefits
 - Reduce fragmentation
 - Reduce educated guesses in clinical care
 - Improve referral quality by making relevant information available to the consultant
 - Save time on referral paperwork, responding to chart requests
- Evidence re referral rates, % visits missing information, administrative costs of referrals and chart requests
 - Experts estimated HIEI impact on administrative costs

Annual Benefit of Level 4 HIEI

	US	Mid-size Hospital 50-199 beds
Prov-Lab	\$ 31.8b	\$ 200,000
Prov-Rad	26 b	170,000
Prov-Payer	20.1b	250,000
Prov-Prov	13.2b	570,000

Provider-Pharmacy HIEI



Level	
1	Paper prescriptions carried by patient or courier, prescriptions called in by clinicians
2	Faxed prescriptions
3	Free-text electronic prescriptions
4	Encoded, standardized electronic prescriptions

Provider–Pharmacy HIEI

- Benefits
 - Improve patient safety: access to complete medication lists will reduce drug interactions and adverse drug events
 - More convenient for clinicians: automatic refill alerts, access to adherence information, automated insurance forms, identify patients for drug recalls
 - Save time ordering, dispensing prescriptions
 - Efficient formulary management between pharmacies and payers – probably biggest financial impact
- Evidence re time and phone calls:
 - Over half of outpatient prescriptions involve a phone call
 - Experts estimated HIEI impact on % calls

Annual Benefit of Level 4 HIEI

	US	Mid-size Hospital 50-199 beds
Prov-Lab	\$ 31.8b	\$ 200,000
Prov-Rad	26 b	170,000
Prov-Payer	20.1b	250,000
Prov-Prov	13.2b	570,000
Prov-Pharm	2.7b	70,000

Provider–Public Health HIEI



Level	
1	Paper report forms delivered by mail or verbally reported
2	Faxed case and vital statistics reports
3	Free text electronic case and vital statistics reports
4	Encoded electronic case and vital statistics reports

Provider–Public Health HIEI

- Benefits
 - Increase % of disease reported
 - Earlier recognition of disease outbreaks
 - Save time reporting vital statistics and disease
 - Biosurveillance: identify warning signs by aggregating data from many sources
- Evidence re number of vital statistics and disease reports, and time required
 - Experts estimated HIEI impact

Annual Benefit of Level 4 HIEI

	US	Mid-size Hospital 50-199 beds
Prov-Lab	\$ 31.8b	\$ 200,000
Prov-Rad	26 b	170,000
Prov-Payer	20.1b	250,000
Prov-Prov	13.2b	570,000
Prov-Pharm	2.7b	70,000
Prov-PH	195 m	-

Value of HIEI

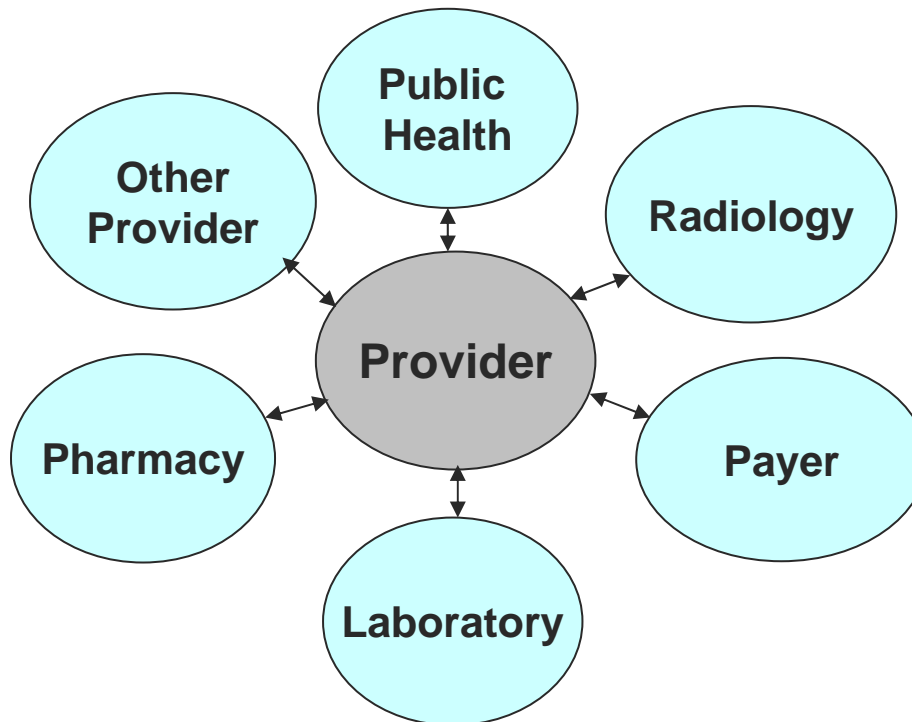
Benefits

- Costs

Value of HIEI

HIEI Cost Model

- Interfaces in each relationship
- Internal systems for providers
- 10-year rollout

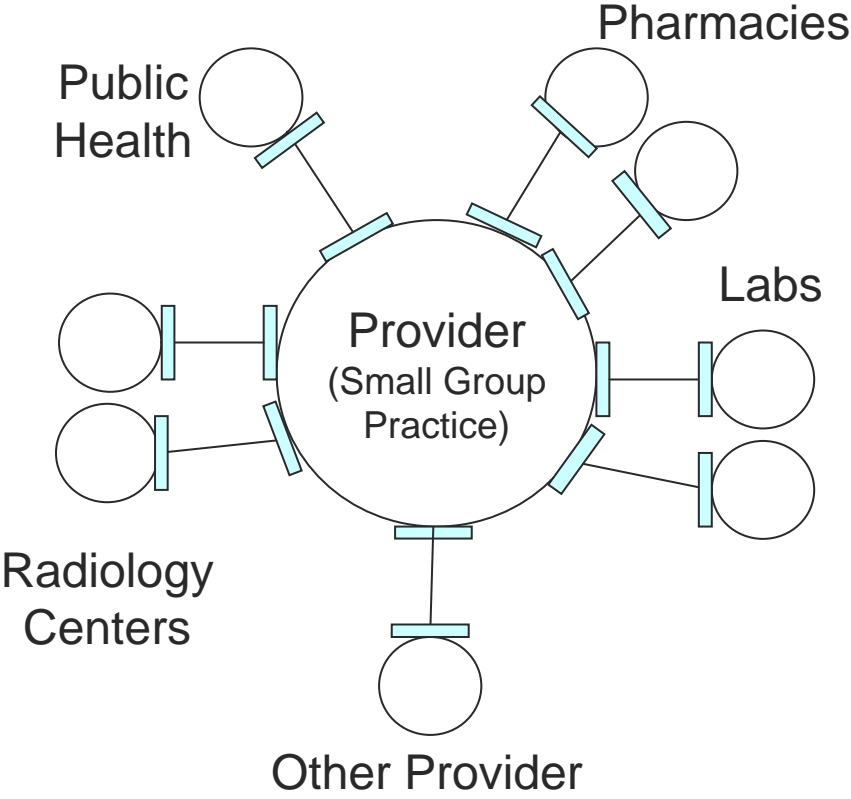


Other internal systems:

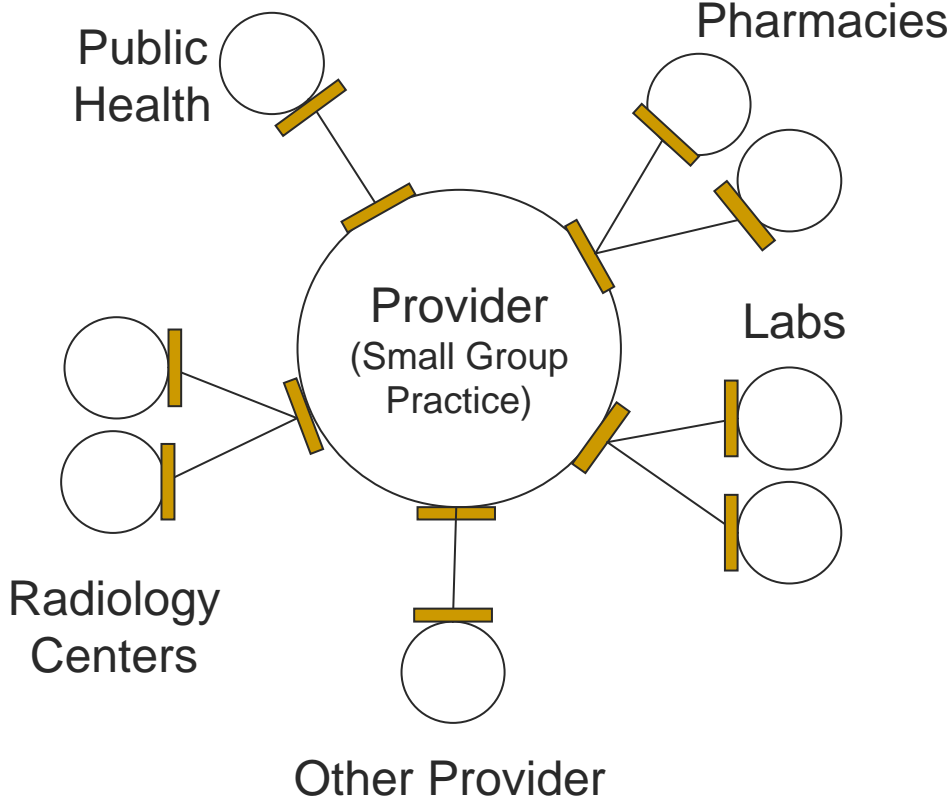
- Radiology, payers, laboratories, pharmacies already partially automated, hard to get proprietary cost data
- Complex public health system, no cost data available

How Many Interfaces?

Level 3



Level 4



HIEI Cost

	Level 3 Rollout	Level 4 Rollout	Level 3 Annual	Level 4 Annual
Office systems	\$162.9 B		\$9.1 B	
Hospital systems	\$27.1 B		\$1.6 B	
Office and hospital interfaces	\$123.9 B	\$75.7 B	\$9.0 B	\$5.4 B
Stakeholder interfaces	\$6.4 B	\$9.9 B	\$0.5 B	\$0.5 B
Total	\$320 B	\$276 B	\$20.2 B	\$16.5 B

Value of HIEI

Benefits

- Costs

Value of HIEI

HIEI National Value

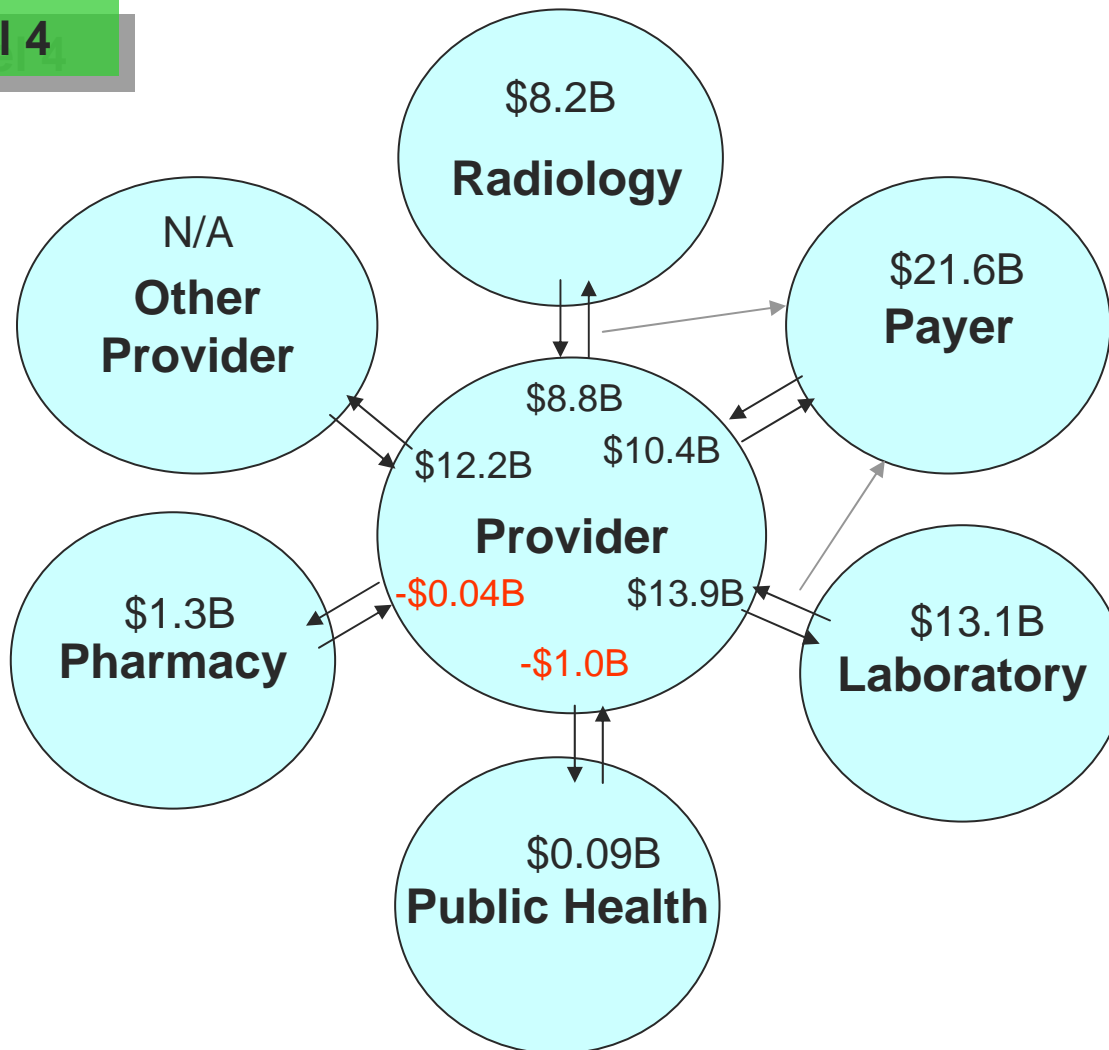
Value = Benefit - Cost

	<u>Value during 10-year Implementation</u>	<u>Value per year after Implementation</u>
Level 2	\$141 B	\$22 B
Level 3	-\$34 B	\$24 B
Level 4	\$337 B	\$78 B

Value of HIE standards is the difference between Level 3 & 4

Steady-State Annual Value

Level 4



Total: \$78 billion

Providers: \$34 billion

Midsized hospital: \$1 million

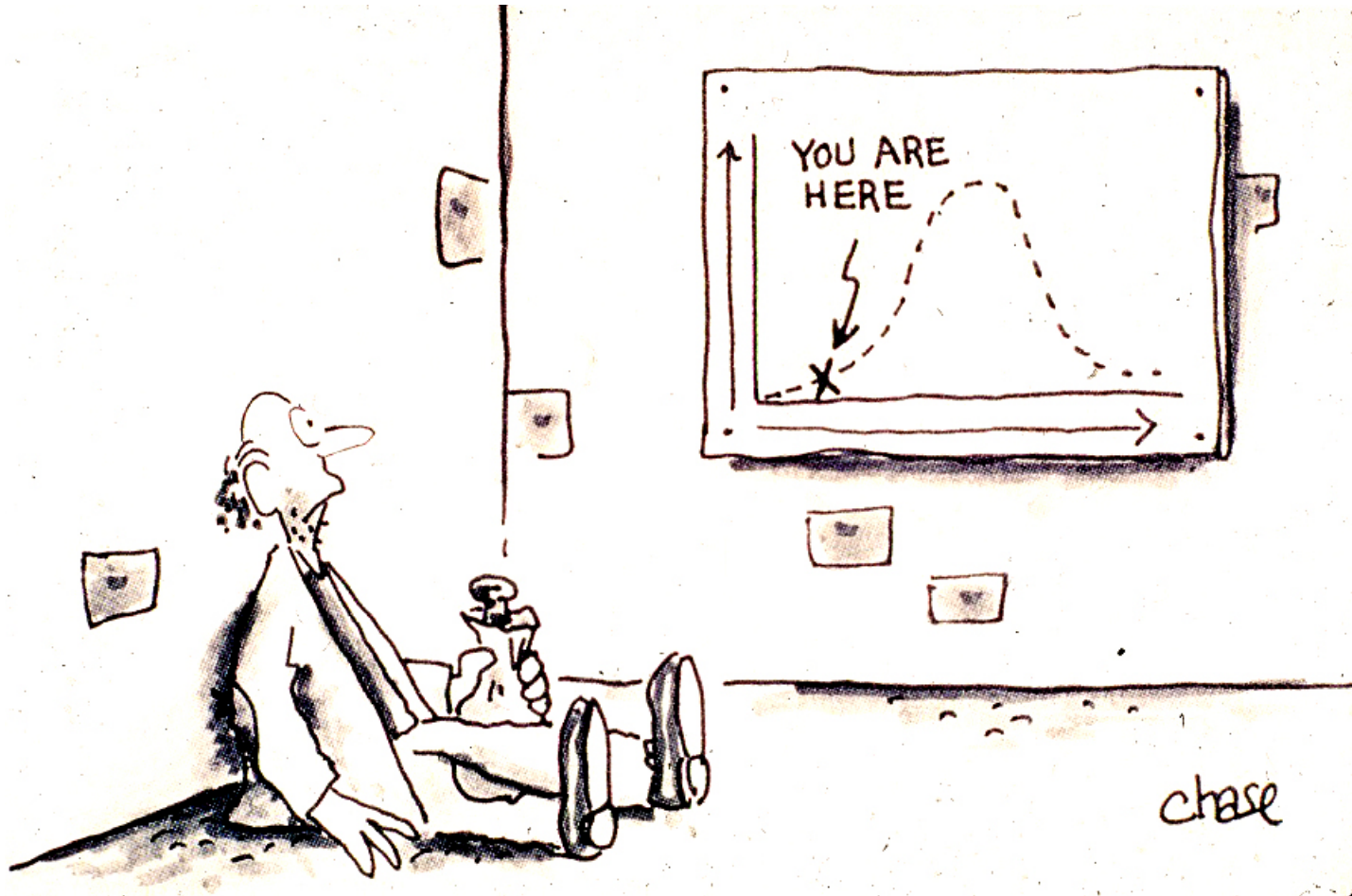
Limitations

- Benefits are incomplete
 - Clinical benefit
 - Many other transactions
- Costs are incomplete
 - Internal systems: pharmacies, labs, radiology centers, public health departments
 - Legacy data conversion
 - Workflow re-engineering
 - Standards development
- Time savings may be realized as quality improvements rather than financial returns

Conclusions

- National implementation of HIEI is a good investment.
- Standardized Level 4 HIEI is by far the best investment for the nation and for individual providers, and probably for labs, radiology centers, payers, and the public health system
- Non-standardized HIEI is not a good investment.
 - Interfaces are expensive
 - We will have to do it twice
- We must set standards

Where Are We?



Where Are We?

- Commission on Systemic Interoperability
- Certification Commission for HIT
- American Health Information Community
- 4 ONCHIT NHIN contracts
- 6 state and regional demonstration projects funded by AHRQ

Nationwide Health Information Network Architecture

- Secure information sharing between
 - hospitals, labs, pharmacies, and MDs
 - the 4 networks
- 4 network prototypes
 - Accenture: Kentucky, Tenn, W Virginia
 - CSC: Indiana, California, Massachusetts
 - IBM: New York, N Carolina
 - Northrop Grumman: California, Ohio
- Networks will be in the public domain

Nationwide Health Information Network Architecture

- Costs, revenues, business case for each
- Use cases Dec 05
 - Biosurveillance
 - Consumers (registration, Rx history)
 - EHRs (lab results and interpretations)

Mass eHealth Collaborative

- 2004
- \$50m for pilot, BCBS Ma
- All MA healthcare stakeholders, 34 members
- 3 communities from 35 applications: Brockton, Newburyport, N Adams
- 24-36 months. EMRs for >600 MDs

AHRQ HIT Grants

- 103 planning, implementation, value projects
- 6 states
 - Colorado
 - Delaware
 - Indiana
 - Rhode Island
 - Tennessee
 - Utah
- National Resource Center

- “Unless interoperability is achieved, physicians will still defer IT investments, potential clinical and economic benefits won’t be realized, and we will not move closer to badly needed healthcare reform in the US.”

David Brailer, May 21, 2004



Thank You!

Order national report www.himss.org
Paper January 19, 2005 healthaffairs.org
More information www.citl.org

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