Overview

- CITL overview
- Research methods & results
- Study limitations
- Take home points
CITL Overview

Center for Information Technology Leadership
Center for IT Leadership Mission

- Produce timely, rigorous market-driven technology assessments which:
  - Help providers invest wisely
  - Help IT firms understand value proposition
  - Help shape public policy
- Established at Partners HealthCare in partnership with HIMSS
CITL Research Team

- Eric Pan, MD, MSc
- Davis Bu, MD, MA
- Julia Adler-Milstein, BA
- David Kendrick, MD, MPH
- Ellen Rosenblatt, BS
- Jan Walker, RN, MBA
- Blackford Middleton, MD, MPH, MSc

- David Bates, MD, MSc
- Doug Johnston, MA
HIEI Definition

- Provider-centric encounter-based model of clinical information exchange

  - Clinical and administrative transactions and data exchange
    - Between providers and other providers
    - Between providers and labs, pharmacies, payers, radiology centers, and public health departments
## HIEI Taxonomy

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Non-electronic data</td>
<td>No PC/information technology</td>
</tr>
<tr>
<td>2</td>
<td>Machine-transportable data</td>
<td>Fax/Email</td>
</tr>
<tr>
<td>3</td>
<td>Machine-organizable data</td>
<td>Structured messages, non-standard content/data</td>
</tr>
<tr>
<td>4</td>
<td>Machine-interpretable data</td>
<td>Structured messages, standardized content/data</td>
</tr>
</tbody>
</table>
Research Methods

- Literature review
  - Reviewed studies from academic and general/trade literatures; over 600 citations reviewed
  - Market research

- Expert panel
  - Day-long briefing and first assessments
  - Phone/email consultations
  - Expert review of literature findings
  - Estimates of HIEI impact
  - Critique of all projections and conclusions

- Construction of cost-benefit model (influence diagram)
  - Includes 1,238 nodes
HIEI Expert Panelists

- **David J. Brailer, MD, PhD.**
  - Senior Fellow, Health Technology Center.
- **William R. Braithwaite, MD, PhD, FACMI.**
  - Independent Consultant.
- **Paul C. Carpenter, MD, FACE.**
  - Associate Professor of Medicine, Divisions of Endocrinology-Metabolism and Health Informatics Research, Mayo Clinic, Rochester, MN.
- **Daniel J. Friedman, PhD.**
  - Independent consultant.
- **Robert Miller, PhD.**
  - Associate Professor of Health Economics in Residence, Institute for Health & Aging and Department of Social and Behavioral Sciences, UCSF.
- **Arnold Milstein, MD, MPH.**
- **J. Marc Overhage, MD, PhD, FACMI.**
  - Investigator, Regenstrief Institute for Health Care. Associate Professor of Medicine, Indiana University School of Medicine.
- **Scott S. Young, MD, FAAFP.**
  - Senior Clinical Advisor, Office of Clinical Standards and Quality, Centers for Medicare and Medicaid Services.
- **Kepa Zubeldia, MD.**
  - President and CEO, Claredi Corporation.
HIEI Analytical Model

- Model financial value with 3 perspectives:

1) Individual provider group or hospital
2) Stakeholder group
3) National
Key HIEI Model Assumptions

- Level 1 is baseline – manual practices
  - Project the financial impact of cost reduction at Levels 2, 3, and 4
  - Model payers at Level 4 only
- Provider-centric
  - No secondary transactions considered
- Encounter-centric
  - Clinical, administrative, and financial data related to clinical encounters
- Financial value of information exchange and interoperability between entities
  - Not within entities
Principal Cost Model Components

- For providers:
  - Number of interfaces
  - Interface costs
  - System costs

- For stakeholders:
  - Number of interfaces
  - Interface costs
HIEI Cost Assumptions

Assumptions:
- No cost for Levels 1 and 2
- Stakeholder and hospital interface cost at $50K/each. Clinician office interface cost at $20K/each
- Providers purchase electronic medical records with interoperability functionality at Levels 3 and 4
- Cost for stakeholder systems not included
- Rollout costs include initial system and interface costs
- Include annual maintenance costs for systems and interfaces
- Cost for standards development and maintenance not included
- Payer costs derived from HIPAA Final Impact Analysis
Number of Interfaces

Level 3

Provider (Small Group Practice)

Public Health

Radiology Centers

Other Provider

Labs

Pharmacies

Level 4

Provider (Small Group Practice)

Public Health

Radiology Centers

Other Provider

Labs

Pharmacies

Entity

Interface
National Implementation Schedule

- Assume a 10-year technology rollout and usage schedule
- Ramp up the adoption of systems and interfaces over the first five years, with 20% adoption per year
- Ramp up the benefit from technology over five years, beginning with 50% benefit in the first year of adoption and increasing by 10% each year
- On a national basis, the return is then realized as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10%</td>
<td>22%</td>
<td>36%</td>
<td>52%</td>
<td>70%</td>
<td>80%</td>
<td>88%</td>
<td>94%</td>
<td>98%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Percent of potential return realized
How Much Does HIEI Cost?

<table>
<thead>
<tr>
<th></th>
<th>Level 3 Rollout</th>
<th>Level 4 Rollout</th>
<th>Level 3 Annual</th>
<th>Level 4 Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinician office system cost</td>
<td>$162.9B</td>
<td></td>
<td>$9.1B</td>
<td></td>
</tr>
<tr>
<td>Hospital system cost</td>
<td>$27.1B</td>
<td></td>
<td>$1.6B</td>
<td></td>
</tr>
<tr>
<td>Provider and hospital interface cost</td>
<td>$123.9B</td>
<td>$75.7B</td>
<td>$9.0B</td>
<td>$5.4B</td>
</tr>
<tr>
<td>Stakeholder interface cost</td>
<td>$6.4B</td>
<td>$9.9B</td>
<td>$0.5B</td>
<td>$0.5B</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$320.3B</strong></td>
<td><strong>$275.6B</strong></td>
<td><strong>$20.2B</strong></td>
<td><strong>$16.5B</strong></td>
</tr>
</tbody>
</table>

- Fewer provider interfaces required at Level 4 vs. Level 3
- Difference in stakeholder interface cost at Level 3 vs. Level 4 due to payer cost (payers only modeled at Level 4)
HIEI Principal Sources of Benefit

- HIEI produces two principal types of benefit
  - Administrative savings
    - Quantify the financial value of time saved by transitioning from manual to electronic data exchange
    - Benefit accrues to all entities that participate in data exchange
  - Utilization (Avoided redundancy)
    - Reduction in unnecessary lab and radiology tests
    - Results from interoperability between providers and labs, and providers and radiology centers
    - Benefit accrues to the entities who pay for tests: providers and payers
### HIEI National Net Cost-Benefit

<table>
<thead>
<tr>
<th>Level</th>
<th>Net Return over 10-year Implementation</th>
<th>Annual Net Return after Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2</td>
<td>$141B</td>
<td>$22B</td>
</tr>
<tr>
<td>Level 3</td>
<td>-$34B</td>
<td>$24B</td>
</tr>
<tr>
<td>Level 4</td>
<td>$337B</td>
<td>$78B</td>
</tr>
</tbody>
</table>

*Value of HIE standards is the difference between Level 3 & 4*
10-Year Cumulative Net Return by HIEI Level

Levels:
- Level 1
- Level 2
- Level 3
- Level 4

Years:
0 1 2 3 4 5 6 7 8 9 10

Net Returns in billions:
- $(200)
- $(100)
- $0
- $100
- $200
- $300
- $400

Graph showing the cumulative net return over 10 years for different HIEI levels.
Limitations
Limitations

- Our model combines evidence from the academic literature, experts, and market data.
- We extrapolate to make national projections.
- The model may be incomplete and important determinants missing.
Limitations

- Benefit from secondary transactions beyond provider-centric, encounter-based model not included
- Secondary benefit from enhanced data integration not included
- Costs not included:
  - Stakeholder system cost (other than Providers and Hospitals)
  - Cost to develop, implement, and maintain standards
  - Volume discount associated with a national roll-out
  - Revenue loss to labs and radiology from reduction in tests
  - Conversion of legacy data
Limitations

- Administrative benefits may be difficult to realize
  - Assume labor savings translate directly into dollar savings
  - Or, newly available resources may be used for non-revenue generating activity
Take Home Points
Value of HIEI: Key Findings

- **Standardized, encoded, electronic healthcare information exchange would:**
  - Save the US healthcare system $337B over a 10-year implementation period
  - Save $78B in each year thereafter
  - Total provider net benefit from all connections is $34B
  - Net benefits to other stakeholders:
    - Payers $22B
    - Laboratories $13B
    - Radiology centers $8B
    - Pharmacies $1B
    - Public Health $0.1B

- **Dramatically reduce the administrative burden associated with manual data exchange**
- **Decrease unnecessary utilization of duplicative laboratory and radiology tests**
To Achieve the Vision of HIEI

- Truly interoperable systems will require:
  - Federal policy and financial incentives to stimulate adoption
  - New organizational structures to facilitate, manage, and provide oversight for HIE
  - Private sector investment for lab, radiology, and pharmacy systems
  - Public sector support for investment in public health systems, provider systems
  - Acceptable rules and regulations for data ownership, and sharing, between covered entities
  - HIEI Standards
For More Information

- See [www.citl.org](http://www.citl.org)
- The Value of HIEI Full Report
  - Available through HIMSS
  - Includes detailed results for individual provider organizations and hospitals
- CITL Value of ACPOE Full Report
  - Available from CITL and HIMSS
Thank You!

Davis Bu, MD, MA
dbu@partners.org