

The Learning Health System: A Golden Opportunity for Public Health

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Preamble

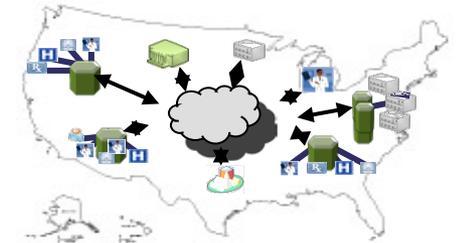
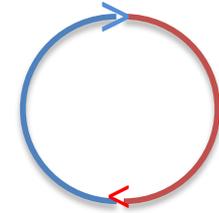
I believe that people are drawn to ideas that reflect imagination and vision.

The nation will invest approximately \$200 billion in health IT but until recently, we have lacked an idea that captured why we were doing it.

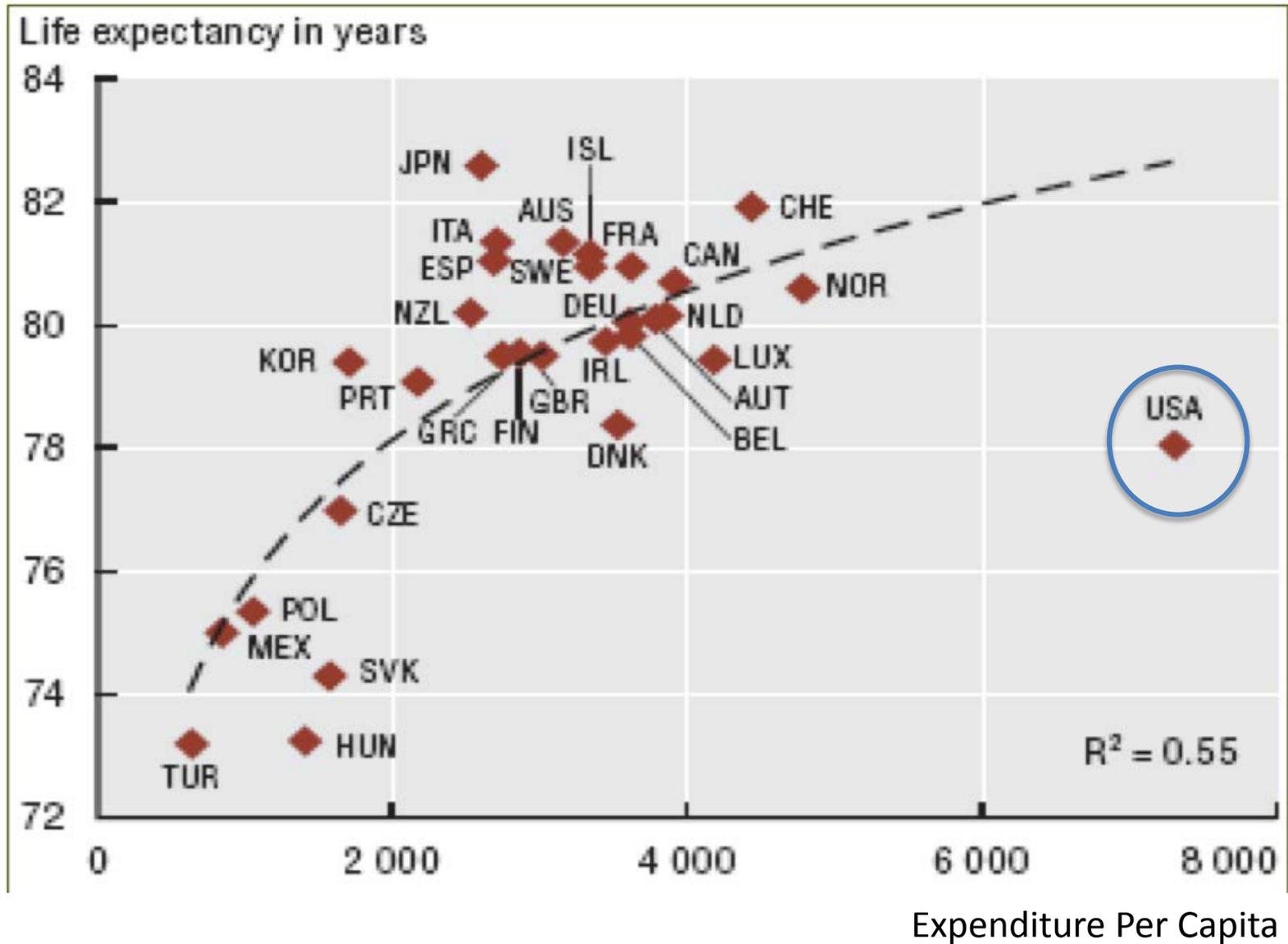
By the end of this hour, I hope to convince you that the concept of **learning** is that key idea and how important this is to public health.

Today's Menu

- The plight of nation's health system (briefly)
- The visions of **Learning** and the **Learning Health System (LHS)**
- Widespread calls for the LHS and early progress toward a national system
- The golden opportunity for public health



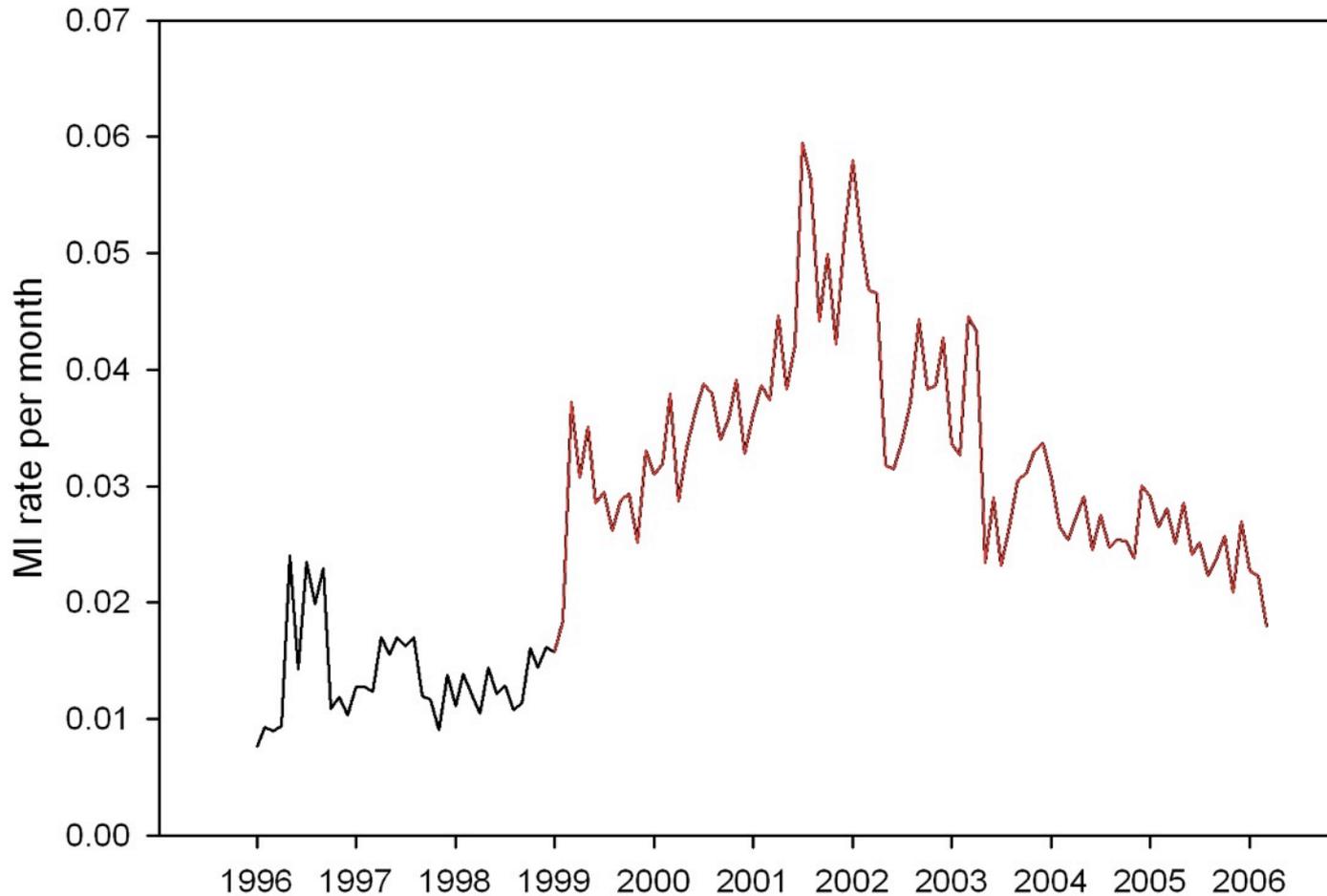
The Plight in a Figure



The Plight in Words

- Spending 18% of GDP on health, which is unsustainable
 - 25% of which is “wasted”
- ~45th in infant mortality. Japan and Sweden have a rate 40% of ours.
- “To Err is Human” Study: ~100,000 deaths per year due to medical error. No improvement since then.
- Among five highly developed nations, the U.S. is last or next-to-last on five indicators of a “high functioning” health system

And We're Virtually Blind: We Can't Monitor the System in Real Time



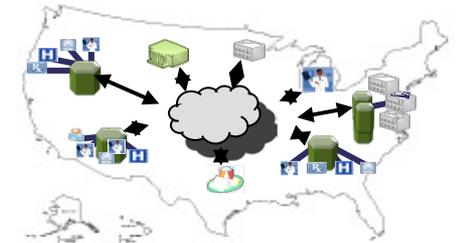
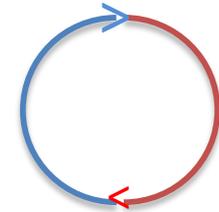
Slide courtesy of Kenneth Mandl

We Need a Hefty Rudder, Now...

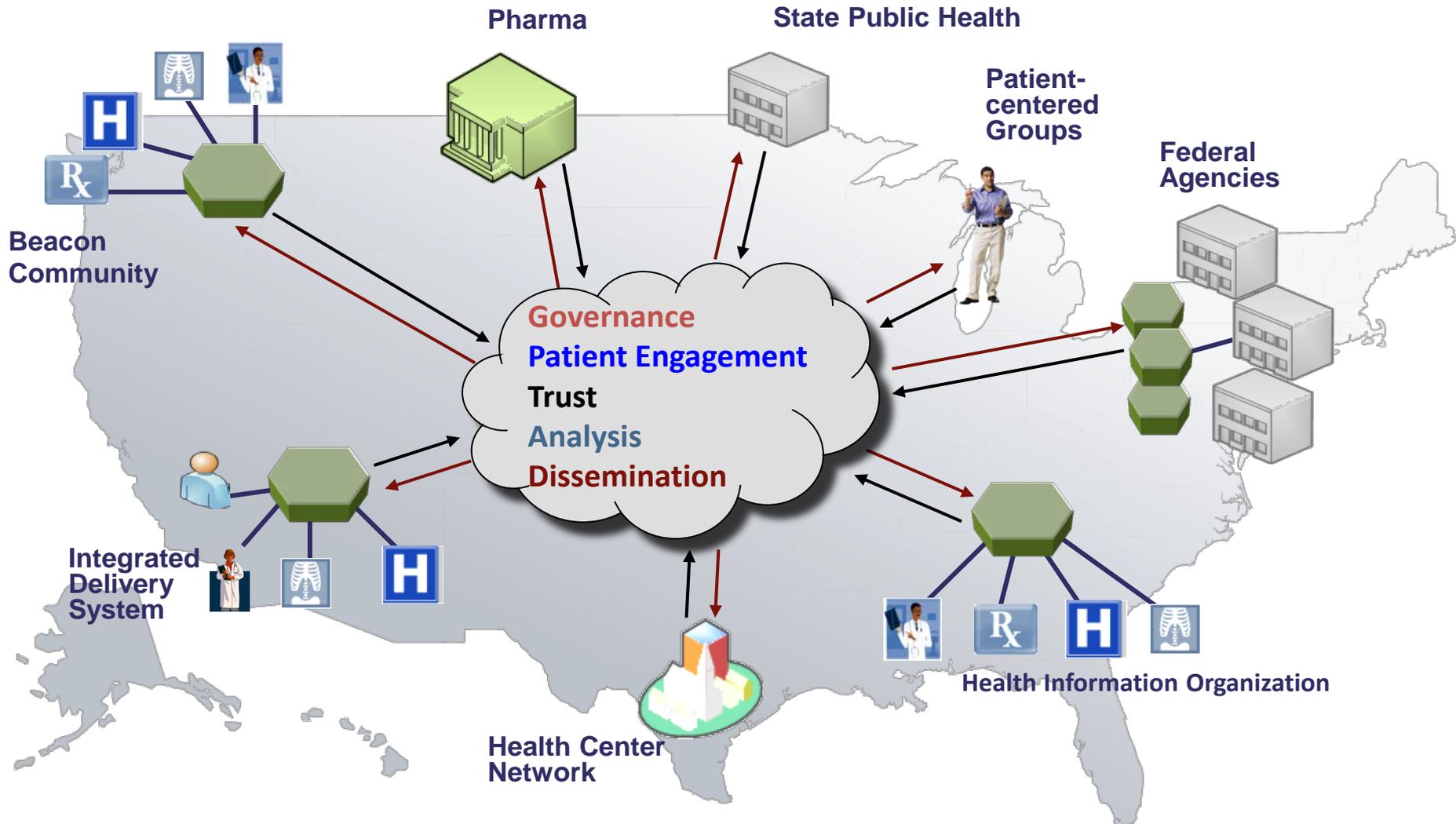


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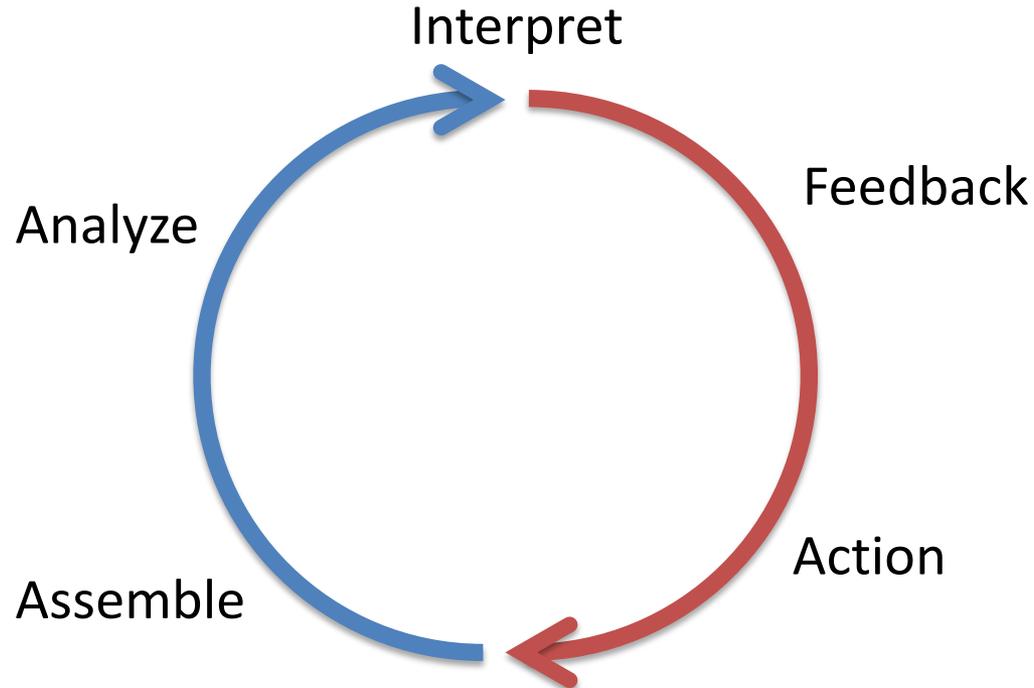
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A National-Scale Learning Health System (LHS)



“Virtuous Cycles” of Study, Learning and Improvement



Example: Reducing Falls in Nursing Homes

Interpret Findings:

Are the results credible?

What advice should be given?

Analyze Data:

What practices
associate with
lower fall
rates?

Provide Feedback:

Based on your current
practice, you might
want to consider...

Assemble Data:

How do we prevent
falls?

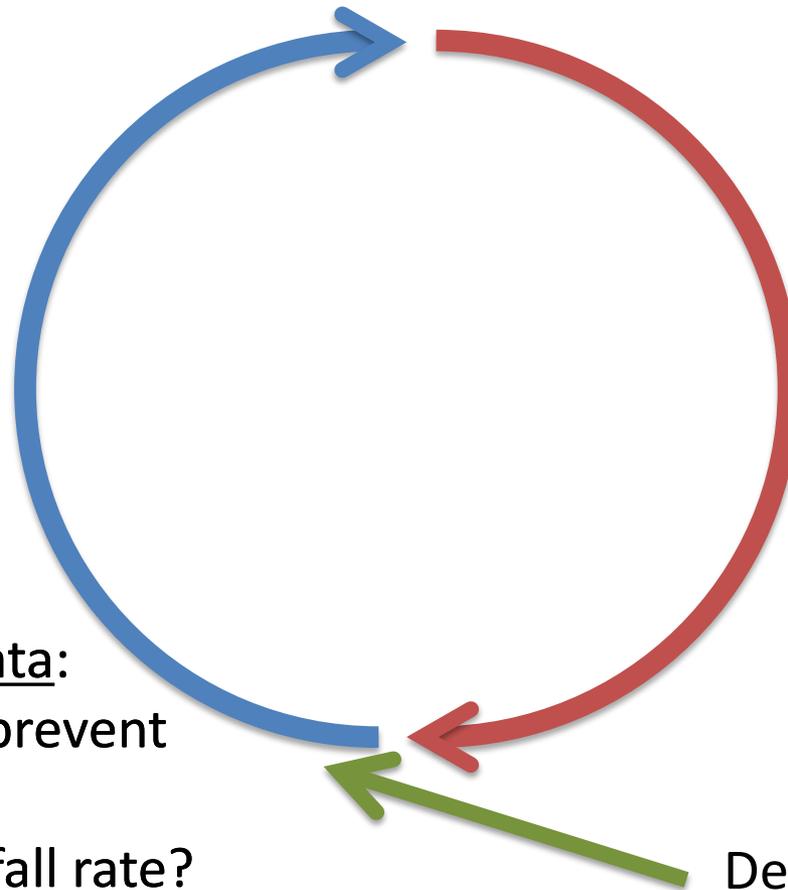
What is the fall rate?

Take Action: Change

Current Practice:

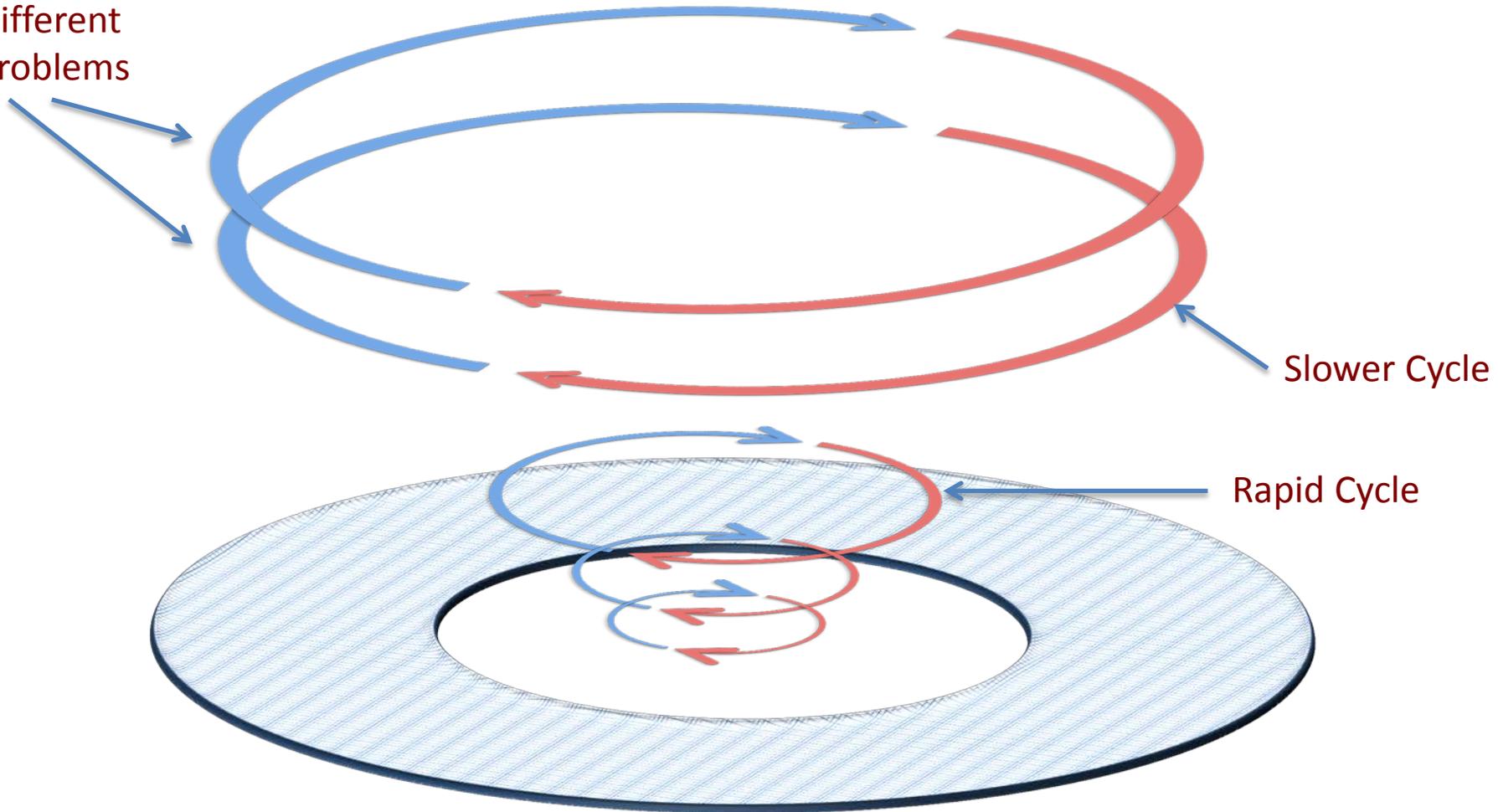
In whole or part...

Decision to study falls



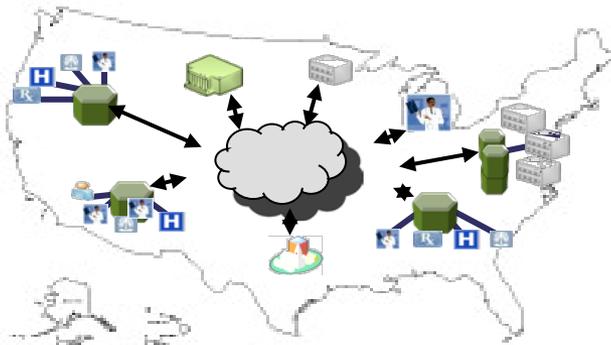
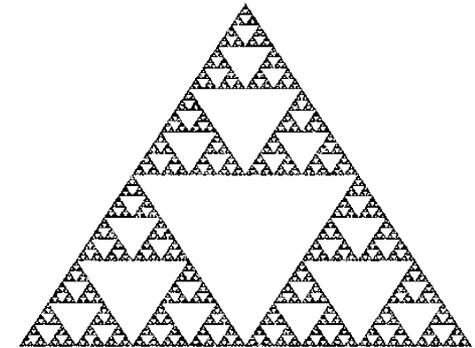
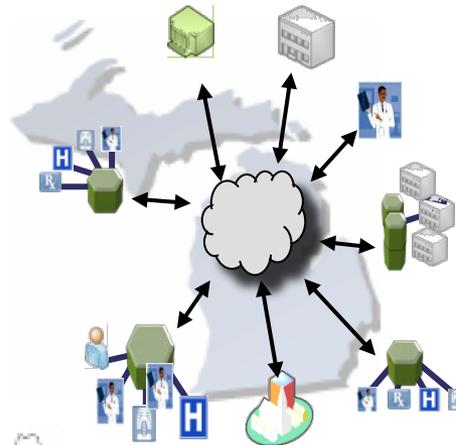
LHS: A Infrastructure Platform that Supports Multiple “Virtuous Cycles”

Different Problems



Learning Systems Can Exist at Any Level of Scale

- At every level of scale, it looks pretty much the same
- Local, state, national, global



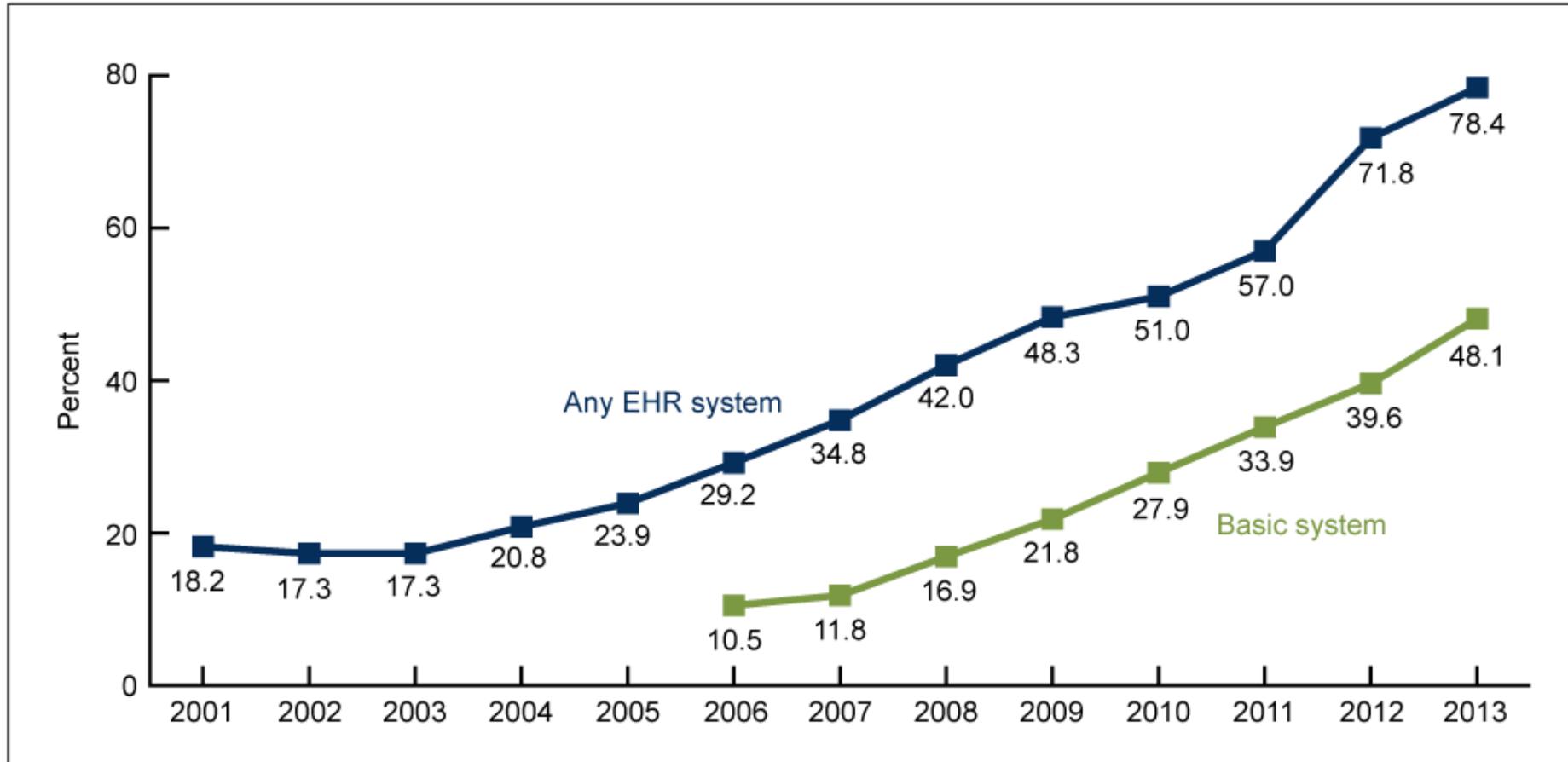
A High Functioning LHS Will Make These (and Other) Things Possible

“17 years to 17 months, or maybe 17 weeks or even 17 hours...”

- Over time, the best “personalized” dosage of a new drug is learned based on patient experience. The current optimal dosage algorithm is automatically implemented nationwide in EHR systems.
- During an epidemic, new cases are reported directly from EHRs and the spread of the disease is predicted. Clinicians are alerted as the epidemic approaches their practice areas.
- A patient facing a difficult medical decision describes her case. She discovers the experiences of other patients like her.

The Nation's Health System Goes Digital

Figure 1. Percentage of office-based physicians with EHR systems: United States, 2001–2013

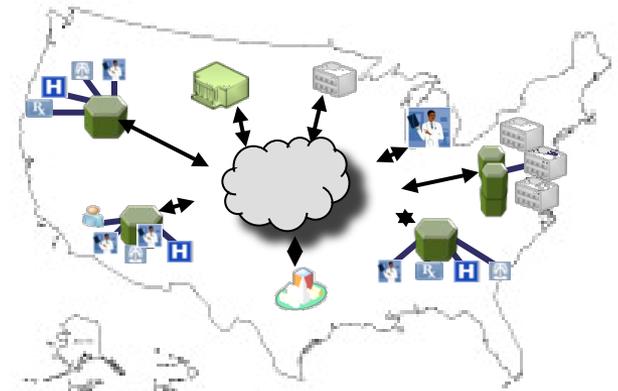


NOTES: EHR is electronic health record. "Any EHR system" is a medical or health record system that is either all or partially electronic (excluding systems solely for billing). Data for 2001–2007 are from in-person National Ambulatory Medical Care Survey (NAMCS) interviews. Data for 2008–2010 are from combined files (in-person NAMCS and mail survey). Estimates for 2011–2013 data are based on the mail survey only. Estimates for a basic system prior to 2006 could not be computed because some items were not collected in the survey. Data include nonfederal, office-based physicians and exclude radiologists, anesthesiologists, and pathologists.

SOURCE: CDC/NCHS, National Ambulatory Medical Care Survey and National Ambulatory Medical Care Survey, Electronic Health Records Survey.

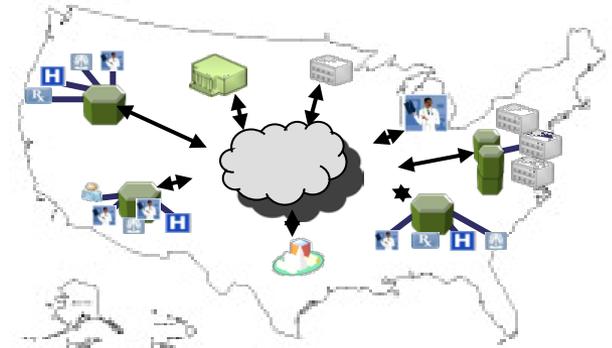
The LHS: *One Infrastructure that Supports*

- **Research**
 - Clinical
 - Comparative effectiveness
 - Translational
- **Public Health**
 - Surveillance
 - Situational Awareness
- **Quality Improvement**
 - Health process and outcomes research
 - Best practice dissemination
- **Consumer Engagement**
 - Knowledge-driven decision making

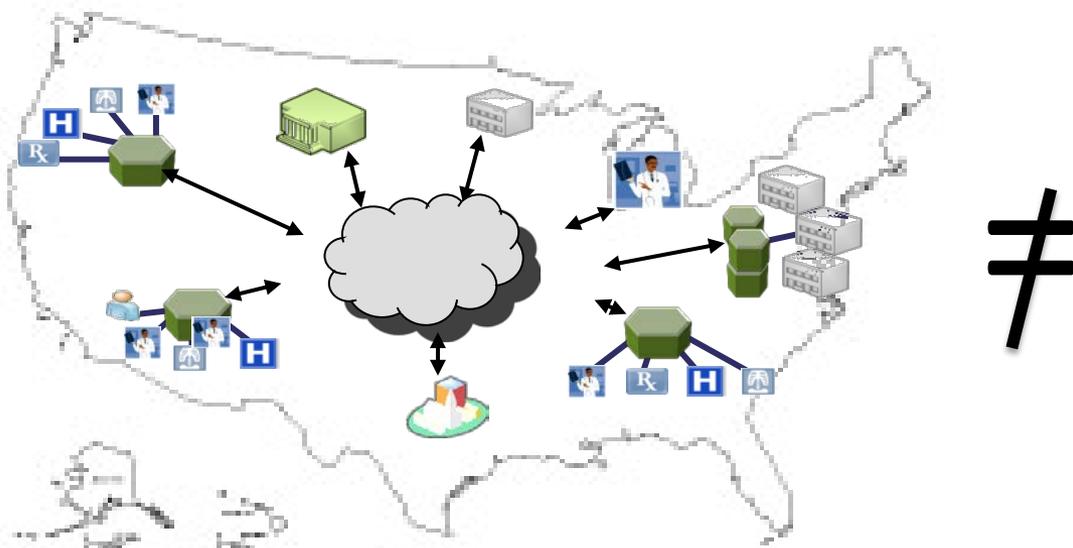


The LHS as Currently Envisioned

- A federation
 - *Not* a centralized database
- Grounded in public trust and patient engagement
- Participatory governance
- An “Ultra Large Scale” System
 - “Just enough” standardization
 - Supports innovation around standards

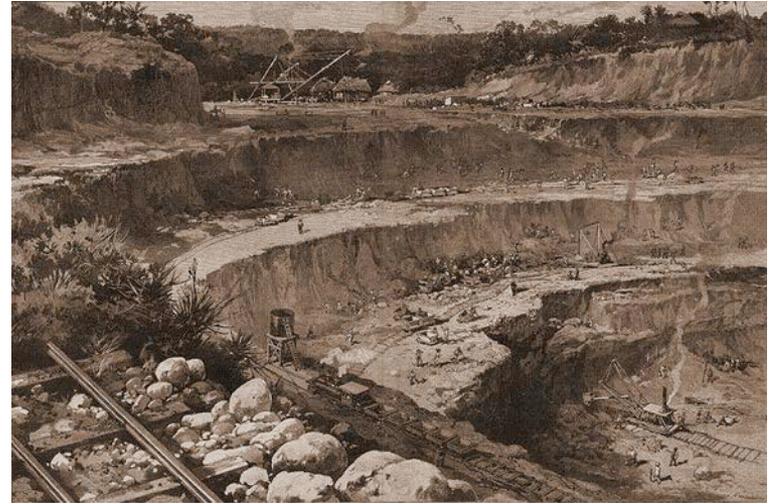


The LHS Can't be Framed Purely as a Technical Problem



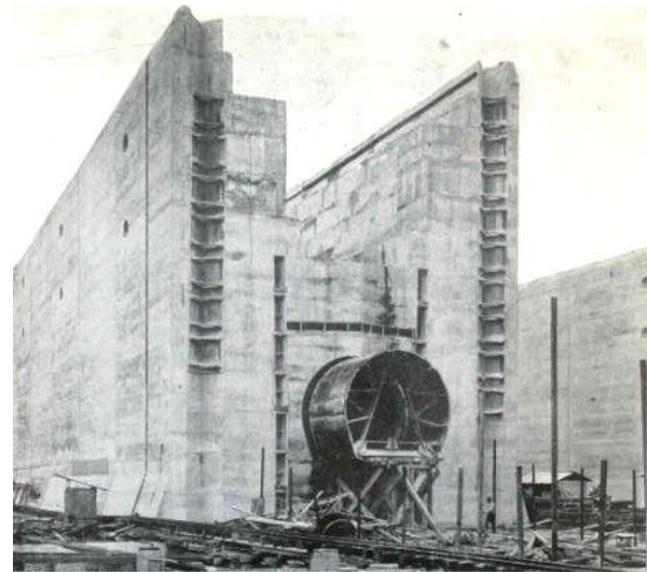
History Lesson: the Panama Canal

The French built the Suez Canal as a ditch in the desert.



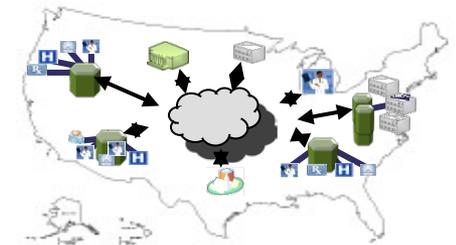
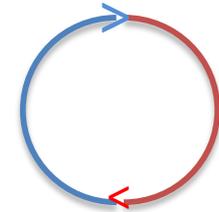
They tried to build the Panama Canal the same way, and failed. They didn't have the right perspective on the problem.

The Socio-Technical Approach that Built the Panama Canal



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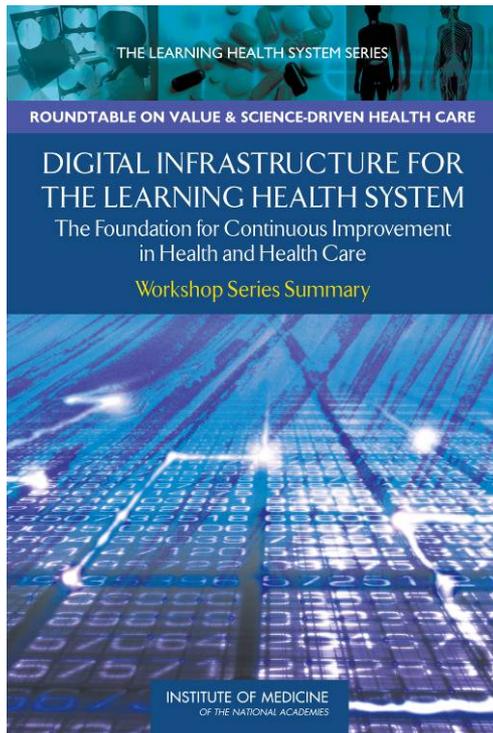
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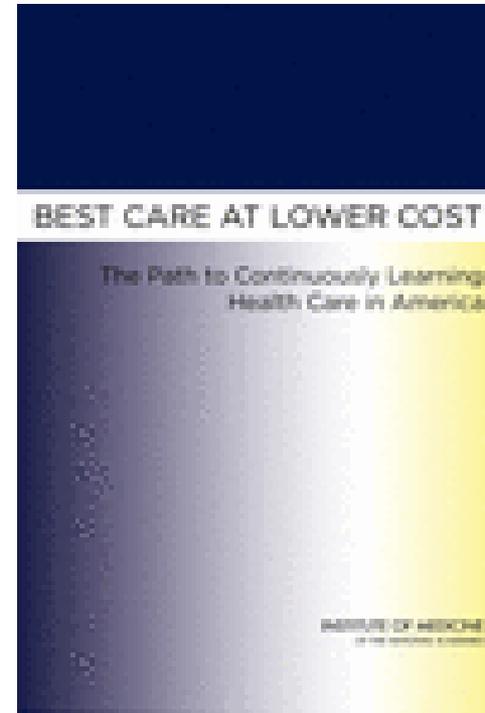
Institute of Medicine Reports



Digital Infrastructure for the Learning Health System: The Foundation for Continuous Improvement in Health and Health Care



Best Care at Lower Cost: The Path to Continuously Learning Health Care in America





The NEW ENGLAND JOURNAL of MEDICINE

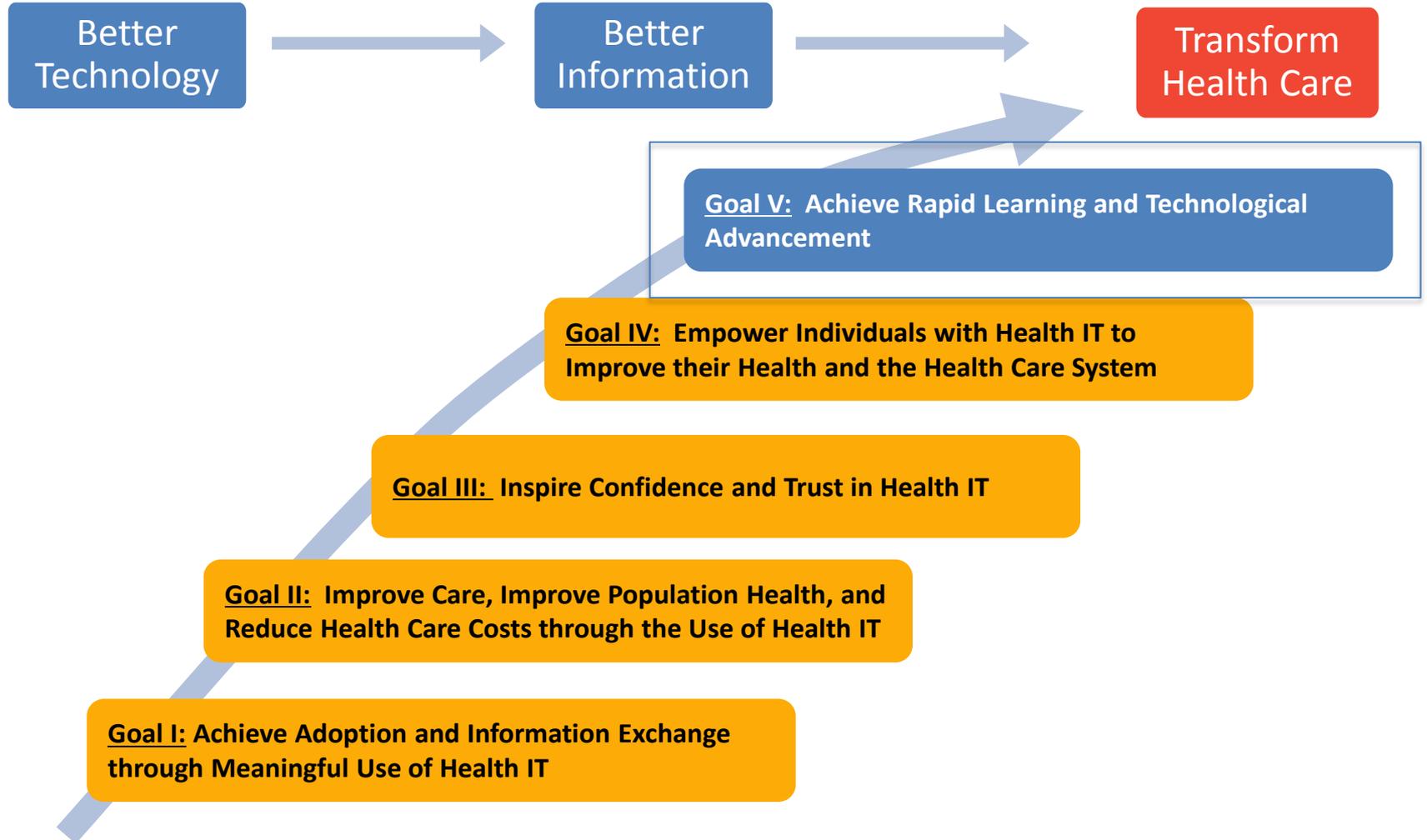
- Arnold Milstein. “Code Red and Blue — Safely Limiting Health Care’s GDP Footprint”, Jan 2013

*“U.S. health care needs to adopt new work methods, outlined in the Institute of Medicine’s vision for a **learning health system**...”*

- Victor Dzau et al. “Transforming Academic Health System for an Uncertain Future”, Sept 2013.

*“In the Big Data era, AHCs should strive to become “**learning health systems**” by making clinical data “research grade” and lowering the costs of data acquisition and knowledge generation.”*

The 2011 Federal Health IT Strategic Plan



Progress: Learning “Islands”

- *Organizations that have become Learning Health Systems at their level of scale.*
- *But don't routinely connect with other islands.*



Progress: Inter-organizational Data Federations and Networks

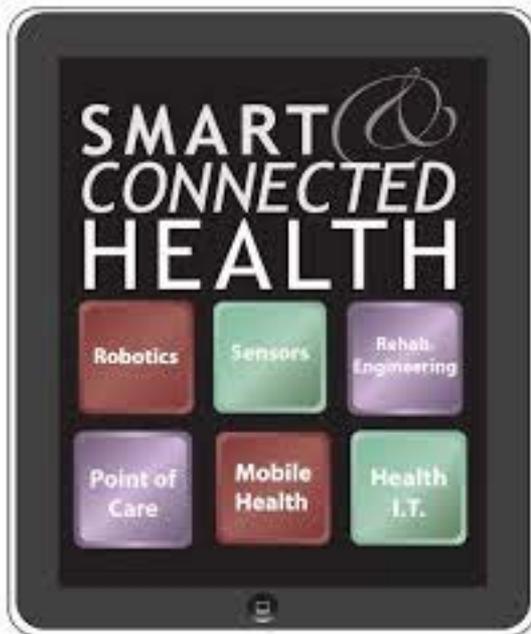


PopMedNet™



Progress: Grant Programs

- NIH “Big Data to Knowledge”
- PCORI Research Networks
- NSF Smart and Connected Health



Progress: Grassroots Movement

- National “Summit” convened in May 2012 to envision LHS as set of shared beliefs
- A Dumbarton Oaks conference for the LHS
- ~ 70 organizations represented at the National Press Club
- Resulted in 10 consensus *Core Values*
- 60 organizations have formally endorsed
- Giving rise to a **Learning Health Community**



60 Endorsements of the LHS *Core Values** (As of 5/2/2014)



*To be included on a Learning Health Community public website that will list all organizations that have endorsed the LHS *Core Values*.

Medical Advocacy Mural Project
Let's change the "face" of healthcare.



LHS Research Challenges Workshop: April 2013



- A national workshop to explore the *research challenges* inherent in achieving a high functioning LHS
- Computer science to epidemiology to economics
- 45 invited participants plus Federal liaisons
- Report (“Toward a Science of Learning Systems”) at healthinformatics.umich.edu/lhs/nsfworkshop



Workshop Findings at Two Levels



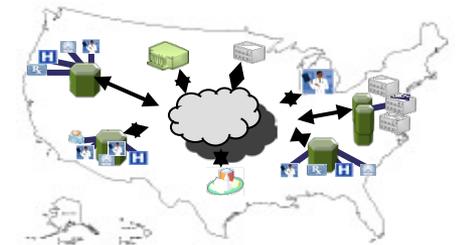
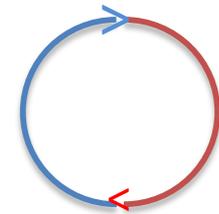
1. **What we were asked to do:** the research questions that must be addressed to meet LHS system level requirements
 - **106 questions** organized into four categories and 19 sub-categories
2. **Something transcendent:** A vision of a *science of cyber-social ecosystems* necessary to address these questions (and achieve the LHS)

Approaching a “First” National System

1. Words: calls and reports
2. “Learning Islands”
3. Data federations and networks
4. Grant programs
5. A grassroots coalition of the willing
6. A emerging science of learning systems

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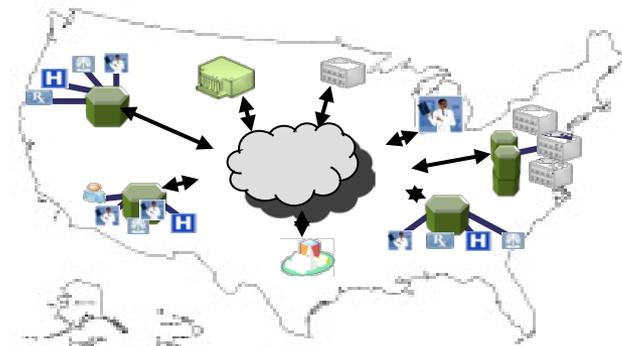
Infrastructure, Infrastructure, Infrastructure...



Paradoxically: Where is Public Health?

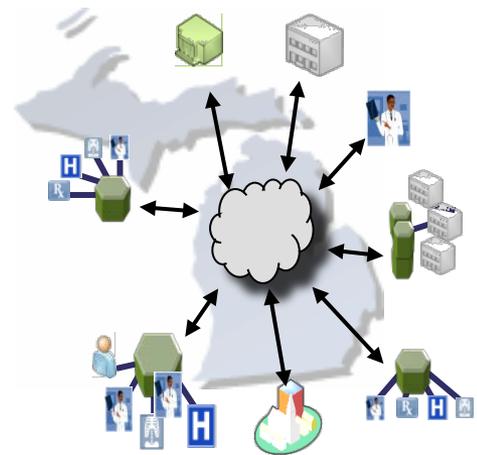
Public health has the most to gain from an LHS:

- Engages the entire population
- Aligns with public health's mission of intervention
- Public health needs the persistent infrastructure and economy of scale



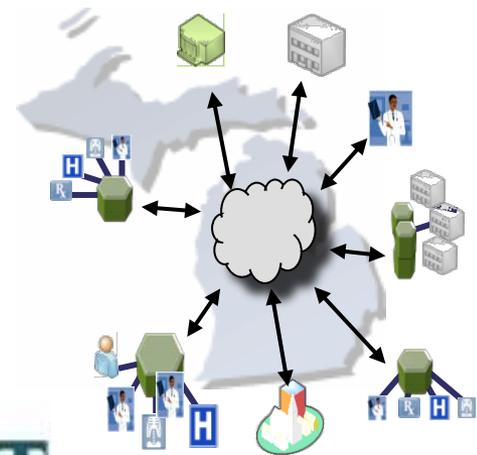
State Level LHS Initiatives

- LHS is a fractal: allows initiatives at any level
- State level initiatives put public health at the center



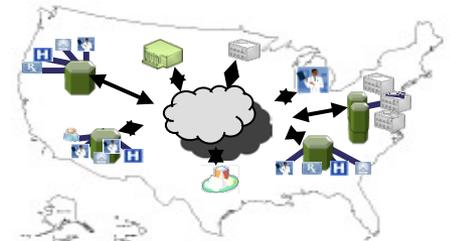
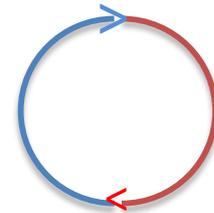
Learning Health for Michigan

- Toward a state level Learning Health System
- Hosted by the Center for Healthcare Research and Transformation
- Multi-stakeholder Planning Committee
- Kickoff Meeting July 11



In Sum

- We need to turn the “Titanic”, locally and nationally
- The **Learning Health System** (LHS) can help do this
- I’m not the only one who believes this to be the case
- Public health may have the most to gain from an LHS



Thanks & Write to Me

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