

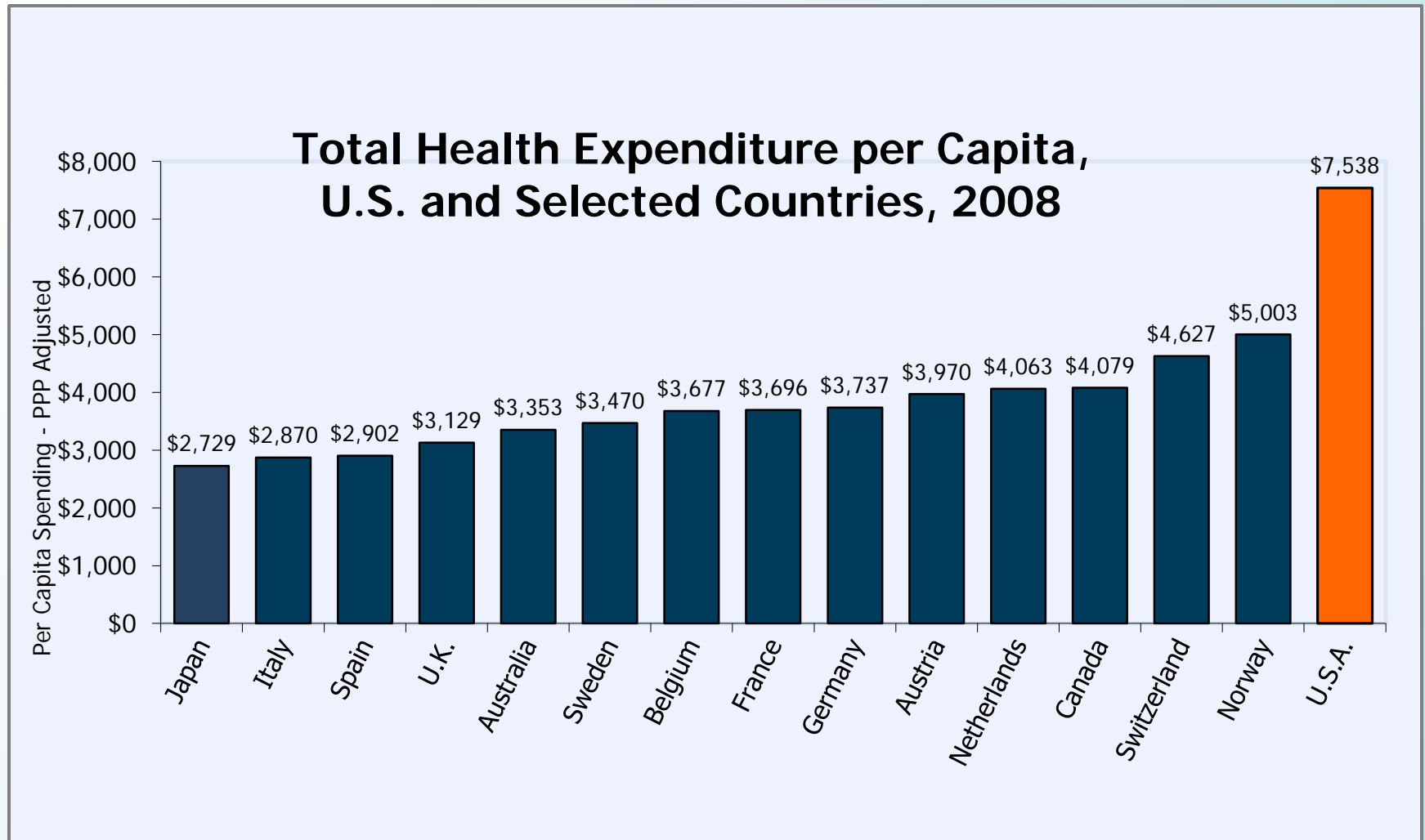


# Evidence-based Design for Health Information Technology (HIT)

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# Complaint – U.S. health care most costly in the world



**Source:** Organization for Economic Co-operation and Development (2010), "OECD Health Data", *OECD Health Statistics* (database). [doi: 10.1787/data-00350-en](https://doi.org/10.1787/data-00350-en) (Accessed on 14 February 2011).

Slide is courtesy The Kaiser Family Foundation, Kaiser Fast Facts. Data Source, accessed on 11/26/11, available at <http://facts.kff.org/results.aspx?view=slides&detail=43>

# Complication -

HIT has great potential that can't be realized with conventional, hit-or-miss methods

- HIT has powerful impact on the way care can be practiced
- Unpredictable HIT impact on workflow can -
  - risk patient safety
  - disrupt appropriate care
  - undermine needed efficiency gains

# Diagnosis -

Conventional HIT functions are not co-designed to work smoothly with important, manual activities in the workflow of care

- usability testing only covers the user interface, not the workflow

# Ineffective treatment -

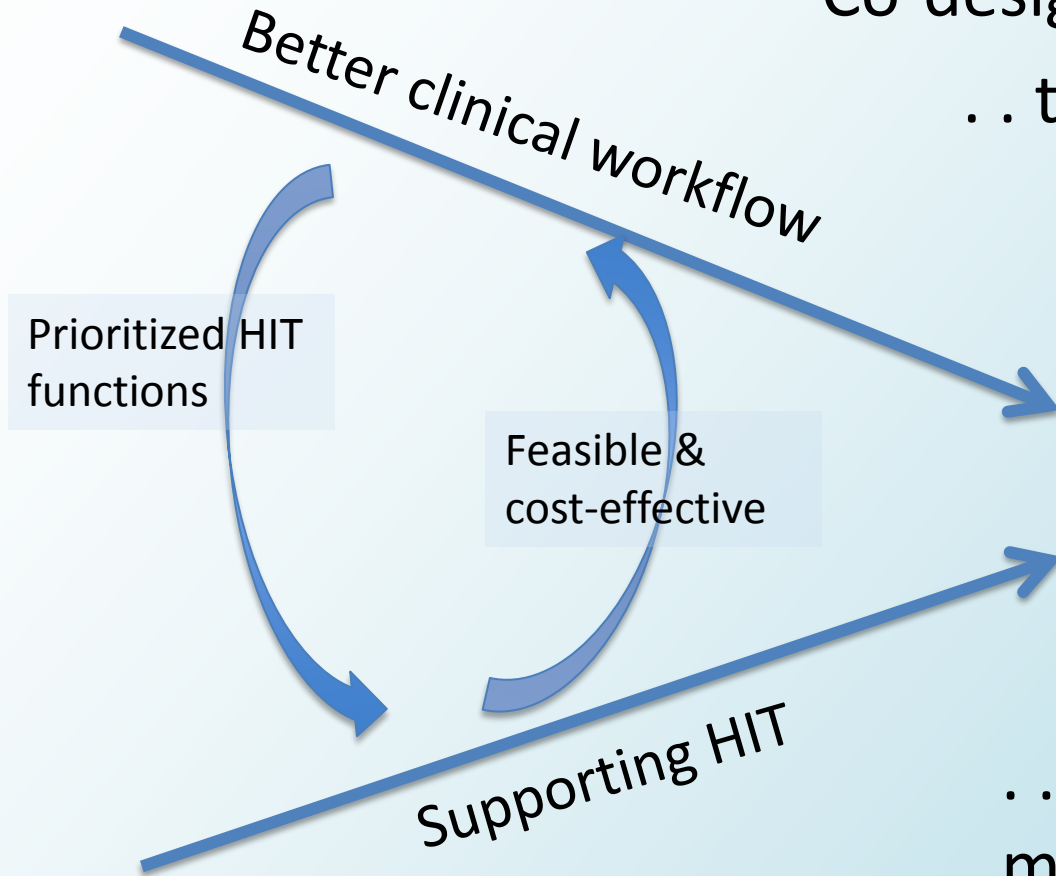


**Just pave the cow paths**



# Rx – make improvement of clinical workflow integral to the way HIT systems are created

Co-design care workflow & HIT . .  
. . to form a matched pair . .



. . that work together for  
measurably better care

# Protocol -

Use MATH<sup>1</sup> to co-design HIT with workflow

- MATH extends easily understood BPMN standard
- Better information resources can be traded-off for less physical resource use

MATH makes beneficial impact to workflow a quantifiable, predictable part of HIT system design



# Case Study - *Priority Contact*

Reduces unproductive clinician time to contact patients quickly about test results

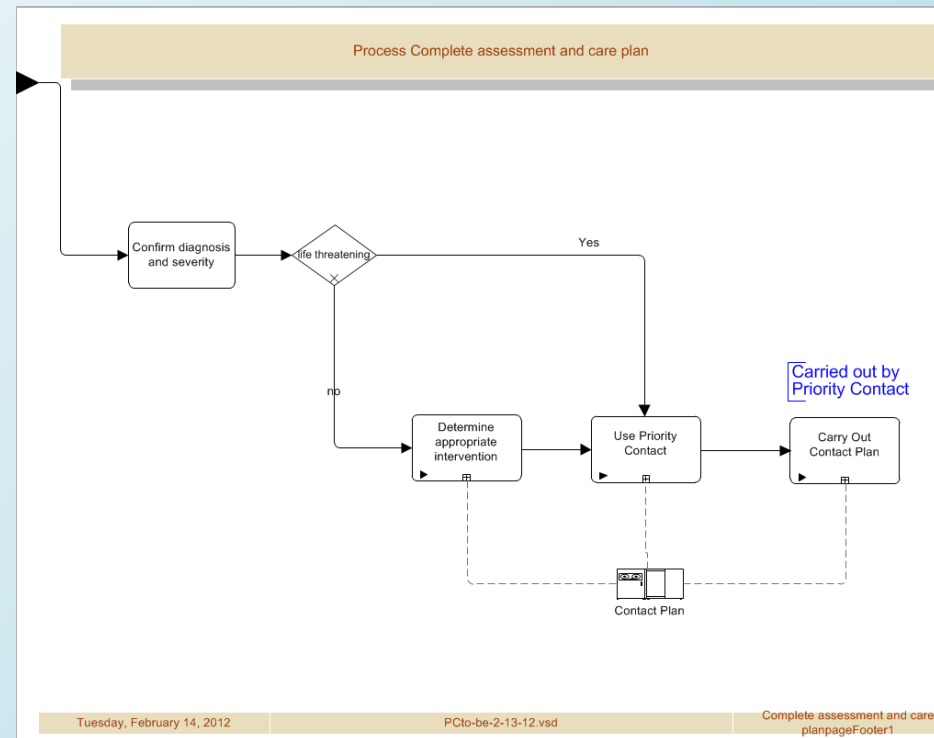
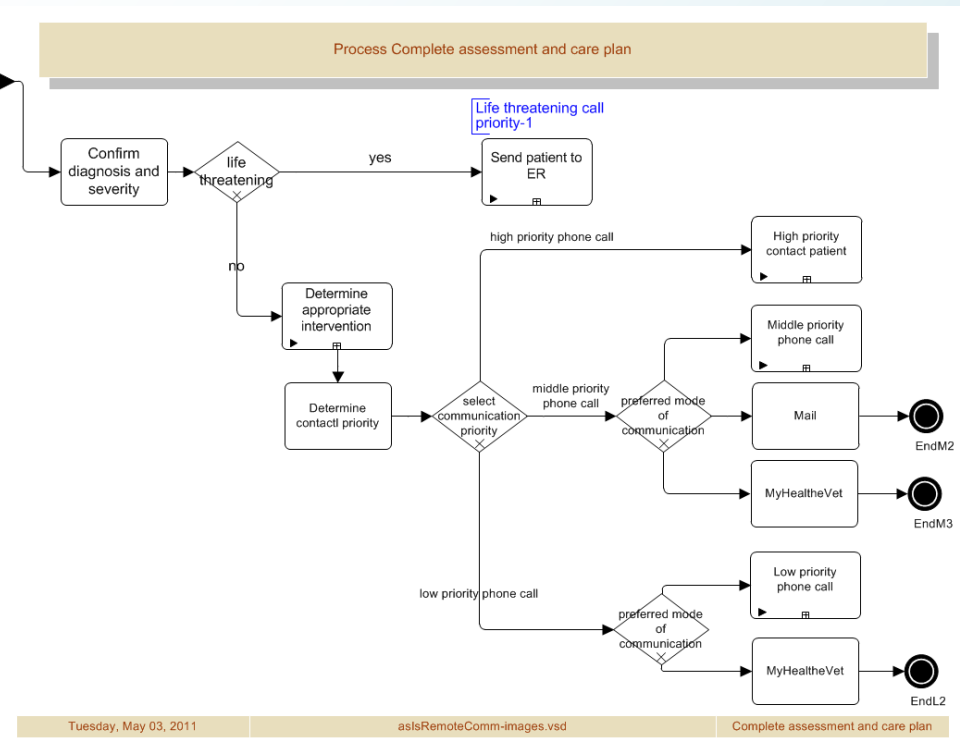
- harvests EHR data to carry out appropriate procedures
- can improve quality measures for patient contact
- won award in national SMART Apps competition



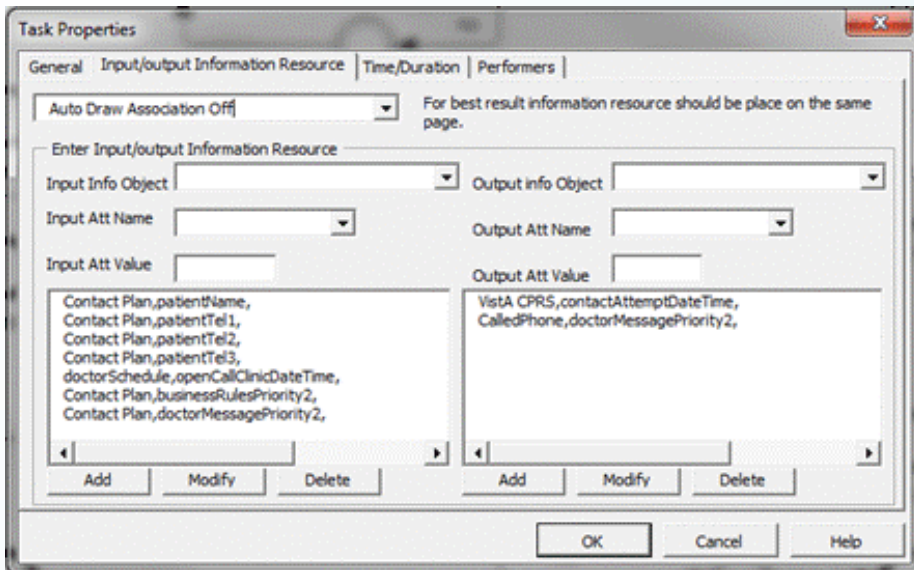
# Clinicians participated in concept design and critique impact on quality

Part of as-is manual workflow to contact patients

Streamlined with *Priority Contact*

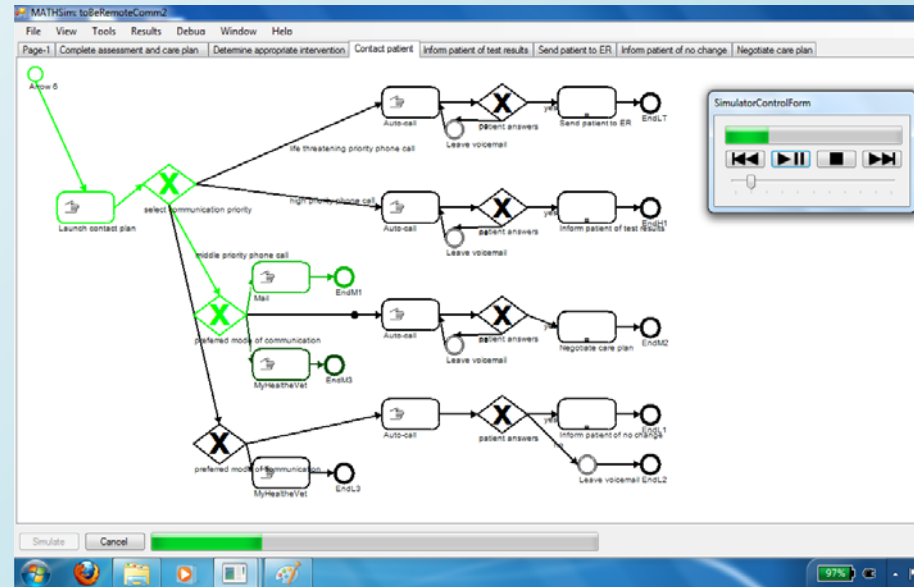


# Formative evidence for efficiency impact of *Priority Contact* - discrete-event simulation



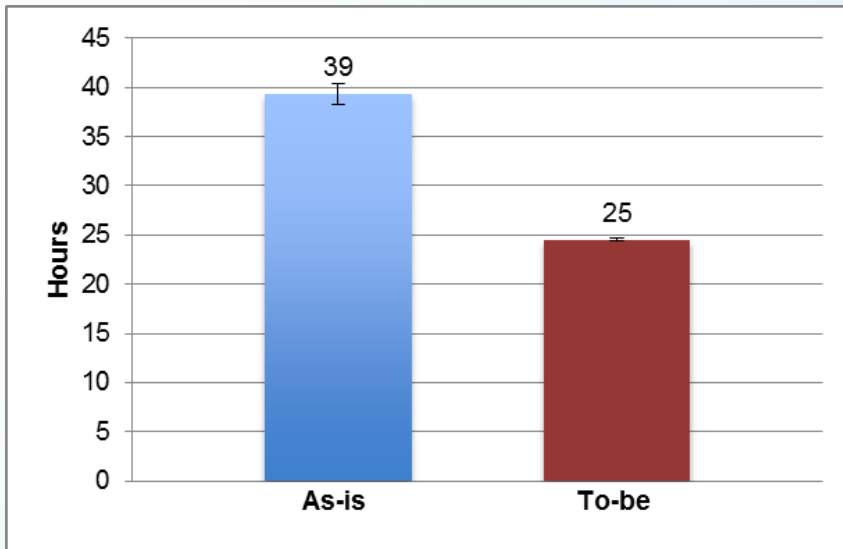
2. Run MATHsim to analyze efficiency impact of new system on workflow

1. Re-assign manual tasks to *HIT services* in MATHflow

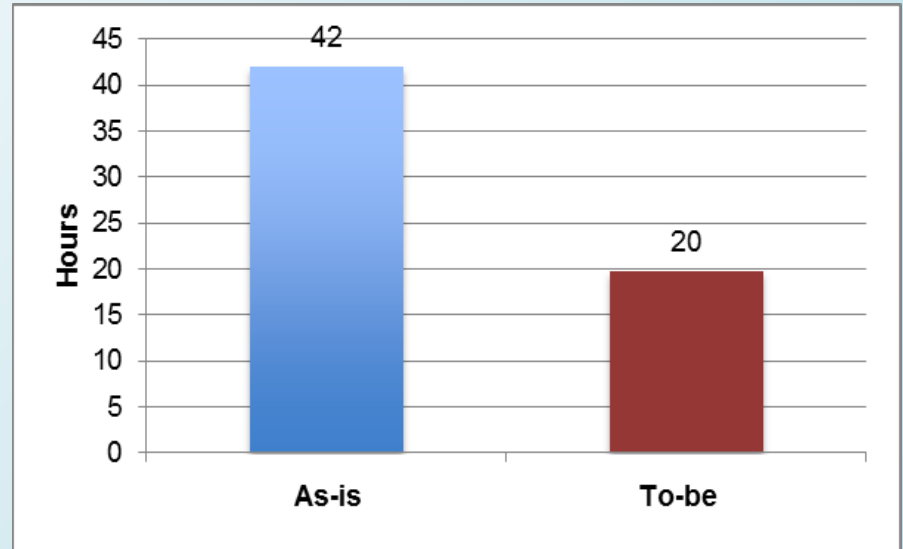


# Evidence Progression for *Priority Contact*

**Data that guided design: Formative comparison of monthly hours spent contacting patients**



**Revised comparison from measured alpha test results**



Demonstrates technical feasibility of evidence-based design of HIT

- detailed model provides accuracy

# Side Effects -

- Labor intensive
  - MATH projects require 15-20 hours of clinician interviews and observations
- Skill level need for MATH projects is still high
  - Ethnographic research
  - Clinical experience
  - Systems modeling & simulation
  - Impact evaluation
  - Software design/implementation
- Mitigation
  - 1.5-day training course for MATH is available and several BPMN tutorials are online
  - Each subsequent project can help build a library of reusable model components

## Summary -

- MATH models the workflow of clinical care to understand how it should be improved with HIT
- Credible proxy measures of HIT impact can be derived from workflow models to guide design

All models are wrong . .

. . but some are useful.

- *George Box, distinguished statistician*

Thank you.