HUMAN CENTERED DESIGN & ENGINEERING
UNIVERSITY of WASHINGTON

SHARPC NCCD

Evidence-based Design for Health Information Technology (HIT)

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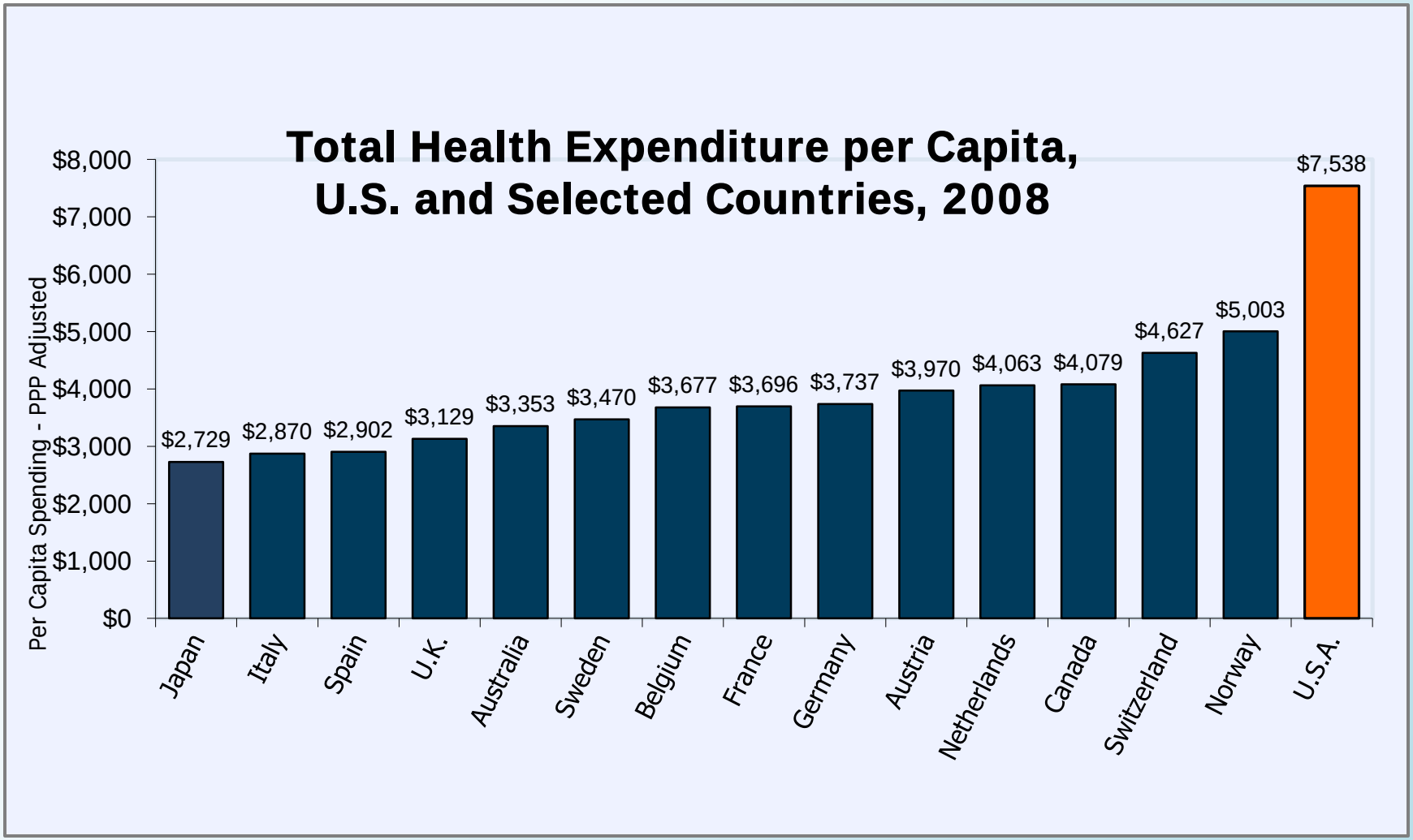
Complaint –
U.S. health care most costly in the world



Source: Organization for Economic Co-operation and Development (2010), "OECD Health Data", *OECD Health Statistics* (database). doi: 10.1787/data-00350-en (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 -

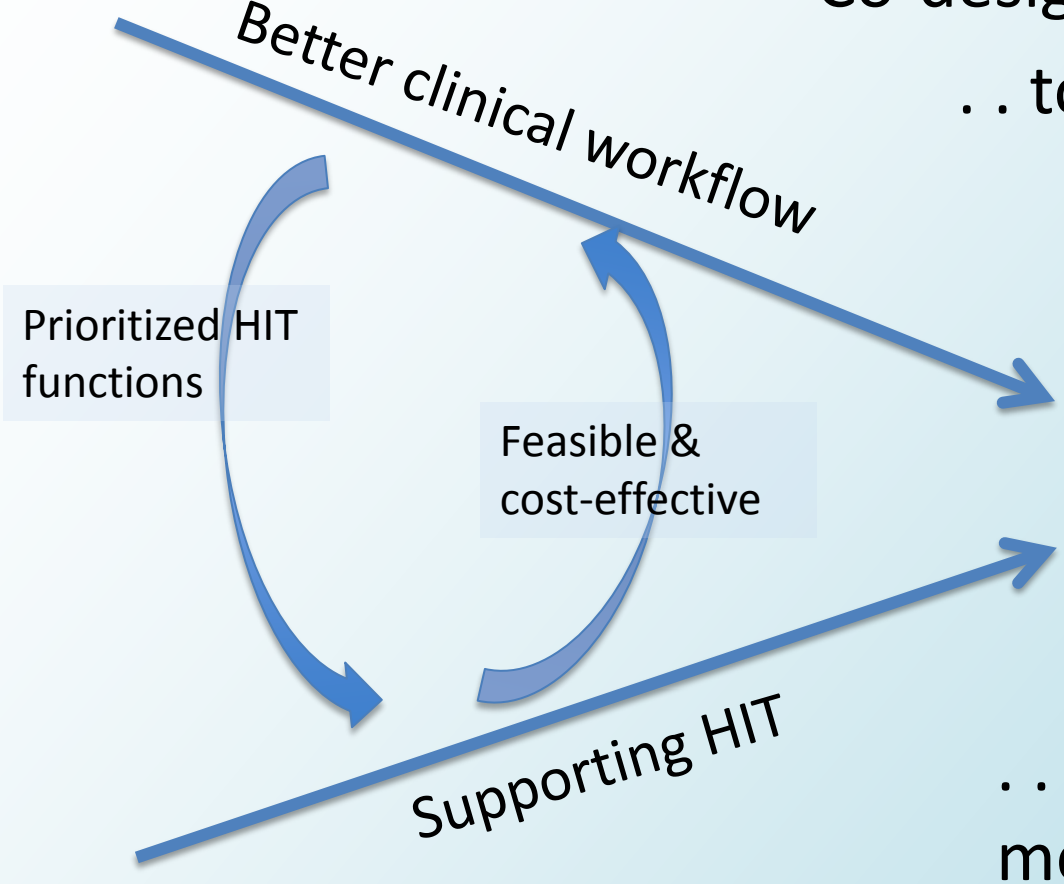
Conventional HIT functions are not co-designed to work smoothly with important, manual activities in the workflow of care

- 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 <u>together</u> for measurably better care

Protocol -

Use MATH[1] 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

1. Modeling & Analysis Toolsuite for Healthcare – patent pending 13/740,681

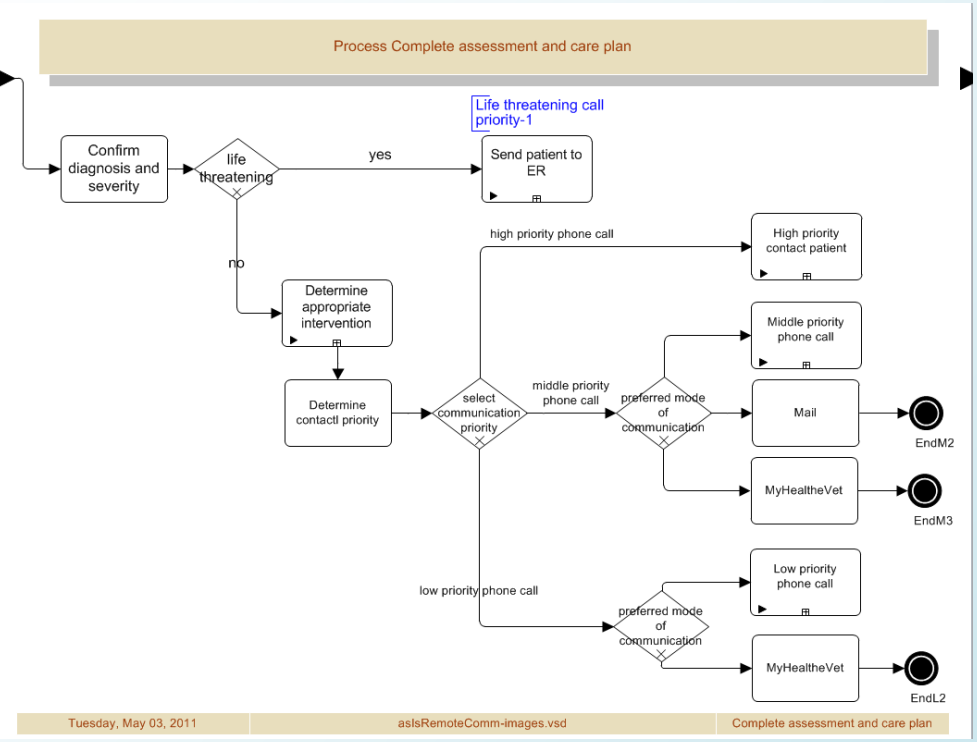
Case Study - *Priority Contact*

Reduces unproductive clinician time to contact patients quickly about test results

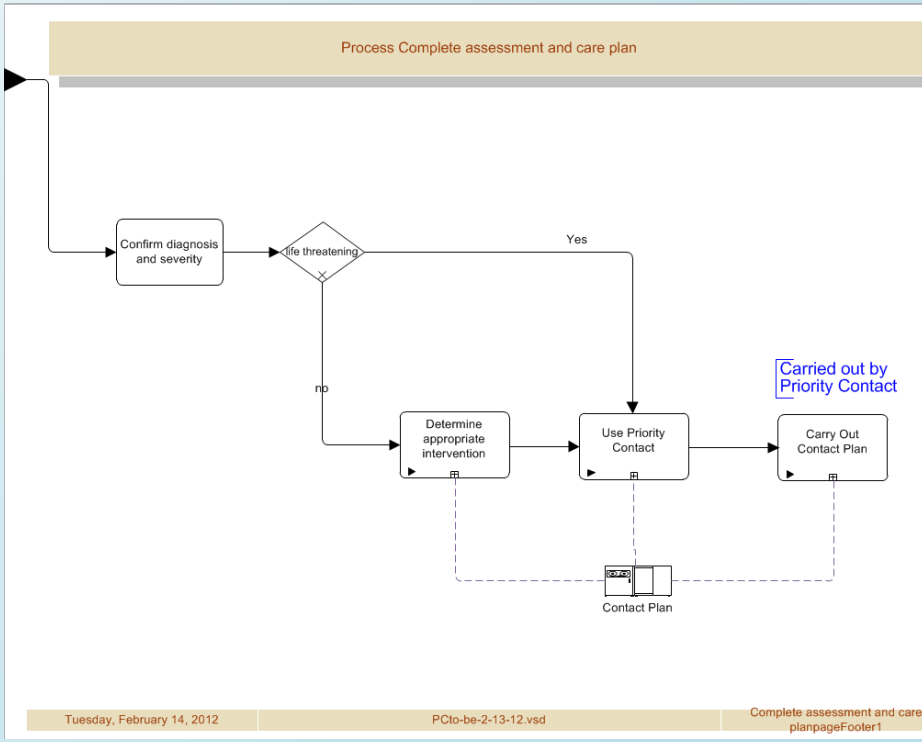
- harvests EHR data to carry out appropriate procedures
- can improve quality measures for patient contact
- won award in national SMART Apps competition

Clinicians participated in concept design and critique impact on quality

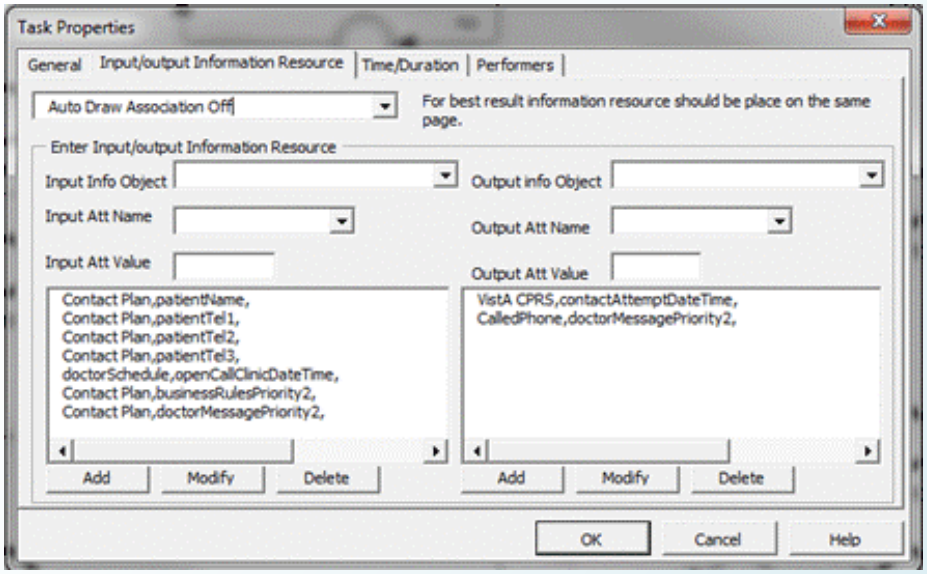
Part of as-is manual workflow to contact patients



Streamlined with *Priority Contact*

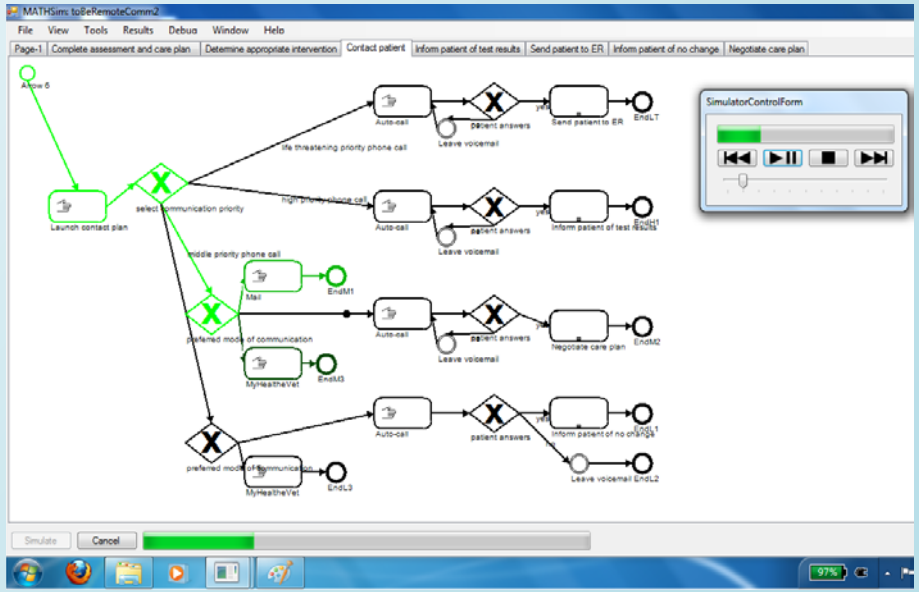


Formative evidence for efficiency impact of *Priority Contact* - discrete-event simulation



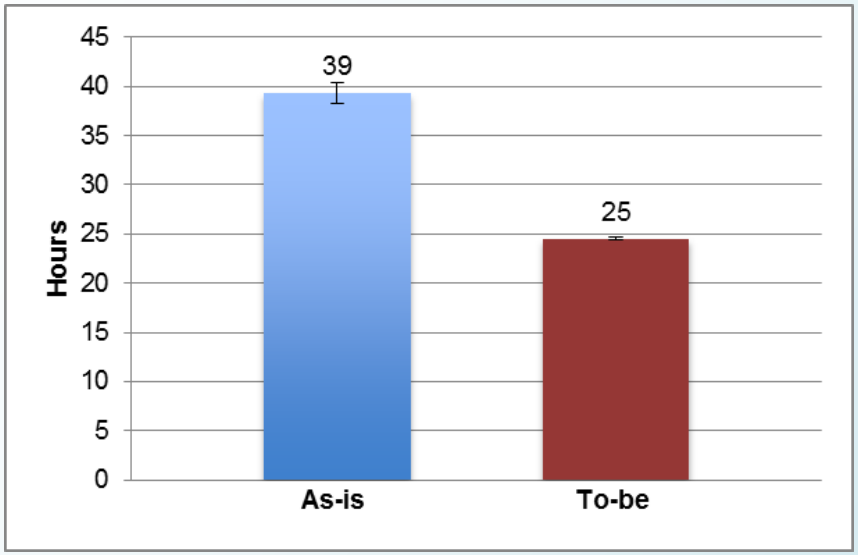
1. Re-assign manual tasks to *HIT services* in MATHflow

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

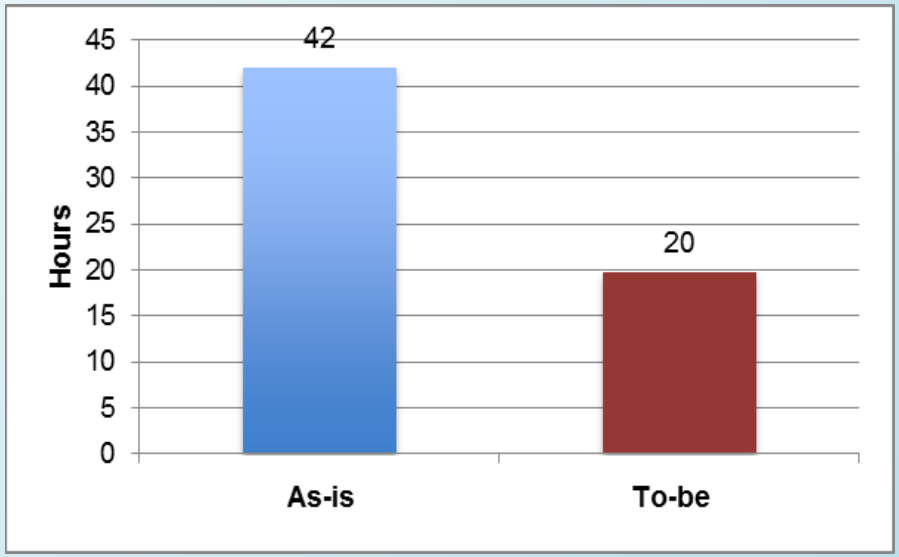


Evidence Progression for *Priority Contact*

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.