

# CDS Consortium Overview

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Principal Investigator

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# Introduction

- **Clinical Decision Support Consortium (CDSC)**

- **Participating Organizations:**

- Partners HealthCare/BWH
- Regenstrief Institute
- Siemens Medical Solutions
- Veterans Health Administration
- Kaiser Permanente Center for Health Research
- University of Texas Health Science Center at Houston
- Duodecim Medical Publications Ltd
- NextGen
- UMDNJ
- WVP Health Authority
- Mayo Clinic
- GE Healthcare
- OHSU



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**DUODECIM**  
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NextGen



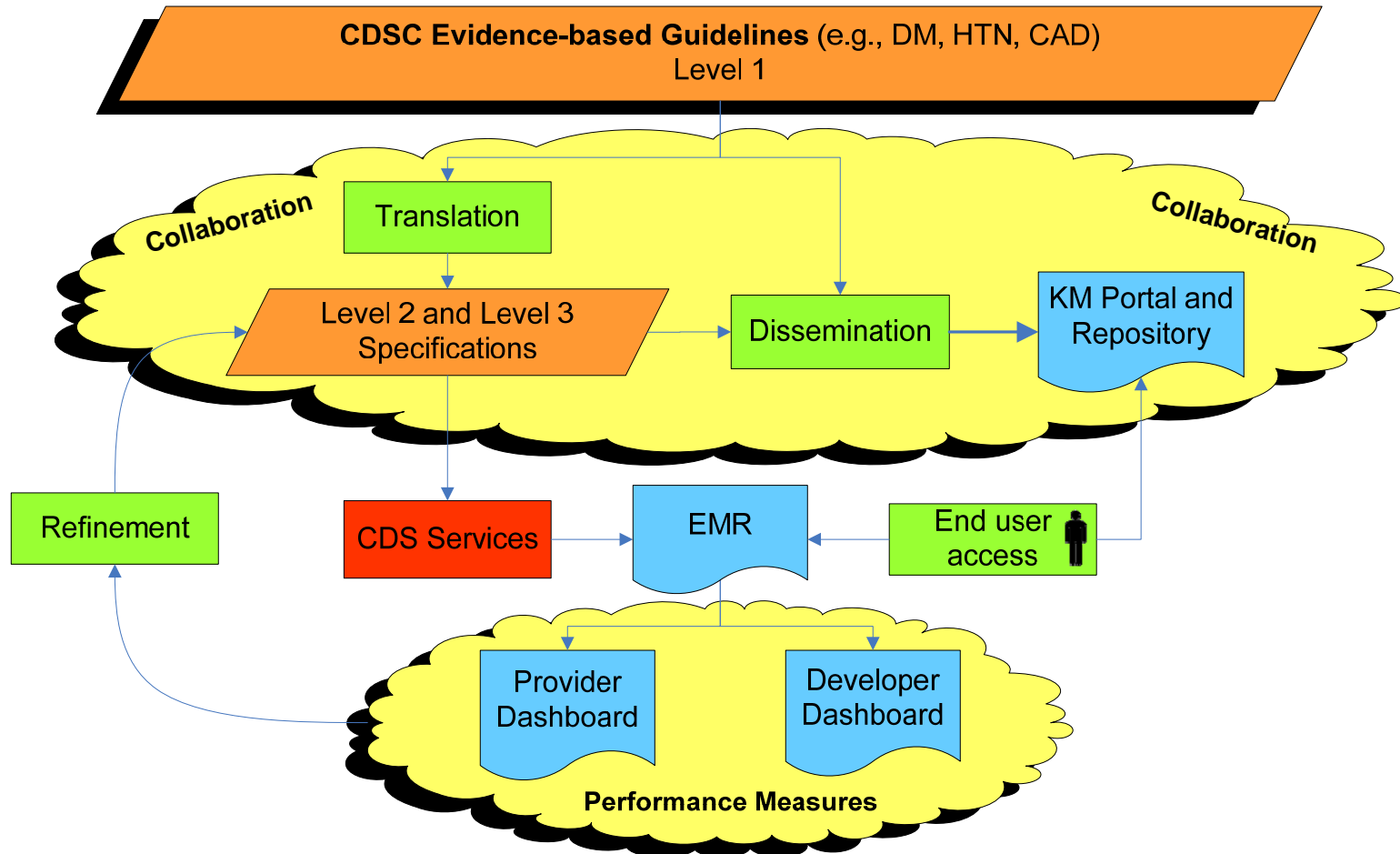
THE UNIVERSITY OF TEXAS  
SCHOOL OF HEALTH INFORMATION  
SCIENCES AT HOUSTON

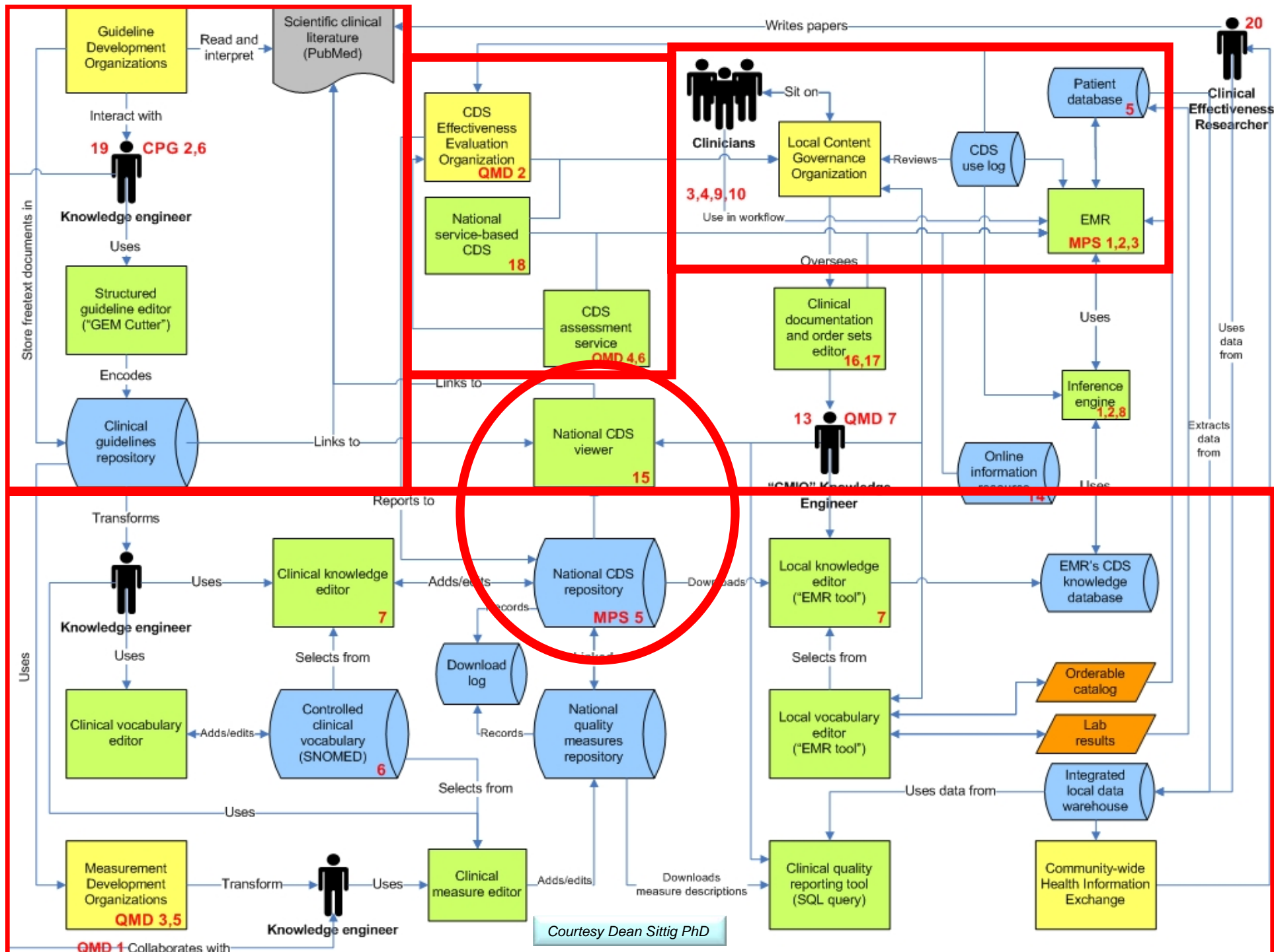
# CDSC Goal and Significance

- **Goal:** To assess, define, demonstrate, and evaluate best practices for knowledge management and clinical decision support in healthcare information technology at scale – across multiple ambulatory care settings and EHR technology platforms.
- **Significance:** The CDS Consortium will carry out a variety of activities to improve knowledge about decision support, with the ultimate goal of supporting and enabling widespread sharing and adoption of clinical decision support.

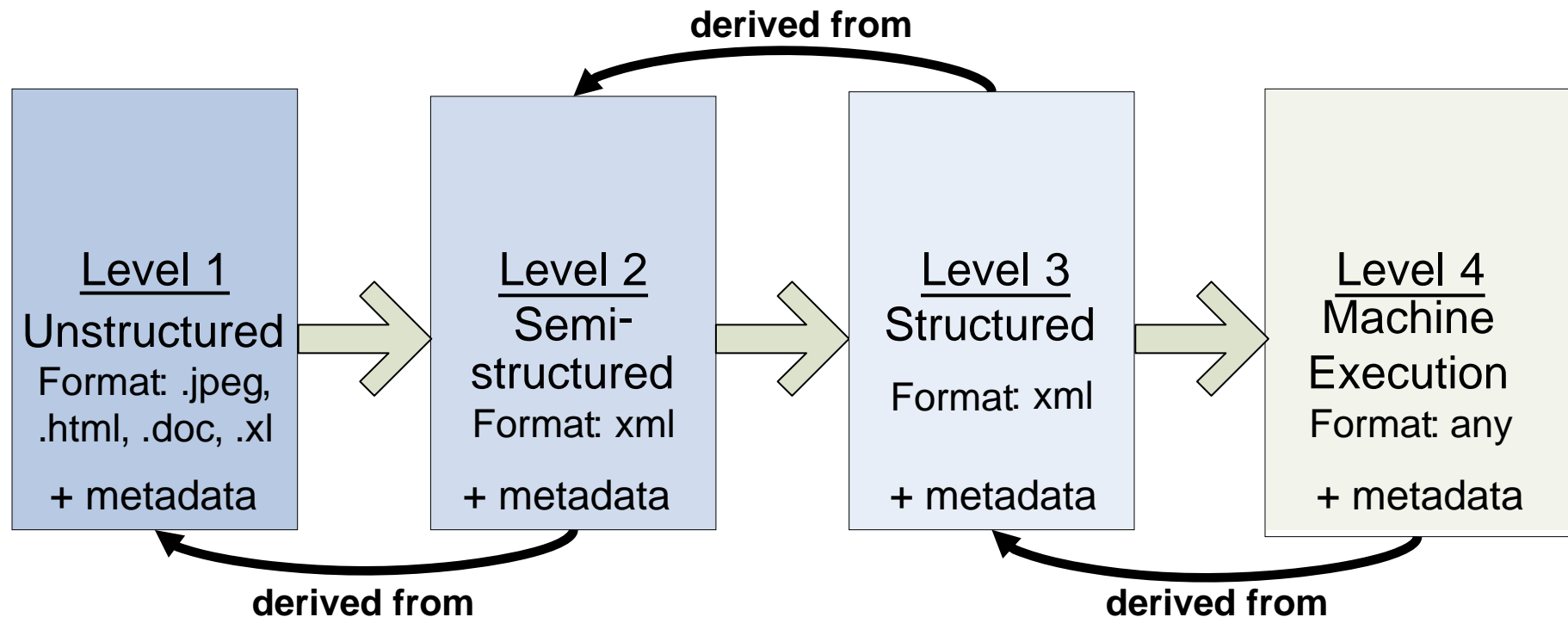
|   |                                    |                                    |
|---|------------------------------------|------------------------------------|
| 1. Knowledge Management Life Cycle                              |                                    |                                    |
| 2. Knowledge Specification                                      | 3. Knowledge Portal and Repository | 4. CDS Public Services and Content |
| 5. Evaluation Process for each CDS Assessment and Research Area |                                    |                                    |
| 6. Dissemination Process for each Assessment and Research Area  |                                    |                                    |

# CDSC Conceptual Approach





# KTS: Four-Layer Model and Evaluation



**Initial evaluation results:** Structured recommendation (L3) was considered *more implementable* than the semi-structured recommendation (L2).

# KM Portal: Gateway to Clinical Knowledge

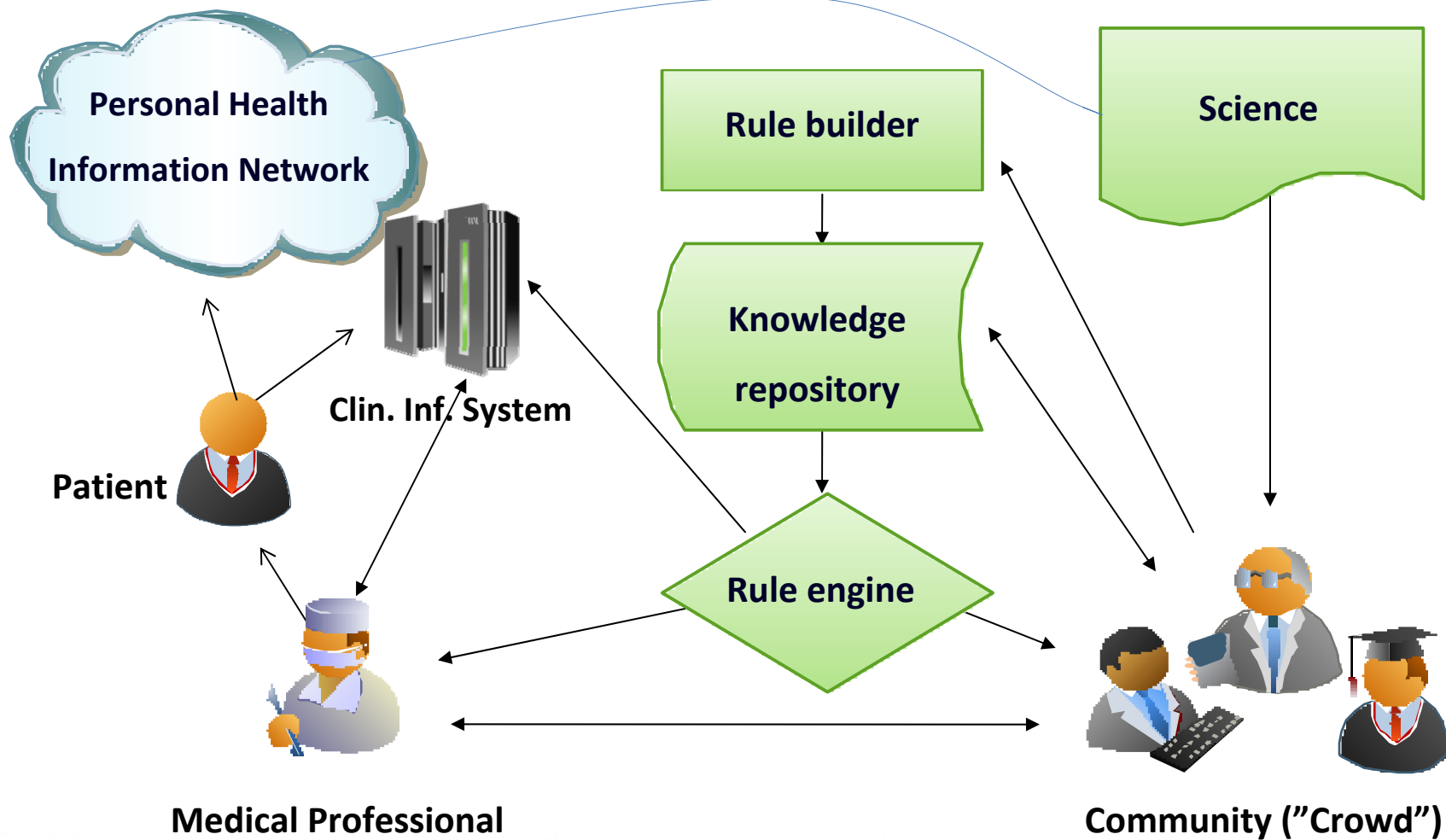
The screenshot shows the CDSC Knowledge Management Portal search interface. The browser window title is "CDSC Knowledge Management Portal - Microsoft Internet Explorer provided by Partners HealthCare System". The address bar shows the URL "http://stage-cdportal.partners.org/CDSCSearch.aspx". The page features a navigation menu with links: Home, About the Portal, About the Consortium, FAQ, Glossary, Terms of Use, and Contact Us. The main search area includes a "Search Term" input field, a "Search" button, and a "Clear Selection" button. Below this is a "Hide Advanced Search" button. The search filters are organized into two columns:

- Specification Level:** All Levels, Level 1 - Unstructured, Level 2 - Semi-Structured
- Intended Recipient Role:** All Roles, Nurse, Patient
- Contributing Entity:** All Contributing Entities, GE Healthcare, Kaiser Permanente Northwest
- Clinical Information System:** All Clinical Info Systems, GE, Meditech
- Content Type:** Alert, All Content Types, Definition/Dictionaries
- Patient Population:** Adolescent, Adult, All Patient Population
- Clinical Domain:** Aerospace Medicine, All Clinical Domain, Allergy and Immunology, Anesthesiology, Audiology, Chiropractic Medicine

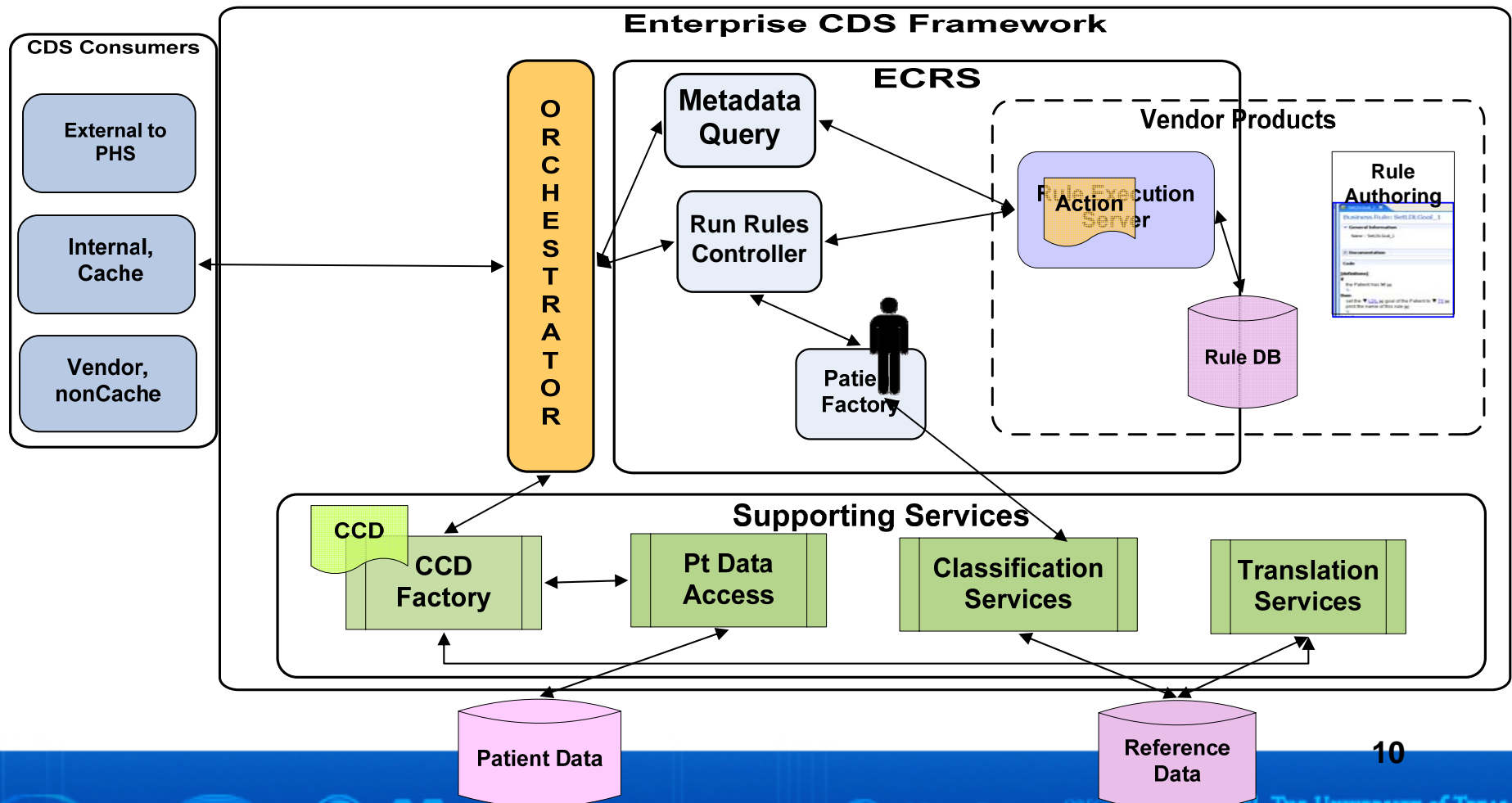
At the bottom, there are "Date From:" and "Date To:" input fields. The Windows taskbar at the bottom shows the Start button, several open Internet Explorer windows, and the system tray with the time "2:00 PM". A small number "8" is visible in the bottom right corner of the browser window.

# 'Crowdsourcing' Knowledge Engineering

Petter K. Risøe  
HSPH HPM512 2009



# CDS Services: ECRS Functionality



# CDSC Impact to Date

1. Disseminating recommendations on best practices for knowledge management and CDS to key stakeholders such as CCHIT, HITSP, and health IT vendors
2. Facilitating cross-institutional knowledge engineering collaboration via the CDSC KM portal and through refinement of the four-layer knowledge representation
3. Demonstrating interoperable CDS Services in the Partners LMR, and in the Regenstrief Institute

# KMLA: CDS/KM Best Practices

**Tools and techniques that should have high priorities in organizations interested in developing successful CPOE and CDS implementations:**

1. External repository of clinical content with web-based viewer
2. Online, collaborative, interactive, Intranet-based tool to facilitate content development
3. Enterprise-wide tools to maintain controlled clinical terminology concepts
4. A multidisciplinary team responsible for creating and maintaining clinical content

Sittig DF, Wright A, Simonaitis L, Carpenter JD, Allen GO, Doebbeling BN, Sirajuddin AM, Ash JS, Middleton B. The state of the art in clinical knowledge management: an inventory of tools and techniques. *Int J Med Inform.* 2010 Jan;79(1):44-57.

# KMLA: Vendor Capabilities

Representatives of 9 **commercially-available, CCHIT-certified** clinical information systems (CIS) were interviewed to evaluate their CIS capabilities' along 4 functional axes:

1. **Triggers:** events that invoke a CDS rule.
2. **Input data:** data elements used by a rule to make inferences.
3. **Interventions:** possible actions a CDS module can take.
4. **Offered choices:** choices given when an event triggers.

Trigger, input data, and intervention axes are generally well covered by major CIS's, **but offered choices are not.**

**Dramatic system-by-system variability was found.** CCHIT should include all features measured in this study in their future certification criteria.

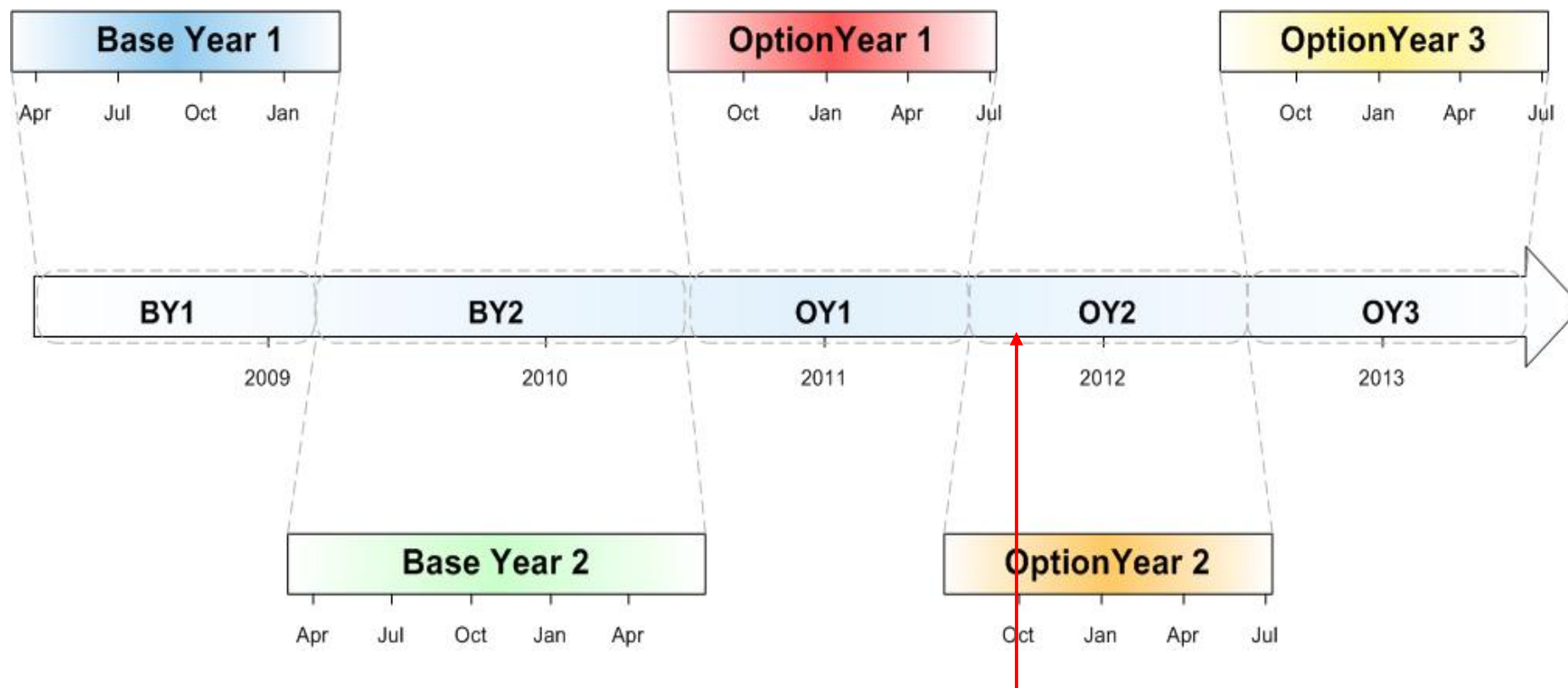
Wright A, Sittig DF, Ash JS, Sharma S, Pang JE, Middleton B. Clinical Decision Support Capabilities of Commercially-available Clinical Information Systems. J Am Med Inform Assoc. 2009 Jun 30.

# KMLA: Recommendations

## Recommendations for clinical guideline development organizations regarding CDS-related standards:

1. Identify **standard data triggers**
2. Work on increasing **clarity and internal consistency of clinical logic**
3. Suggest **appropriate personnel and best insertion points in clinical workflow** to deliver CDS interventions
4. Facilitate **selective filtering** with guidelines
5. Support the **HL7 InfoButton standard** in guidelines
6. Include **experienced and well-trained clinical informaticians** on all committees in guideline development groups

# CDSC Timelines



We are here

# Overview of OY1 Accomplishments

- Four-layer knowledge representation stack.
- Knowledge Authoring Tool (KAT).
- KM Portal for collating and browsing knowledge artifacts.
- Web-based CDS services.
- 6 month Pilot at PHS.
- Working with NextGen and GE to implement ECRS in their Electronic Health Records (EHRs).
- Devised a novel method for CDS performance assessment.
- CGC, clinical content governance, and editorial process.
- Legal agreements to support CDSC work.
- Disseminated our findings.

# OY2 – OY3 Themes

- Continue work on improving **the translation of knowledge** in clinical practice guidelines into actionable CDS.
- Continue work on identifying the best ways **to represent knowledge** and data required to make actionable CDS content in human readable and machine readable and executable forms.
- Continue explore the best practices **to collate, aggregate, and curate** knowledge content for CDS in the KM portal. Work on the required tools to support KM and collaborative knowledge engineering.
- **Demonstrate** broad adoption of evidence-based CDS at scale.
- **Define and evaluate best practices** for CDS demonstrations. Assess how to incorporate CDS services at scale in a vendor and academic platforms. Evaluate how do we deploy CDS services in healthcare IT in a manner that improves CDS impact.
- **Broadly disseminate** the lessons garnered through the course of these investigations to key stakeholder audiences, including academic informatics, patient safety and quality, clinical professional societies, small office practice settings, and more.

# CDSC Findings and Lessons Learned

## RI team discovered that:

- Meaningful Use is causing many delays as our health care partners rapidly transition from existing systems to new systems which are certified for meaningful use. Research and development projects take a back seat to initiatives that will result in financial benefits for health care providers.
- The legal road for a general service to provide CDS by an external entity (not just access to the rules) has not been paved previously. Liability and indemnification were key issues to resolve, especially in the wake of the recent AMIA workshops and papers denouncing “hold harmless clauses” in software and service contracts.

KM team discovered there is a significant amount of preparation work that the external CDSC members must do prior to integrating with the CDSC content. It is critical that KM be included in the discussions with the CDSC members early on to get this work started.

## CDSC Findings and Lessons Learned (cont.)

Services team discovered that caching of reference data improved performance of classification services to acceptable limits by reducing the number and complexity of such calls made from within ECRS.

CGC discovered that face-to-face interaction for teams is extremely important. Without such interaction, efforts can wane and members can feel a loss of accountability to their work, especially when members are separated by such long distances and only meet via teleconference.

Demonstration team discovered that data from the CDS Dashboards can be reused for the demo analysis.

# Acknowledgements

**Principal Investigator: Blackford Middleton, MD, MPH, MSc**

**Research Management Team:** Lana Tsurikova, MSc, MA

**KMLA/Recommendations:** Dean F. Sittig, PhD

**Knowledge Translation and Specification:** Aziz Boxwala, PhD

**KM Portal:** Tonya Hongsermeier, MD, MBA

**CDS Services:** Howard Goldberg, MD

**CDS Demonstrations:** Adam Wright, PhD

**CDS Dashboards:** Jonathan Einbinder, MD

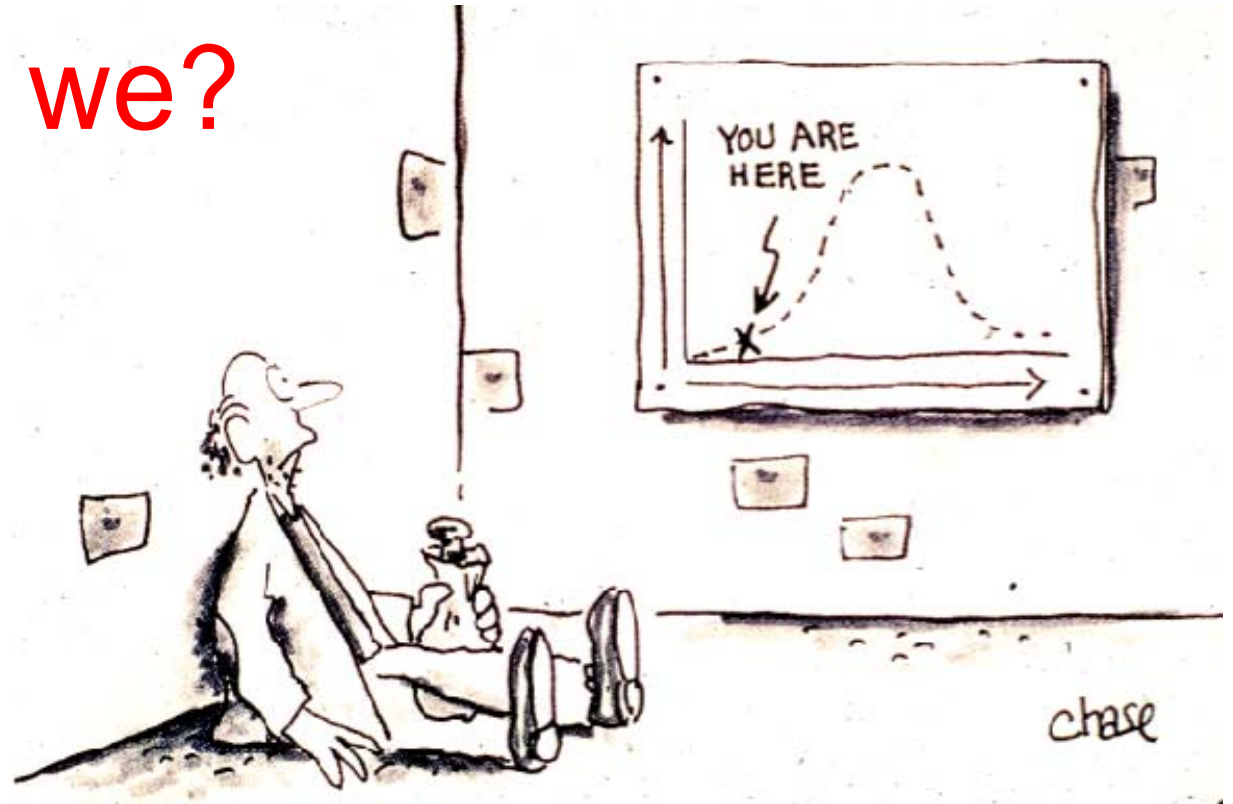
**Evaluation:** David Bates, MD, MSc

**Content Governance Committee:** Saverio Maviglia, MD, MSc

# Where are we?

*“I conclude that though the individual physician is not perfectible, the system of care is, and that the computer will play a major part in the perfection of future care systems.”*

*Clem McDonald, MD NEJM 1976*



**Thank you!**

**Blackford Middleton, MD**

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