



# Clinical Decision Support Technical Expert Panel Meeting

- June 1, 2011
- 1:00 PM - 3:00 PM Eastern Time
- Facilitator: Scott Finley

# Agenda



- Welcome & Introductions
- Review of February's TEP Meeting
- Contractors' Status Reports & Discussion
  - CDSC
  - GLIDES
- Long-Term Deliverables for Lasting Impact and Synchronization Efforts
  - CDSC
  - GLIDES
  - Discussion
- Recap & Next Steps



# Welcome



# Review Of February's TEP Meeting

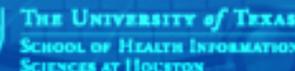
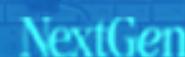
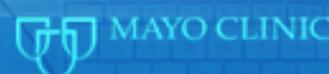
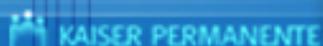
# Status Reports



# Clinical Decision Support Consortium Technical Expert Panel Teleconference

Blackford Middleton, MD, MPH, MSc  
Lana Tsurikova, MA, MSc

June 1, 2011



# Agenda

- **Status Update (5-10 min)**
  - Progress and Accomplishments
  - Challenges Overcome
- **Discussion (10 min)**
- **Long-Term Deliverables for Lasting Impact and Synchronization Efforts (10 min)**
- **Questions for the Technical Expert Panel (TEP)**

# ACCOMPLISHMENTS

## Task 1. Program Management

- Submitted Option Year Two (OY2) and Option Year Three (OY3) Technical Proposal, budget and budget justification to the Brigham and Women's Hospital (BWH) on 5/2/2011.
- BWH plans on submitting the set of documents to the Agency for Healthcare Research and Quality (AHRQ) on *5/30/2011*.
- Prepared customized presentations on Clinical Decision Support Consortium (CDSC) work in OY2 and OY3 and share with each of the CDSC teams leads.



# ACCOMPLISHMENTS

## Task 2. Implementation

### *Subtask 2.1 Demonstration of Clinical Decision Support (CDS) service at two organizations*

- Partners Healthcare System (PHS) sent the final version of the Service Sharing Agreement to Regenstrief Institute (RI) on 5/9/2011.
- The RAND/BWH Advanced CDS (ACDS) project team has been working with the Jerry Osheroff and the eRecommendations (eRecs)/ Structured Care project. The Portal Publishing Agreement has been sent to AHRQ for signing. Once it is signed, we will publish the eRec specs on CDSC Knowledge Management (KM) Portal.
- Moved Enterprise Clinical Rules Service version 2 (ECRSv2) to production. Ready for use as of April 5, 2011.
- Reduced timeout thresholds for classification and Continuity of Care Document (CCD) Factory services calls by ECRS for this project, to ensure service performance stays within Longitudinal Medical Record (LMR) acceptable limits.

# ACCOMPLISHMENTS

## Task 2. Implementation

### ***Subtask 2.1 Demonstration of CDS service at two organizations (cont.)***

- Installed public version of RI digital certificate at PHS. Begun testing with RI in Quality Assurance (QA) environments.
- CareWeb is in production and beginning to be used by clinicians who will participate in the CDSC trial.
- Data caching solution moved to production, ready for use as of May 3, 2011.

### ***Subtask 2.2 Other implementation projects***

#### Knowledge Translation and Specification (KTS) team:

- Defined a model for embedding the terminology “Value Set”;
- Developed prototypes for extended document types/schemas, value sets, wrappers for Level 4 (L4) comment;

# ACCOMPLISHMENTS

## Task 2. Implementation

### *Subtask 2.2 Other implementation projects*

#### KTS team (cont.):

- Developed a plan for gathering stylesheet user requirements for knowledge engineers (KE), Subject Matter Experts (SME), and developers;
- Developed a joint with Advanced CDS contract eRoom database to keep track of proposed changes to the model, schema, and editor as well as to ensure data and knowledge sharing across and between teams;
- Developed prototype Guideline Element Model (GEM) to Level 2 (L2) and eRecs to Level 3 (L3) import into editing tool;
- Added a model for definitions to structured recommendations L3 to support value sets;
- Presented demo of authoring tools for Content Governance Committee (CGC) to achieve efficient L3 implementations of L4 artifacts, and for CDSC Research Committee;

# ACCOMPLISHMENTS

## Task 2. Implementation

### *Subtask 2.2 Other implementation projects (cont.)*

#### KTS team (cont.):

- Developed order set stylesheet; and
- Proposed a scope and representation model for infobutton that is based on the analysis of infobutton specification from Health Level 7(HL7) and implementations of that specification.

#### Services team

- Reviewed and updated documentation for Extensible Markup Language (XML) documents;
- Added research data requirements document to Implementation Guide Packet (formerly Dev Guide Packet).

#### Dashboard team:

- Developed Site Assessment questions, based on barriers experienced by PHS;
- Developed Dashboard Implementation Guide.

# ACCOMPLISHMENTS

## Task 2. Implementation

### CGC:

- Held its first face-to-face meeting on 3/5/2011 in Boston. During the meeting CGC addressed the editorial policy, future projects and funding opportunities for the CGC, CGC membership policies, knowledge authoring, and strategies for prioritizing rules. The meeting was empowering for the CGC and renewed the commitment and effort of its members;
- Summarized the outpatient, health maintenance and/or chronic disease rules and reminders submitted by Mid-Valley Independent Physicians Association (MVIPA), Kaiser Permanente (KP), PHS, and the Department of Veterans Affairs (VA) to the eRoom for the rule prioritization effort;
- Made a progress on the editorial policy in the areas of membership to the CGC, its implications for the KM Portal, and minor wordsmith of the entire policy; and
- Created work groups for the following areas to push development: top rule prioritization and RI L4-L3 transformation.

# ACCOMPLISHMENTS

## Task 3. Evaluation

### *Subtask 3.1 Evaluation Plan EVA 3.1 (ongoing activities)*

All teams completed and submitted draft evaluation reports.

### *Subtask 3.3 Conduct evaluation activities as specified in the final Evaluation Plan*

- Knowledge Management Lifecycle Assessment (KMLA) team submitted report on the PHS site visit, completed the site visit to RI and started data analysis
- Developed a 10 question “Lessons Learned” Assessment Tool for PHS KEs who work with different knowledge layers.
- Created and tested database for storing input CCD and output recommendation data for PHS consumers. Received additional data from PHS warehouse to model baseline performance for CDSC reminders.
- Completed multivariate analysis of data from PHS demo to control for baseline clinic characteristics and secular change in reminder performance. There still appears to be increased performance in the CDSC clinics.
- Completed testing of new ECRSv2 in LMR. Performance test now in progress. New ECRS will be implemented in May, 2011 with LMR Spring release.

# ACCOMPLISHMENTS

## Task 3. Evaluation

### *Subtask 3.3 Conduct evaluation activities as specified in the final Evaluation Plan (cont.)*

- CareWeb at RI is now live, and testing in progress for three physicians. Once this test is complete, and all remaining (minor) integration and legal hurdles are cleared, we will turn on the CDSC Services at RI. Developed a risk of mitigation plan for potential risk in go live of CDSC demo at RI.
- Scheduled and conducted an in-service training at the PHS clinics that have access to the CDSC provider Dashboard.
- Conducted presentation on CDS Dashboard for KM team and Clinical Content Committee (CCC).
- Started dashboard user evaluation. Developed set of Dashboard User interview questions and conducted semi structured interviews.

# CDSC Usage Summary Statistics to Date

CDSC KM Portal Statistics					
Current Published Assets	April, 2011		Since February, 2010		Most Viewed Content
	Unique IP Addresses	Number of Visits	Unique IP Addresses	Number of Visits	
36	44	53	516	788	CDSC-Diabetes-L4-PHS-2010-L4EXP-1.0-090221fe8001692a.pdf

CDS Dashboards Usage Summary		
	Usage for: 4/27-5/10/2011	Total number of usage
<b>Provider View:</b>	<b>3 times by 3 unique people</b>	<b>200 times by 105 unique people</b> (mainly physicians but also nurses, NPs and quality staff)
	3 people used it once	70 people used it once
	-----	17 people used it twice
	-----	7 people used it three times
	-----	11 people used it four or more times
<b>Designer View:</b>	<b>2 time by 2 unique people</b>	<b>8 times by 6 unique people</b>
	2 person used it once	5 people used it once
	-----	1 person used it three times

# ACCOMPLISHMENTS

## Task 4. Meeting with TEP

### **Subtask 4.1** *In-person TEP meeting (February 2-3, 2011)*

- Principal Investigator (PI) and Research Program Manager (RPM) participated in TEP meeting by phone due to the weather.
- Tonya Hongsermeier (KM Portal team lead) and Lana Tsurikova (RPM) presented on CDSC legal issues at TEP meeting.

### **Subtask 4.2** *TEP Teleconference (June 1, 2011)*

- Research Management Team (RMT) prepared and submitted materials for the next TEP teleconference meeting.

# ACCOMPLISHMENTS

## Task 5. Dissemination

### *Subtask 5.3 Carry out dissemination activities as described in final Dissemination Plan*

- Submitted draft of three recommendations to AHRQ: Quality measure developers, Clinical professional organizations, and Health IT Policy recommendations.
- Submitted paper to AMIA Fall 2011 Conference: Paterno MD, et al. Feasibility of Using the service-oriented architecture (SOA) Approach to CDS: Early Findings from a CDSC Demonstration.
- Submitted the revised manuscript on the multilayer model to the Journal of the American Medical Informatics Association (JAMIA) in January.
- CDSC representatives presented at Healthcare Information and Management Systems Society (HIMSS) on CDSC progress, meet with vendors for dissemination, and gather data on vendor CDS services capabilities.
- KMLA team resubmitted JAMIA case study about MVIPA and submitted the AMIA draft of the CDS content vendor paper: Ash JS et al, Studying the Vendor Perspective on CDS.
- KM team provided materials to NextGen and General Electrics (GE) to help them understand the content of the CDSC rules, the structure of the L3 spec and the work they need to perform to integrate with the CDSC rules.

# OY1 Dissemination

## CDSC Journal Publications

1. Ash JS, Sittig DF, Dykstra R, Wright A, McMullen C, Richardson J, Middleton B. Identifying best practices for clinical decision support and knowledge management in the field. *Stud Health Technol Inform.* 2010;160(Pt 2):806-10.
2. Sittig DF, Wright A, Meltzer S, Simonaitis L, Evans RS, Nichol WP, Ash JS, Middleton B. Comparison of clinical knowledge management capabilities of commercially-available and leading internally-developed electronic health records. *BMC Med Inform Decis Mak.* 2011 Feb 17;11(1):13.
3. Wright A, Sittig DF, Ash JS, Bates DW, Feblowitz J, Fraser G, Maviglia SM, McMullen C, Nichol WP, Pang JE, Starmer J, Middleton B. Governance for clinical decision support: case studies and recommended practices from leading institutions. *J Am Med Inform Assoc.* 2011 Mar 1;18(2):187-94.
4. Wright A, Sittig DF, Ash JS, Feblowitz J, Meltzer S, McMullen C, Guappone K, Carpenter J, Richardson J, Simonaitis L, Evans RS, Nichol WP, Middleton B. Development and evaluation of a comprehensive clinical decision support taxonomy: comparison of front-end tools in commercial and internally developed electronic health record systems. *J Am Med Inform Assoc.* 2011 Mar 17.

# OY1 Dissemination (cont.)

## CDSC Conference Papers

1. Paterno M, Mavigla S, Ramelson H, Schaeffer M, Rocha B, Hongsermeier T, Wright A, Goldberg H. Creating Shareable Decision Support Services: An Interdisciplinary Challenge. AMIA Annu Symp Proc. 2010 Nov 13;2010:602-6.
2. Richardson J, Ash J, Sittig DF, Wright A, Dkystra R. Multiple Perspectives on the Meaning of Clinical Decision Support. AMIA Annu Symp Proc. 2010 Nov 13;2010:1427-31.
3. Wright A, Sittig DF, Carpenter J, Krall M, Pang J, Middleton B. Order Sets in Computerized Physician Order Entry Systems: an Analysis of Seven Sites. AMIA Annu Symp Proc. 2010 Nov 13;2010:892-6.

# OY1 Dissemination (cont.)

## CDSC Conference Posters

1. Sittig DF, Wright A, Meltzer S, Middleton B. A Preliminary Assessment of the Clinical Knowledge Management Capabilities of Commercially-available Electronic Health Records. Poster session presented at: 13th International Congress on Medical Informatics; 2010 Sept 12-15; Cape Town, South Africa.
2. Meltzer S, Boxwala A, Middleton B. Evaluation of a Multilayered Knowledge Representation Using the GuideLine Implementability Appraisal. Poster session presented: AMIA Annual Symposium; 2010 Nov 13-17; Washington, DC.
3. Turechek Z, Maviglia S, Wright A, Saleem J, Simonaitis L, Fraser G, Krall M, Sonnenberg F, Middleton B. Sharing is caring: Why collaboration is the key to overcoming decision support content management and development barriers. Poster session presented at: AMIA Annual Symposium; 2010 Nov 13-17; Washington, DC.

# ACCOMPLISHMENTS

## Task 6. OY1 Progress Report

### *Subtask 6.1 Submit Draft Option Year One (OY1) Report*

- The CDSC project teams prepared their draft reports detailing the team's progress in OY1 and submitted to RMT.
- RMT collated the reports submitted by teams in the draft of the report and submitted to AHRQ for review.
- AHRQ returned their comments on the OY1 report.
- CDSC works to address the comments and to add pieces that were developed and finalized since the draft submission.

# Challenges



# CHALLENGES

## Task 2. Implementation

### *Subtask 2.1 Demonstration of CDS Service at two organizations*

- RI service demonstration will start only after legal agreements are signed, ECRSv2 is in production and integration testing is completed.
- CDS Services team had a recent discussion about expanding the PHS Systematized Nomenclature of Medicine (SNOMED)-based problem/procedure subsets to include International Classification of Diseases - 9th or 10th Edition (ICD9/10) and Current Procedural Terminology (CPT) codes as a part of OY2. This may require that the legal agreements be expanded or a new Content Development Agreement be drafted.
- RI has obtained a third-party certificate and has installed it on their production server. However they do not have a second certificate to use in QA and they can't use production since the legal agreements have not yet been signed.
- PHS will be required to encrypt patient CCD data that will be stored in the PHS research database.

# CHALLENGES

## Task 2. Implementation

### *Subtask 2.1 Demonstration of CDS Service at two organizations (cont.)*

- During the spring of 2011, RI is implementing a new electronic health information infrastructure (CareWeb) at Wishard Health Services. CDSC Notifications can only be displayed in those settings where the infrastructure is enabled. Any delays or changes in the implementation of the infrastructure have a direct effect on the implementation of the CDSC Notifications.
- To date PHS has experienced challenges with the ECRS accepting the third-party signed digital certificate.
- The display of CDS reminders relies on a beta version of a new Computerized Provider Order Entry infrastructure. Although it appears stable, this beta version may require temporary suspension from time to time for software improvements.

### *Subtask 2.2 Other implementation projects*

- Limited access to project specific eRooms has complicated collaboration efforts with the ACDS project in developing a unified model. The two teams are collaboratively building a Knowledge Modeling Collaboration and Research eRoom in order for the teams to share research and working documents (Unified Modeling Language (UML) models, XML schemas, etc).

# CHALLENGES

## Task 2. Implementation

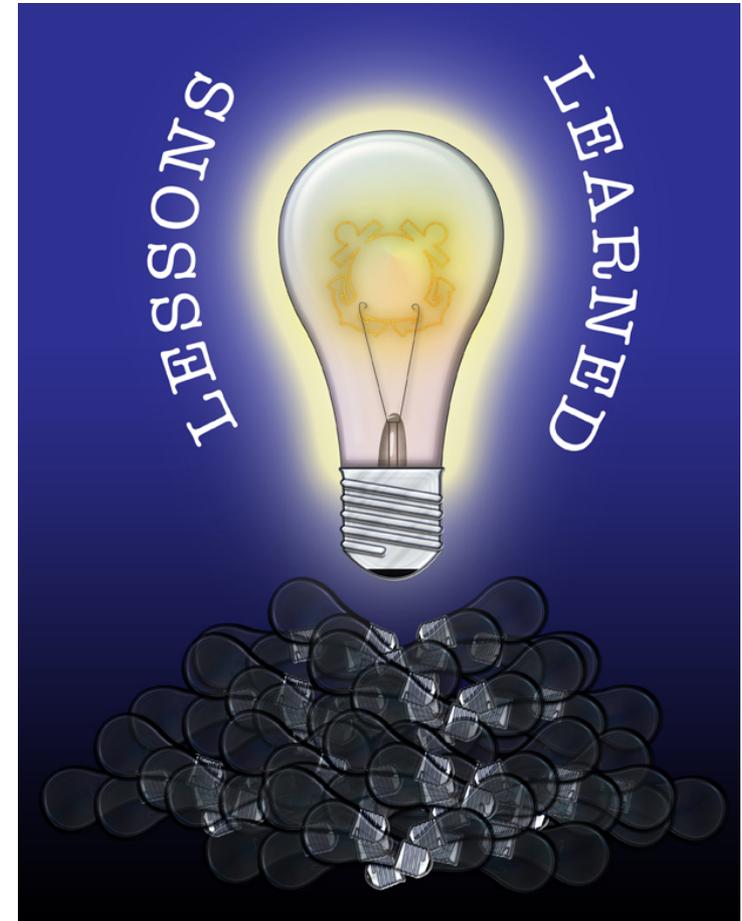
### *Subtask 2.2 Other implementation projects*

- Obtaining sign-off for the Portal Publishing Agreement from MVIPA and University of Medicine and Dentistry of New Jersey (UMDNJ) requires time.
- Decision is needed whether infobutton knowledge should be modeled as “rules” using logic or as “tags” using metadata elements.

### *Subtask 3.3 Conduct Evaluation Activities*

- Organizing and cleaning the PHS Demo data to ensure accuracy and consistency is more time-consuming than was anticipated.
- We need additional data from our data warehouse to model baseline performance in the CDSC intervention clinics – this data has been requested but we have not yet received it.
- No new guideline content is being developed in OY1 which impacts the KTS team’s ability to evaluate its work on the Knowledge Authoring Tool.

# CDSC Findings, Lessons, and Questions



# 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 remain issues, 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.

# Status Reports





# GLIDES Update

Technical Expert Panel Meeting, June 2011

## GLIDES PROJECT

**GuideLines Into DEcision Support**

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The Agency for Healthcare Research and Quality



YALE NEW HAVEN  
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GEISINGER



AMERICAN ACADEMY OF  
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ECRI Institute

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# Contents

- **Current Project Status**
  - Progress
  - Accomplishments
  - Challenges Overcome
  - Questions for TEP
- **Models, Processes and Tools for Lasting Impact and Synchronization**

# Project Timeline

<b>Knowledge Transformation (KT)</b>	
Asthma	
Obesity	

<b>Implementation I</b>	
Asthma	Yale Specialty

<b>Implementation II</b>		<b>Implementation III</b>	
Obesity	Yale PC Delaware PC	Asthma	Yale Primary Care
Asthma	Nemours Florida Sites		Nemours Delaware

<b>Geisinger Implementation</b>		
KT	Design	Build
Adult Low Back Pain		

<b>CHOP Implementation</b>	
KT	Design
Medical Home – Preterm Infants	

<b>AAO-HNS</b>	
BridgeWiz – Sudden Hearing Loss	

<b>AAP</b>	
BridgeWiz – AOM, Fever, Sinusitis	
Evidence Report, Performance	

<b>GEM/GLIA Development</b>	
Literature Review	New Release

<b>ECRI</b>	
Guideline Mark-Up, GEM Cutting	Plan For NGC Delivery

Evaluation and Dissemination

**Years One-Two CDS Implementation Projects**  
Feb 2008 – Jan 2010

**Option Year 1 CDS Projects**  
Mar 2010 – Apr 2011

# Progress Summary

## Option Year 1

- Met all Option Year 1 plan expectations for activities and deliverables, within schedule and budget expectations
  - Knowledge generation (knowledge acquisition and representation)
  - Knowledge transformation
  - Knowledge implementation and evaluation

# Knowledge Generation

**Goal: Improve the quality, transparency, and validity of guidelines as knowledge sources**

## **Progress and Accomplishments**

Worked with two national guideline development organizations —American Academy of Pediatrics (AAP) and American Academy of Otolaryngology-Head and Neck Surgery (AAO)—to design, implement and pilot processes and tools intended to make guidelines clearer and more implementable

- BRIDGE-Wiz was piloted successfully at both AAP and AAO with 5 national panels (AOM, Sinusitis, OSA, T2DM)
- Completed update of Guideine Implementability Appraisal (GLIA) v 2.0 incorporating feedback from users
- Overhauled user interface to eGLIA and released eGLIA 2
- Plans are underway for tool adoption by a wider group of guideline developers
- Participated in IOM Committee to develop standards for trustworthy guidelines

# Knowledge Generation

## Challenges Overcome

- How to engage disparate stakeholder groups in understanding and applying new opportunities for tools and processes
  - Demonstrate working tools, leading to hands-on trial by stakeholder groups in facilitated meeting

## Next Steps (Option Year 2)

- Continue to support AAP and AAO's adoption of these tools
- Work with two more guideline developers (short-list includes NHLBI, ATS, AUA, ASCO, ACEP, ACCP and Decide)
- Prepare for broader roll-out of these tools
- Integrate BridgeWiz with GEM

## Questions for TEP

- What insights or suggestions can you offer that can help us scope the integration of BridgeWiz and GEM tools?
- What suggestions does TEP have regarding developer partners for OY2?

# Knowledge Representation

***Goal: Create a new version of GEM reflecting input from key users***

## **Progress and Accomplishments**

- Documented concepts and requirements for a new release, reflecting literature search, needs for integration with BRIDGE-Wiz, NGC, and other models
- Participated in AHRQ-sponsored effort to assess, compare and align knowledge management systems with CDSC, eRec and other initiations
- ECRI interviewed and evaluated partners' use of GEM (Geisinger, CHOP, Nemours)
- Evaluating options to accommodate GEM-parsed guideline content on NGC
- Paper summarizing GEM use (submitted to AMIA Proceedings)
- Considerations for new release of GEM, GEM Cutter, EXTRACTOR, etc developed

# Knowledge Representation

## Challenges

- “Marketing” GEM

## Next Steps (Option Year 2)

- Enhance GEM’s ability to function in guideline development, implementation, dissemination and measurement environments
- Develop project plan and design prototype for modifications to NGC website to accommodate GEM-parsed guideline content
- Continue to support GEM improvement and promotion, reflecting input from all users

## Questions For TEP

- What thoughts do you have regarding goals and approach to delivering GEM-parsed content via NGC web site?

# Implementation Activities

# Yale “iPad Kiosk” Status

***Goal: Pilot ability to capture patient information directly from patients using iPad technology (for Asthma CDS); improve use of CDS by pediatric pulmonologists***

## **Progress and Accomplishments**

- Completed development and integration testing for iPad message to Centricity and iPad application
- Implemented system in controlled pilot for pulmonologists at Yale’s specialty clinic

## **Challenges Overcome**

- How to work in pilot mode with new technology in corporate IT infrastructure

## **Next Steps (Option Year 2)**

- Optimize and evaluate current pilot
- Consider expanding current capabilities (multi-media health coaching)

## **Questions For TEP**

- What uses do TEP members see for tablet platform vis-à-vis CDS?

# CHOP CDS Implementation

***Goal: Design, develop and implement CDS for several guidelines associated with coordination of care for premature graduates in primary care practices***

## **Progress and Accomplishments**

- Finalized knowledge specifications for the Hearing Screening guidelines
- Programmed DROOLS rules engine using GemCutter output for ROP and Synagis
- Applied iterative Human Computer Interaction methods to design the intervention
- Engaged Faculty Practice clinic (20 clinicians, 5 sites) in design activities
- Implemented beta-version of CDS, completed initial usability assessment

## **Challenges Overcome**

- Resolved local experts' differences in interpretation of the Synagis guideline for prevention of respiratory syncytial virus in premies
- Controlling vocabulary and translation of concepts from "guideline-speak" to DROOLS engine/EPIC

## **Next Steps (Option Year 2)**

- Complete and implement final releases for ROP and Synagis, including use case and usability testing
- Commence evaluation
- Prepare and publish implementation guide and technical appendix

## **Questions For TEP**

- What areas are TEP members particularly interested in for a future demo of this capability?

# Geisinger CDS Implementation

**Goal: Design, develop and implement CDS for ICSI low back-pain guideline**

## **Progress and Accomplishments**

- Completed development and integration testing for CDS application
- Implemented e-health low back pain protocol in one of Geisinger's clinics
- Phase I will provide necessary information on the content of the study tools, the use of the study tools, and modifications that may help phase II implementation

## **Challenges Overcome**

- Clarified and supplemented vague logic in the original ICSI guideline
- Created nuanced language tables for each recommendation based on a set of covariates

## **Next Steps (Option Year 2)**

- Expand coded guidelines to translate into rules for real time application of management recommendations based on patient reported data on back pain
- Audio-record the patient-provider dialogue of 40 consenting patients randomized to the eLowBackPain intervention group and 40 consenting patients randomized to the usual care group
- Evaluate recordings using the Roter Interaction Analysis System (RIAS)

## **Questions For TEP**

- What areas are TEP members particularly interested in for a future demo of this capability?

# Implementation

## Other Initiatives For OY2

- Add one new implementation partner (potential for a Beacon)
- Continue to formalize the GLIDES “Methodology/Toolkit” for implementation, reflecting experience to date
- ECRI collecting experiences of GLIDES partners
- ECRI/Silverchair focused on dissemination of GEM-ified guidelines via NGC

# Dissemination

## ***Publications***

- Lomotan EA, Michel G, Lin ZQ, Shiffman RN. **How “should” we write guideline recommendations? Quality and Safety in Health Care 2010**; 19:503-13. (PMCID: PMC2982946)
- Scotch M, Duggal M, Brandt C, Lin Z, Shiffman R. **Use of statistical analysis in the biomedical informatics literature.** J Am Med Informatics Assoc 2010; 17:3-5.
- Shiffman RN, Michel G, Krauthammer M, Fuchs NE, Kaljurand K, Kuhn T. **Writing clinical practice guidelines in controlled natural language.** In: *Controlled Natural Language*. Ed: Fuchs NE. Heidelberg, Springer 2010. 264-280
- Hoeksema LJ, Bazy-Asaad A, Lomotan EA, Edmonds DE, Ramírez-Garnica G, Shiffman RN, Horwitz LI. **Accuracy of a computerized clinical decision support system for asthma assessment and management.** J Am Med Inform Assoc May 2011.

## ***In Revision***

- Lomotan EA, Hoeksema LJ, Edmonds DE, Ramirez-Garnica,G, Shiffman RN, Horwitz LI. **Mixed-methods evaluation of a decision-support System for pediatric pulmonologists**
- Shiffman RN, Michel G, Rosenfeld R, Davidson C. **Building better guidelines with BRIDGE-Wiz: a software assistant to promote quality, transparency, and implementability.**

## ***Submitted***

- Hajizadeh N, Kashyap N, Michel, G, Shiffman RN. **GEM at 10: A decade’s experience with the Guideline Elements Model**
- Shiffman RN, Michel G, Burns P, Vitkauskas G, Monahan J, Stoker D, Filice C, Hsiao AL. **Using iPad to collect clinical data from patients: overcoming decision support avoidance.**
- Shiffman RN, Michel G, Kashyap N, Dixon M. **A systematic and replicable approach to knowledge formalization.**

# Dissemination

## *Presentations*

- **Composite Measures of Asthma Control: An End-user Perspective.** NIH Outcomes Workshop. Bethesda, MD. March 15, 2010
- **An Implementer at the Developers' Table.** National Guidelines Clearinghouse / National Quality Measures Clearinghouse Advisory Group. Rockville, MD. April 7, 2010
- **Building Better Guidelines.** AAP Acute Otitis Media Guideline Development Panel. Elk Grove Village, IL. June 28, 2010.
- **Building Better Guidelines.** AAP Sinusitis Guideline Development panel. Elk Grove Village, IL. August 6, 2010.
- **A quality-driven, pragmatic approach to crafting guideline action statements and evidence profiles.** Annual Guidelines International Network Meeting, Chicago, IL. August 26, 2010.
- **An Implementer at the Developers' Table.** AAP Steering Committee on Quality Improvement and Management, Rosemont, IL, October 30, 2010.
- **What's in a Name? Transparency & the Current State of AAP Policies; How do we assure that AAP policies are evidence-based when evidence exists? What are we doing now in grading evidence quality and recommendation strength and what are other developers doing? Staying ahead of the curve: 21<sup>st</sup> century policy development; How can we improve adoption of AAP policies? How should implementation of these changes be staged?** AAP Mega-Meeting, Chicago, IL, December 10-11, 2010.
- **Building Better Guidelines With BRIDGE-Wiz;** American Academy of Otolaryngology Head and Neck Surgery Guideline Panel on Sudden Hearing Loss, Alexandria, VA. January 21, 2011.
- **The New Institute of Medicine Standards for Developing Trustworthy Guidelines.** American Academy of Pediatrics Steering Committee on Quality Management, Washington, DC. April 16, 2011.
- **Building Better Guideline Recommendations With a Software Wizard.** Pediatrics Department Research Conference. New Haven, CT. April 19, 2011.
- **Posters**
- Shiffman RN, Dixon M, Milov D, Grundmeier R, Stewart W, Coates V, Davidson C, Brereton J. **Guidelines into decision support: GLIDES tools to take CDS to a national scale.** Office of the National Coordinator of Health Information Technology, Arlington, VA. December 6, 2010.
- In addition to these dissemination activities, GLIDES provided regularly updates to our **website**, and **newsletters** to stakeholders. GLIDES also participated actively in all in-person and teleconference **TEP meetings**, and complied with AHRQ expectations for annual reporting and policy recommendations.



# Long-Term Deliverables for Lasting Impact and Synchronization Efforts

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## Planning for OY2 and OY3



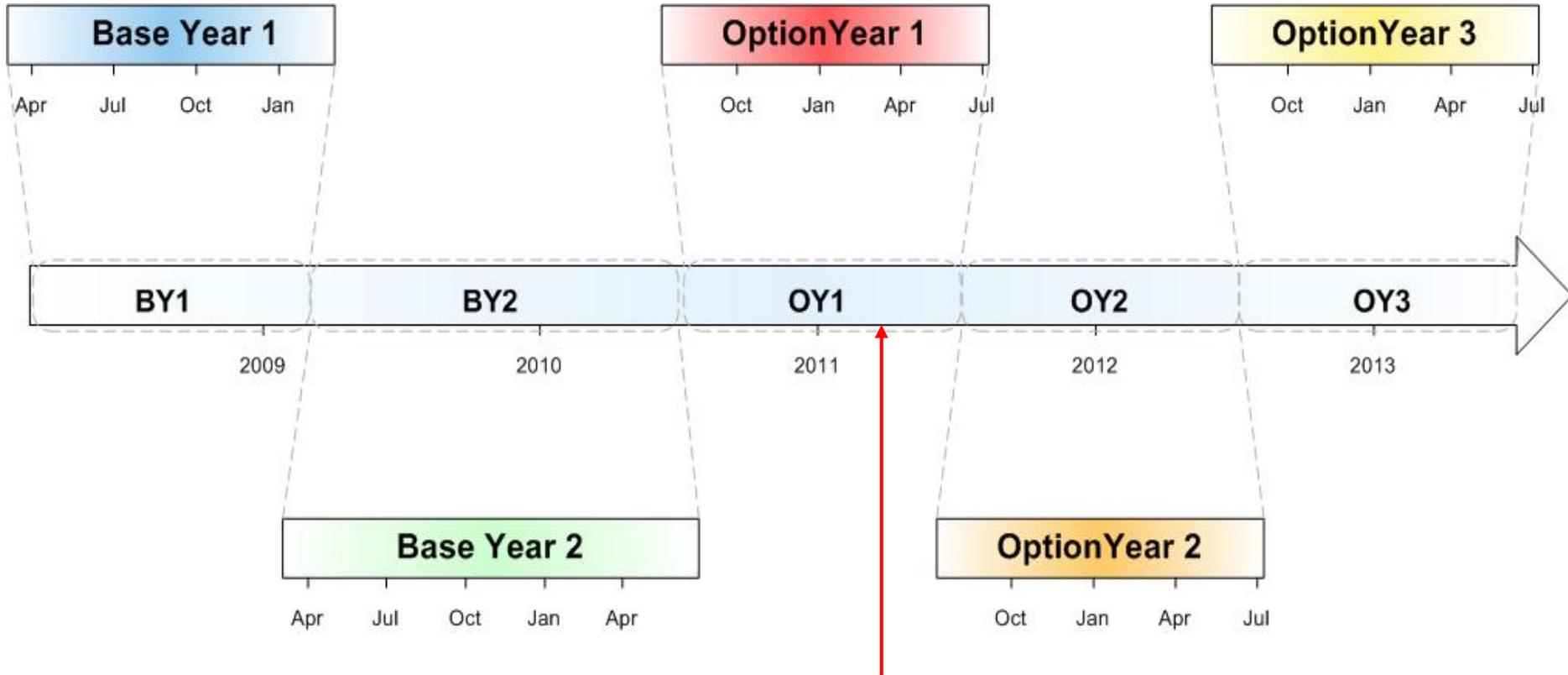
# Overview of OY1 Accomplishments

- 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.

# Timelines



We are here



# OY2-3 Timeline – Task 2.1

PROJECT NAME	OPTION YEAR 2	OPTION YEAR 3
<b>Task 2. Implementation</b>		
<b>Task 2.1. Knowledge Management</b>		
<b>Refinement and generalization of the knowledge stack</b>	Ongoing	
<b>Enhancements to the CDSC Knowledge Authoring Tool</b>	Ongoing	
<b>New content development</b>		
<i>RI Care Rules -&gt; Level 3, Reverse Engineering</i>	[Gantt chart: 10 orange blocks]	
<i>High Priority Rules -&gt;L2, Forward Engineering</i>	[Gantt chart: 5 orange blocks]	
<i>L2-&gt;L3s, Forward Engineering</i>	[Gantt chart: 8 orange blocks]	
<b>New content implementation</b>		
<i>Implementation of new content area L4s in CDS Service, Reverse Engineering (RI)</i>	[Gantt chart: 4 orange blocks]	Content maintenance
<i>Implementation of new content area L4s in CDS Service, Forward Engineering (UMDNJ)</i>	[Gantt chart: 4 orange blocks]	Content maintenance
<b>Publishing new content to KM Portal</b>	Ongoing	
<b>Support clinical content review, update and maintenance of content currently in production</b>	Ongoing	
<b>Develop editorial policies and prioritization metrics for clinical content</b>	Ongoing	

# OY2-3 Timeline – Task 2.2

PROJECT NAME	OPTION YEAR 2					OPTION YEAR 3					
<b>Task 2. Implementation</b>											
<b>Task 2.2 CDS Service Implementation and Demonstration</b>											
<b>Support and maintenance of CDS Service and KM Portal for content and services</b>											
<i>KM Portal support and maintenance</i>	Ongoing										
<i>CDS Services support and maintenance</i>	Ongoing										
<b>Develop and implement solution for inclusion and use of ICD9 and CPT in CDS Service</b>											
<b>Phases 2 and 3 continuation of CDS Service demonstrations at PHS and RI</b>											
<i>Phase 2 and 3 Demonstration at PHS</i>	Phase 2					Phase 3					
<i>Phase 1, 2, and 3 Demonstration at RI Wishard</i>	Phase 1					Phase 2		Phase 3			
<b>Phase 1 and 2 for EHR Vendor implementation and demonstration(s)</b>											
<i>Phase 1 and 2 with 1st EHR vendor (GE, NextGen, or Greenway)</i>	serv. impl.					Phase 1		Phase 2			
<i>Phase 1 and 2 with 2nd EHR vendor (GE, NextGen, or Greenway)</i>						serv. impl.		Phase 1		Phase 2	
<i>Phase 1 with 3rd EHR vendor or Beacon HIE</i>								serv. impl.		Phase 1	

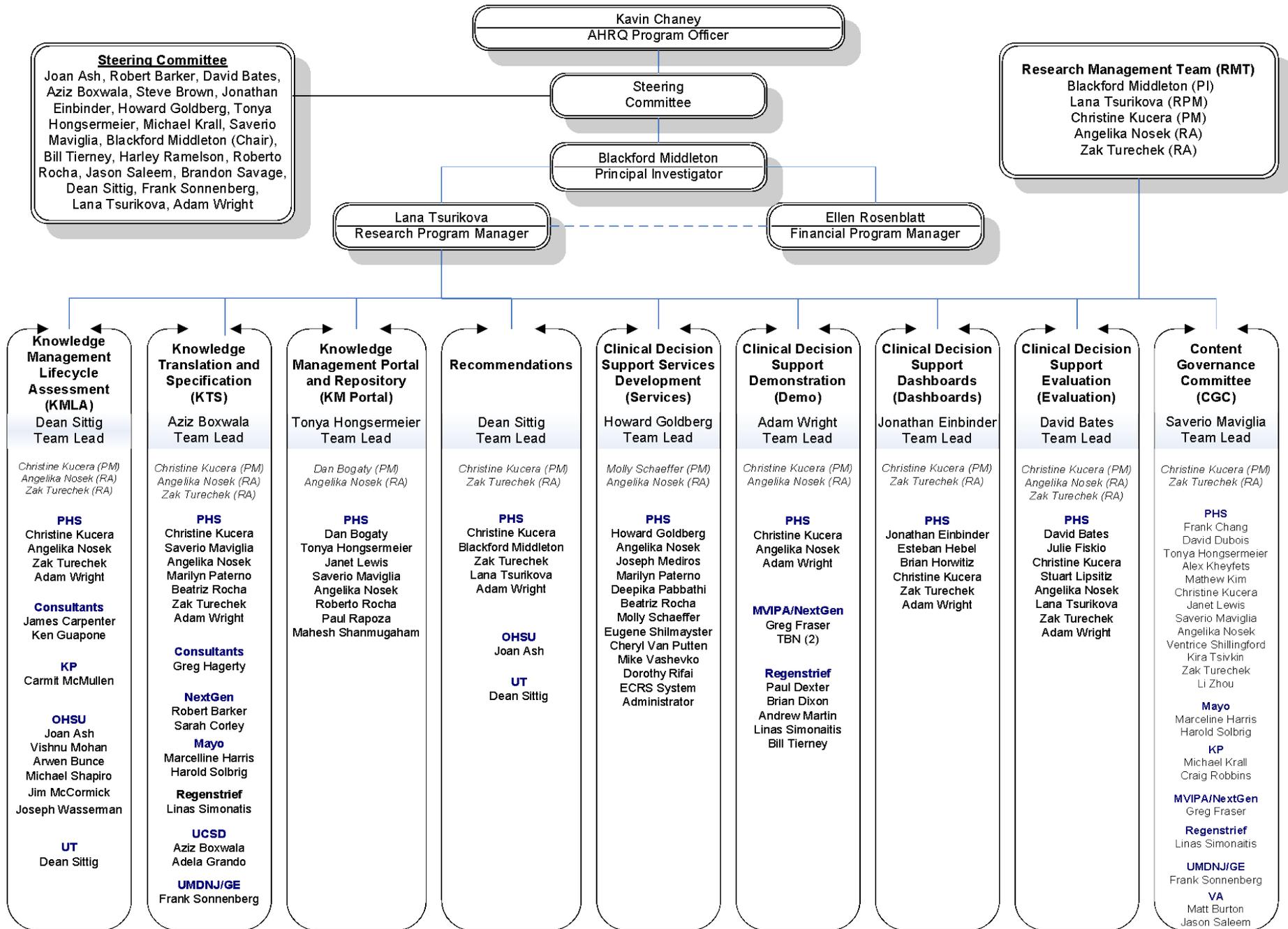
# OY2-3 Timeline – Task 3

PROJECT NAME	OPTION YEAR 2	OPTION YEAR 3
<b>Task 3. Evaluation</b>		
<b>Evaluation Plan</b>	OY2 Evaluation Plan	OY3 Evaluation Plan
<b>Coordinate evaluation and analysis across CDSC</b>		
<i>Evaluation of services implementation and demonstrations</i>	Ongoing	
<i>Evaluate editing/authoring tool by forward or reverse engineering rules</i>		
<b>Analysis for open source – KM Portal, development of RFP</b>		
<b>Analysis for open source - Rules Engine</b>		
<b>Analysis for open source - CDS Dashboard</b>		
<b>CDSC sustainability model</b>		
<b>Site visits to the EHR provider/vendor and their customer sites</b>		
<i>GE: Vendor virtual company visit (phone)</i>		
<i>GE: Vendor Customer post-implementation in-person site visit</i>		
<i>NextGen: Vendor virtual company visit (phone)</i>		
<i>NextGen: Vendor Customer pre-implementation in-person site visit</i>		
<i>NextGen: Vendor Customer post-implementation in-person site visit</i>		
<i>Vendor 3 or HIE virtual visit (phone)</i>		
<i>Vendor 3 or HIE Customer pre-implementation in-person site visit</i>		
<i>Vendor 3 or HIE Customer post-implementation in-person site visit</i>		
<i>Needs Assessment visit with Keystone HIE (Geisinger)</i>		

# OY2-3 Timeline – Tasks 4-9

PROJECT NAME	OPTION YEAR 2	OPTION YEAR 3
<b>Task 4. Meeting with Technical Expert Panel (TEP)</b>		
<b>Prepare and submit required materials and attend TEP meetings</b>		
<i>In-Person TEP Meeting</i>		Ongoing
<i>Teleconference TEP meeting</i>		Ongoing
<b>Task 5. Dissemination Activities</b>		
<b>Dissemination Plan</b>	OY2 Dissemination Plan	OY3 Dissemination Plan
<b>Develop set of recommendations for the audiences specified in the contract</b>		Ongoing
<b>Task 6. OY2 and OY3 Report of Project Progress</b>		
<b>Prepare and submit OY2 and OY3 report</b>	OY2 Progress Report	OY3 Progress Report
<b>Task 7. Coordination with Other AHRQ Contractors</b>		
<b>Coordinate with designated NRC Domain 2</b>		Ongoing
<b>Coordinate with and work closely with the Advancing CDS project, eRecs project, and AHRQ GLIDES project</b>		Ongoing
<b>Task 8. Ensuring High-Quality and 508-Compliant Deliverables</b>		
<b>Develop and implement quality assurance procedures to ensure all deliverables to AHRQ are reviewed for quality control, professional writing, and copy editing</b>		Ongoing
<b>Task 9. Compliance with the Paperwork Reduction Act</b>		
<b>Submit OMB Clearance Package to PO (if applicable)</b>		Ongoing

# Clinical Decision Support Consortium



# Acknowledgements

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

**CDSC Team Leads:**

**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

# Questions to TEP

- Are we on the right track for OY2 and OY3?
- Anything else that we should have considered?



# Discussion

Thank You!

# Long-Term Deliverables for Lasting Impact and Synchronization Efforts





# GLIDES

- (1) Models, Processes, and Tools for Lasting Impact
- (2) Synchronization Potential

## GLIDES PROJECT

### GuideLines Into DEcision Support

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The Agency for Healthcare Research and Quality



Yale School of Medicine



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ECRI Institute

American Academy of Pediatrics  
DEDICATED TO THE HEALTH OF ALL CHILDREN™

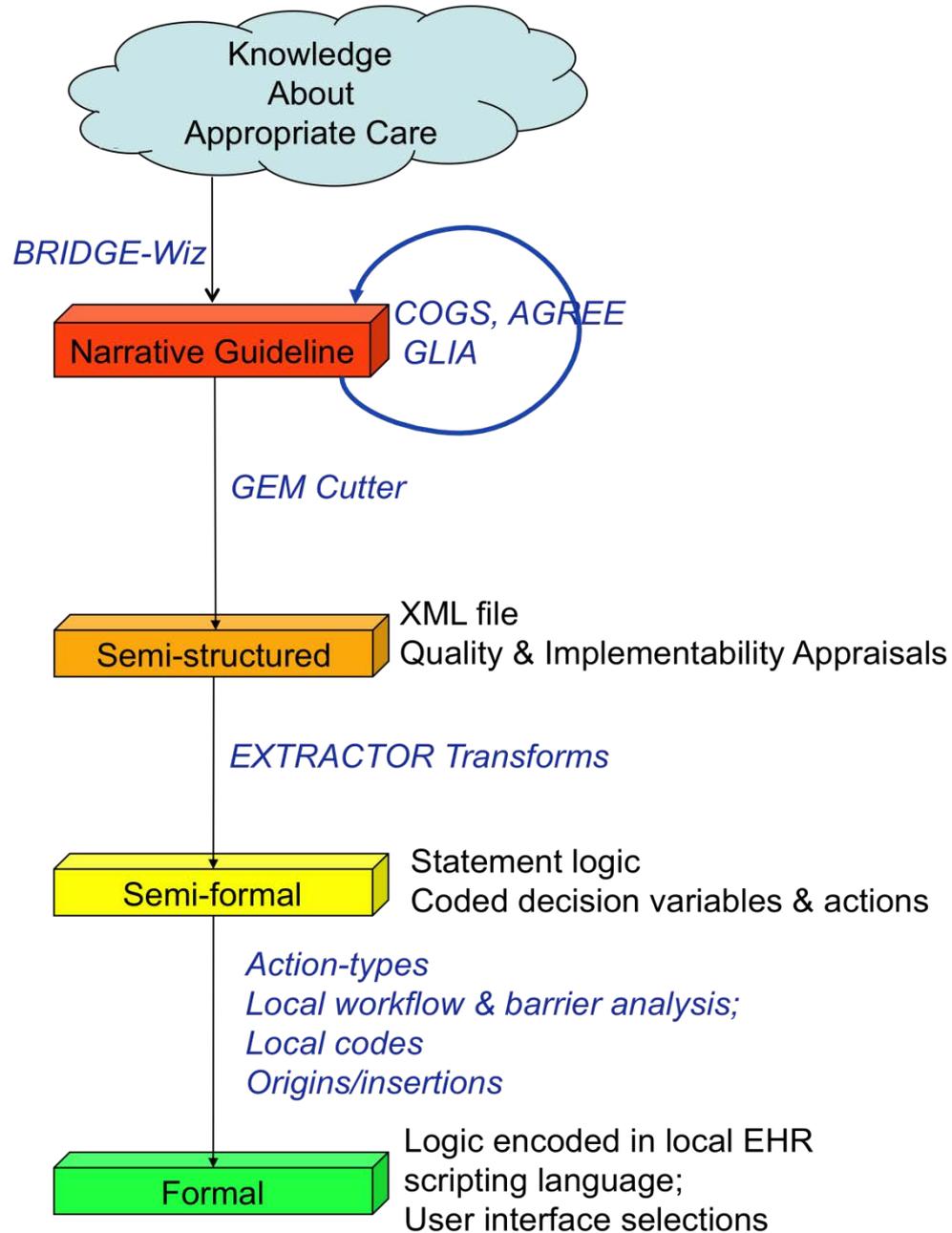


# (1) Models, Processes, and Tools for Lasting Impact

## (2) Synchronization Potential

Developed at YCMI over the past decade with support from AHRQ and the National Library of Medicine

# Formalization Process



# BRIDGE-Wiz<sup>©</sup>



## Building Recommendations in a Developer's Guideline Editor

- Formalizes a process for writing implementable recommendations
- Focuses discussion
- Incorporates prompts based on COGS to improve guideline quality
- Controlled natural language
  - Offers verb choices based on action-type
  - Traps and disallows use of “consider”
  - Discourages “statement of fact” masquerading as recommendation
  - Limits boolean connectors to all ANDs or ORs in a statement
- Incorporates decidability and executability checks
- Requires systematic appraisal of evidence quality and benefit-harms
  - Suggests appropriate obligation term (deontic modal)
- Output includes a high-level “rule” and a recommendation profile



- GuideLine Implementability Appraisal<sup>©</sup>
- An instrument to identify obstacles to successful implementation



- Electronic GLIA<sup>©</sup>
- Facilitates asynchronous appraisal, consensus development, and reporting



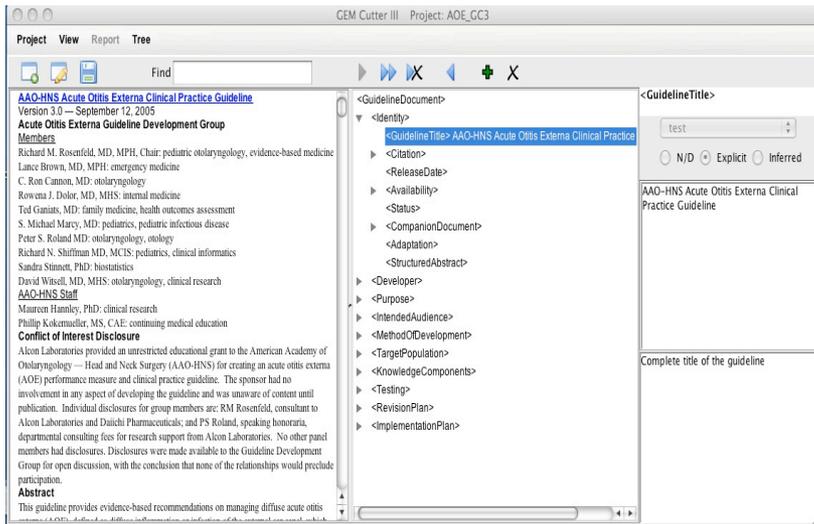
# Guideline Knowledge Representation

- **GEM<sup>©</sup>**: Guideline Elements Model
- Knowledge model for guideline documents in XML
- Set of >100 tags to represent guideline concepts
- Markup can be performed by non-programmers
- Human-readable, yet can be processed by machine

Schema is ANSI standard (ASTM E2210-06)

# XML Tools

- GEM Cutter<sup>©</sup>
  - XML Editor
  - Enables parsing of guideline text into chunks compatible with GEM
  - Highlighting metaphor
- EXTRACTOR<sup>©</sup>
  - Set of XSL transforms
  - Displays “rules,” decision variables, actions



**RECOMMENDATION:** 5–11 Years of Age: Initiating Long-Term Control Therapy.

**Conditional:** 5–11 Years of Age: Initiating Long-Term Control Therapy.

The Expert Panel recommends daily long-term control therapy for children who have persistent asthma {Rec\_5: Cond\_5 }

**Decision Variable:** 5–11 Years of Age

**Decision Variable:** persistent asthma

**Action:** The Expert Panel recommends daily long-term control therapy

**Risk/Harm:** possible long-term effects of inadequately controlled asthma

**Risk/Harm:** possible adverse effects of medications given over prolonged periods

**Evidence Quality:** (Evidence A)

**Recommendation Strength:** The Expert Panel recommends

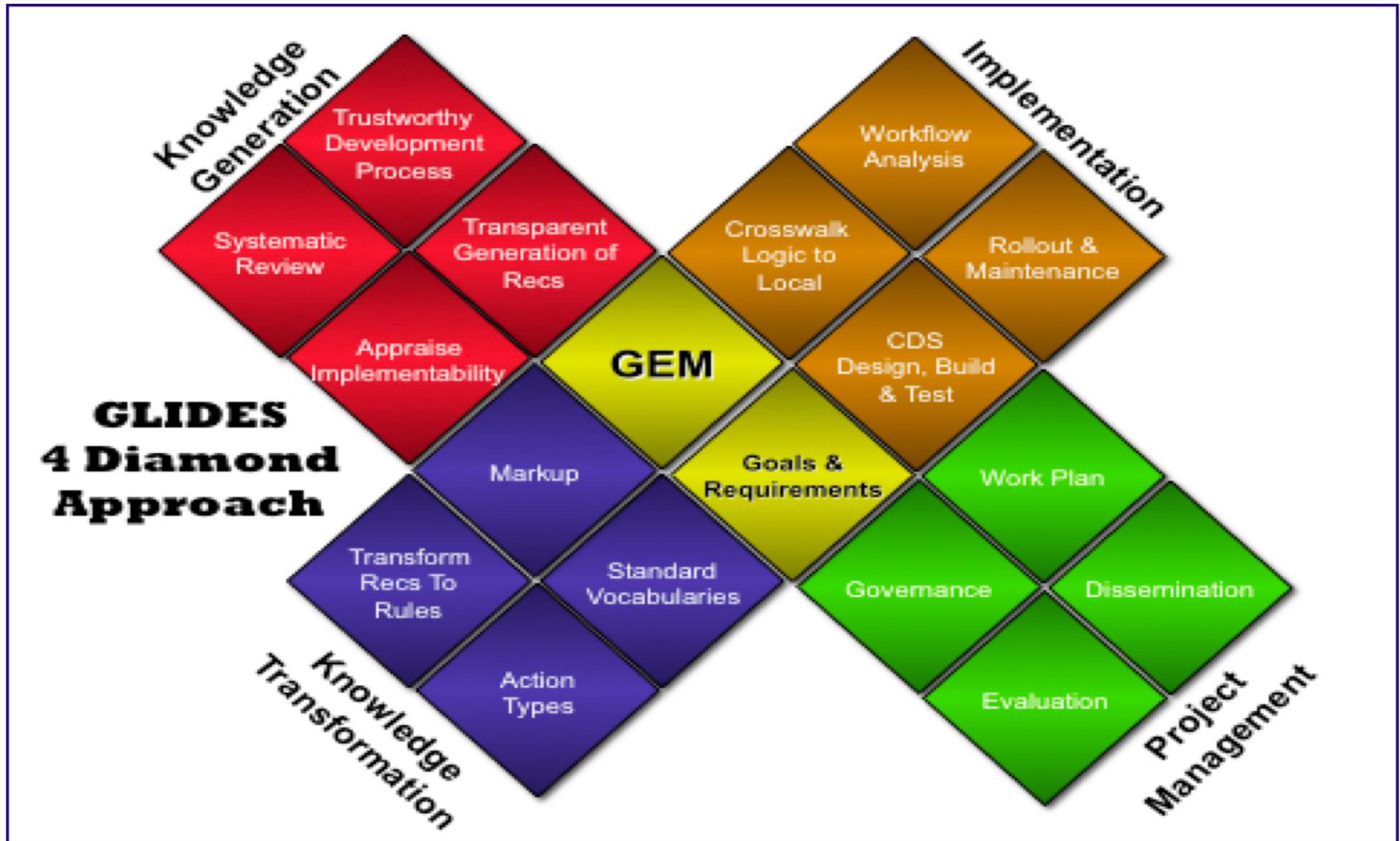
# Synchronization

- Options
  - Continue to sponsor various models/tools/processes and allow the “implementation marketplace” to determine which is most effective, or which individual niches the various models should be applied to
  - Determine which model/tools/processes are most promising, and focus continue investment and development effort on those
- Continued discussion on harmonization and alignment may be interesting, but is unlikely to lead to a major change in trajectory of the current development plans for each model

# Implementation

- **A Methodology/Toolkit approach is a practical way to build a lasting model to guide CDS implementers**
  - Foundational tools that can be integrated, flexibly, into local conditions (technology, clinical policy, workflow, etc)
  - Design guides and best practices that can be applied to specific areas of system design (eg. User interface, data capture techniques, testing models)
  - Sample work plans, templates, activity descriptions and other methodology tools
  - Like any lasting methodology, it should be “technology agnostic” not tied to any particular technology infrastructure
- Key question is how to build and formalize this Methodology/Toolkit, by taking the best concepts, examples and practices from AHRQ’s various CDS sponsored projects?

# GLIDES Toolkit



# Long-Term Deliverables for Lasting Impact and Synchronization Efforts



## Discussion



# Recap and Next Steps



# Thank You!