

Clinical Decision Support Consortium Technical Expert Panel

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Agenda

- Status Update (10 min)
- Discussion of Challenges (5 min)
- Questions for the Technical Expert Panel (TEP) (5 min)

Legal work

- Developed Steering Committee Charter
- Philips signed Letter of Understanding and joined Clinical Decision Support Consortium (CDSC) as an 'Observer'
- Finalized the CDSC collaboration agreement for CDS service integration and shared with both vendors (GE and NextGen)
- Work on the agreement for vendor customers
- Started discussion with AT&T and research team from Norway on a potential collaborations

Terminology

- Guided NextGen through filtering list of 16,000 SNOMED codes to 110 codes needed to align with the CDSC rules
- Identified codes (40+) that need to be reviewed for inclusion in the Partners HealthCare System (PHS) value sets.

International Classification of Diseases – 9th Edition (ICD-9)

- CDSC team discussed different options for building ICD9-based subsets for use by GE. Currently, PHS subset editor only supports SNOMED-based problem subsets.
- Initial review of the ICD9 determined that many of the ICD9 subsets are not equivalent with the SNOMED subsets used in CDSC rules. The CDSC subsets and classification rules may need to be modified to address this inequality.
- Discussed with GE shared roles and responsibilities for building ICD9-based subsets.

Content creation and publishing

RI Care Rules

- Finished analyzing the Preventive Care Blocks which provide preventive care decision support reminders. Created boundaries in the program logic to define 81 level 4 (L4) rules.
- Ranked rules based on feasibility and generalizability. Presented candidate list to CDSC Content Governance Committee (CGC) and incorporating feedback. Final list of rules delivered to eRoom.
- Created first two valid L3 documents.

Publishing

- Editorial Policy was unanimously ratified by the CDSC Steering Committee.
- Published Structured Care Recommendations (eRecs) content on the CDSC knowledge management (KM) portal Related References page.
<http://cdsportal.partners.org/RelatedResources.aspx?pagelId=3>
- Published ONC-funded Advancing CDS (ACDS) project content, which uses expanded L3 schema developed by the CDSC project team.

KM schemas and models

- Created XML schema for unified model for modality-specific knowledge representation. Made progress on a stylesheet for unified model.
- Roll-out of initial beta-test release, with new features: infobutton, order set, bug-tracking, note log.
- Use of schematron for specifying modality-specific constraints. Later modifications permit different modalities in the same file.
- Began development for inter-level content mapping: L1 to L2 and L4 to L3.
- Developed a detailed process for identifying the high priority rules that will be forward engineered.
- Re-published the L3 Diabetes specification to include diabetic foot exam and digital retina exam as requested by RI.

Knowledge Document Structure (example)

CDS Knowledge Base

Knowledge Element: Reminder Rule

Knowledge Element: Order Set

Knowledge Element: Documentation
Template

Knowledge Element: Info Button

Knowledge Element

Metadata

Action

Behavior

Presentation

Knowledge Document Implementation

- XML Schema
 - Specifies a generic structure for all modalities
- Schematron rules
 - ISO Standard
 - Constrain which elements can be used and how for any modalities

Schematron Rule Example

```
<sch:pattern id="CheckActionIsKnowledgeAssetRequestOrMessageRequest">
  <sch:title>Checks all actions are KnowledgeAssetRequest or
MessageRequest</sch:title>
  <sch:rule
context="CDSKnowledgeBase/knowledgeElement[metadata/implementation/knowl
edgeType='Reference Information']/action">
  <sch:assert test="@xsi:type ='KnowledgeAssetRequest' or @xsi:type
='MessageRequest'">
Infobutton only allows KnowledgeAssetRequest or MessageRequest actions
  </sch:assert>
</sch:rule>
</sch:pattern>
```

ACDS Stylesheet

Edit: DemoOrderSetL3.xml

File:///C:/_Greg/CDSC/Editor/CDSC_Editor.html?DemoOrderSetL3.xml

Dictionary.com

Community Acquired Pneumonia Order Set (StructuredCDSKnowledge)

This dummy order set was based on extracts from NWH...

Home Expand/Collapse Panels Open New Structured CDS Knowledge (Level 3 v2) as Order Set Refresh Save Print Undo

Community Acquired Pneumonia Order Set

This dummy order set was based on extracts from NWH...

Coverage (Use this order set if...):

Focus	Display Name	Code	Type
patient	Adult Patient	255397009 (SNOMED)	inclusion
careSetting	Inpatient Environment	416800000 (SNOMED)	inclusion
clinicalFocus	Coronary Artery Disease	53741008 (SNOMED)	inclusion

Medication Orders

No MRSA and no pseudomonas risk

- ceftriaxone 1 gm IV times 1
 - azithromycin 500 mg IV times 1
 - moxifloxacin 400 mg IV times 1 (where appropriate may be used as a single agent)

Lab Orders

- Blood cultures times 2 prior to antibiotics
- Na
- Cl
- K
- BUN
- Microalbumin/Creatinine [Mass ratio] in Urine
- Albumin/Creatinine [Mass ratio] in Urine
- Phosphate [Mass or Moles/volume] in Urine

Infobutton

Main search concept/term	Query modifier/subtopic	Patient	Care setting	Task context	User	Information recipient	Resource
abnormality of secretion of gastrin (ICD-9-CM: 251.5)	treatment	adult female	outpatient		Physician	Patient	Zollinger-Ellison Syndrome Patient Resource http://digestive.niddk.nih.gov/ddiseases/pubs/zollinger
extrinsic asthma with acute exacerbation (ICD-9-CM: 493.02)	diagnosis	adult	inpatient		Physician	Physician	ICSI Guideline for Hypertension Diagnosis and Treatment http://guidelines.gov/content.aspx?id=24719&search=hypertension

CDS Service – PHS and RI

Trial of Enterprise Clinical Rules Service (ECRS) with RI and Longitudinal Medical Record (LMR) is continuing.

- June 16, 2011 - RI demonstration goes live. Stage 1 - system was used by only the RI Medical Informatics team (Drs. Linas Simonaitis, Burke Mamlin, and Jon Duke).
- July 18, 2011 - Stage 2 initiated, four clinicians at the Wishard Health Services Blackburn Health Center began receiving CDSC alerts.
- August 24, 2011 - additional clinicians at Blackburn begin receiving alerts; nurses and medical assistants also start receiving alerts.
- 200 patient visits processed for the month of July.
- Software developers eliminate some duplicate queries.

CDS Service - Regenstrief

Terminology

- Changed CCD's to include new RI LOINC codes mapping blood pressure measurements, diabetic foot exam, and dilated retinal exam.
- Ensured that non-SNOMED based subsets will be correctly processed by downstream services.
- Problem of false-positive related decision support reminders have been corrected for Blood Pressure.
- Counts of reminders to check Diabetic Foot Exams decreased. Counts remain high, but are true-positives rather than false-positives as before. Foot exams may be performed, but are not coded, and thus appropriately lead to the generation of the reminder.

CDS Service - NextGen

- ECRS integration with NextGen EHR has gained needed access to development environment through PHS firewall.
- NextGen's legal counsel is reviewing the legal agreements.
- Sent test list of patients and data to NextGen in preparation for integration testing.
- Began development for changes to service component underlying the CDS Service identified as needed for NextGen integration.

Evaluation

- Conducted literature review, prepared outline of the business model report.
- Met with faculty members at Harvard Business School (HBS), continued work with each of the CDSC teams to identify their unique value.
- Had discussions with encoders of American College of Chest Physicians (ACCP) guidelines on using CDSC schemas and KAT for forward engineering of those guidelines.
- Successfully identified three software packages for CDSC Dashboard open-source analysis based on suitability as enterprise reporting systems.
- KMLA team created schedule for site visits during OY2 and received approval from Jim Walker for making the Geisinger visit.
- Set up queries to provide data to CDSC Research Committee meetings and began matching of RI-provided data with service results.
- Performance data is being loaded to the research database.

KM Portal and Dashboards usage summary statistics to date

CDSC KM Portal Statistics					
Current Published Assets	October, 2011		Since February, 2010		Most Viewed Content
	Unique IP Addresses	Number of Visits	Unique IP Addresses	Number of Visits	
48	43	69	693	1240	SCRCDS_Top_10_eMeasures.zip

CDS Dashboards Usage Summary		
	Usage for: 10/8-11/7/2011	Total number of usage
Provider View:	12 times by 10 unique people	278 times by 138 unique people
	9 people used it once	91 people used it once
	-----	21 people used it twice
	1 person used it three times	9 people used it three times
	-----	17 people used it four or more times
Designer View:	-----	10 times by 8 unique people
	-----	7 people used it once
	-----	1 person used it three times

KM Portal Visit Statistics

	Current Published Assets	Searches	Unique IP Adresses (month)	Cumulative Unique IP Adresses (since 2/1/10)	Monthly Visitors	Visits (month)	Cumulative Visits (since 2/1/10)
Feb '10	32	97	25	25	14	39	39
Mar '10	35	46	32	54	30	55	94
Apr '10	35	268	47	88	23	71	165
May '10	35	52	35	98	22	36	201
Jun '10	35	51	39	145	31	50	251
Jul '10	35	17	37	173	19	31	282
Aug '10	35	59	45	212	21	38	320
Sep '10	35	51	37	242	21	45	365
Oct '10	35	71	39	273	38	80	445
Nov '10	35	240	47	310	36	73	518
Dec '10	35	64	55	351	24	40	558
Jan '11	35	68	66	394	27	49	607
Feb '11	35	65	47	424	24	49	656

KM Portal summary data for the entire evaluation period



Dashboards

View: Executive

- Executive Overview
- Conversion Summary
- Marketing Summary
- Content Summary
- Geo Map Overlay

All Reports

- Marketing Optimization
- Content Optimization
- IT Reports
 - Hits & Bytes Tracking
 - Load Balancing
 - Pages & Files
 - Top Files
 - File Drilldown
 - Downloads
 - Posted Forms
 - File Types
 - Status Codes
 - Referral Errors
 - Unauthorized Usernames
 - Domains & Users
 - Browsers & Robots

Date Range

View By: Default

2011

Jan	Feb	Mar	Apr	May	Jun	
Jul	Aug	Sep	Oct	Nov	Dec	
S	M	T	W	T	F	S
→ 30	31	1	2	3	4	5
→ 6	7	8	9	10	11	12
→ 13	14	15	16	17	18	19

Executive Overview Export Print

cdsportal.partners.org | 2/1/2010 - 2/28/2011

Visits and Pageviews

Average: 3.08 P/V
Visits: 657
Pageviews: 2,025

Visits by New and Returning

Visitor Type	Percentage
Returning Visitor	70.62%
New Visitor	29.38%

Geo Map Overlay

Visits by Source

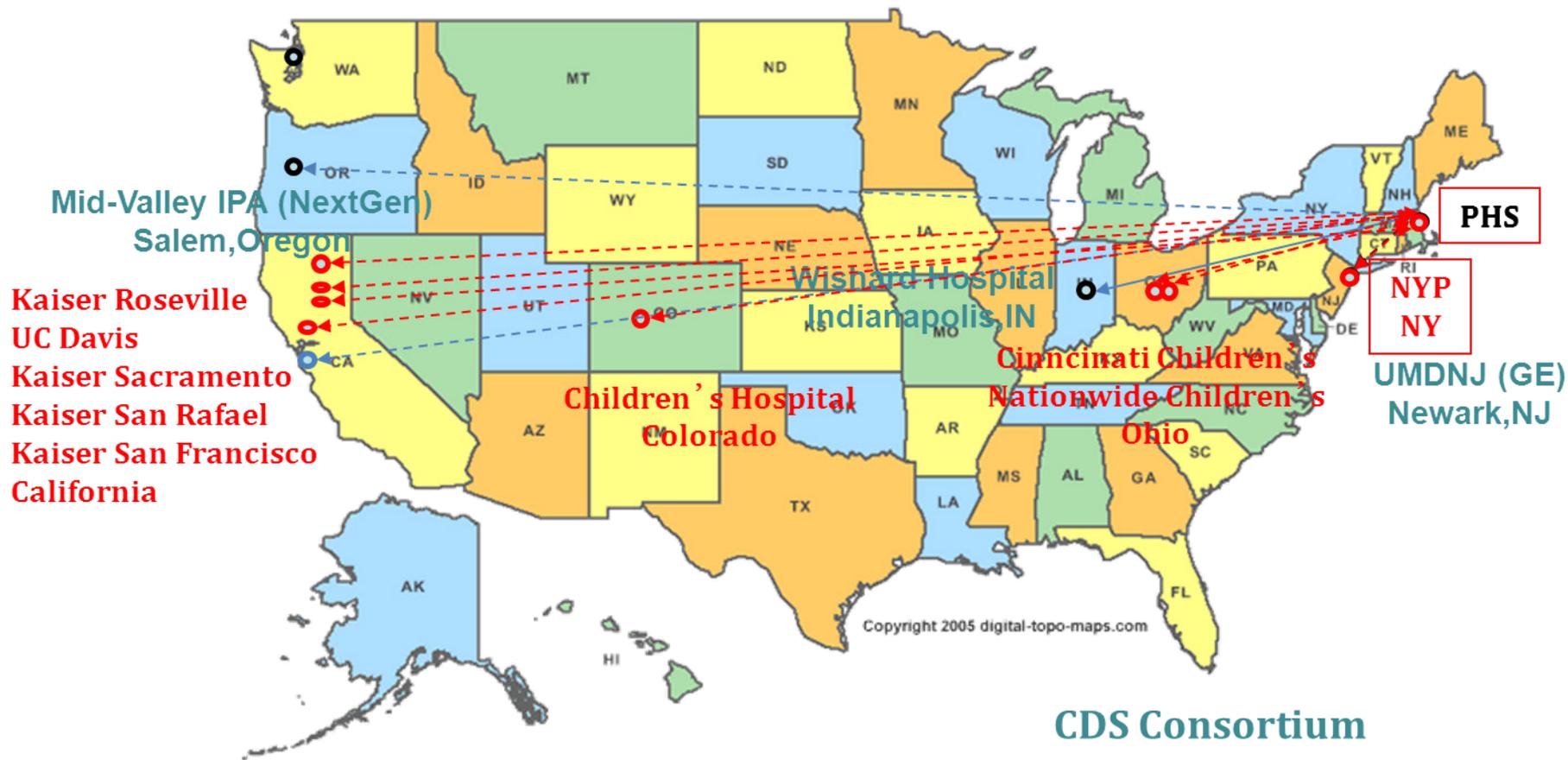
Source	Percentage
(direct)	77.63%
webreports.partner:	6.24%
partners.org	5.94%
google	5.18%
wlapp (other)	5.18%

Services usage summary statistics

Statistics: Calls to ECRS & Success Rates Data from 10/12/2011 through 11/09/2011			
PHS	# Days	# Calls	Avg/Day
All Days	28	51660	1845
Weekend Days	8	2124	266
Weekdays	20	49536	2477
RI	# Days	# Calls	Avg/Day
All Days	11	190	17
Weekend Days	0	0	0
Weekdays	11	190	17

CDS Demonstrations

Toward a National Knowledge Sharing Service



CDS Consortium

PECARN TBI CDS

Site Visits Schedule

NextGen (Virtual, pre-implementation)	December 5-12, 2011
GE (Virtual, pre-implementation)	January 2012
Duodecim (Virtual)	February at HIMSS or in June 2012
Geisinger (In-person, post-implementation)	March 2012
NextGen (In-person, post-implementation)	April 2012
NextGen (Virtual, post-implementation)	May 2012

Dissemination

- Boxwala AA, Rocha BH, Maviglia S, Kashyap V, Meltzer S, Kim J, Tsurikova R, Wright A, Paterno MD, Fairbanks A, Middleton B. A multi-layered framework for disseminating knowledge for computer-based decision support. ” Published in the Journal of the American Medical Informatics Association
- Presented findings at American Medical Informatics Association (AMIA)
- Received Distinguished Paper nomination at AMIA for: *A Legal Framework to Enable Sharing of Clinical Decision Support Knowledge and Services Across Institutional Boundaries.* Hongsermeier T, et al.
- Sent all OY1 recommendations to Jacob Reider, MD, new senior policy director for CDS at ONC.
- Updated CDSC website with OY2 projects and new members.

Challenges and Barriers

- CDSC KAT is not fully deployed yet.
 - Making KAT available as a Web Service would be helpful for Forward and Reverse Engineering projects.
- Current schematron constraints limit an XML instance file to contain only one modality type.
 - It is useful to allow one XML file (equivalent to one guideline) to contain different modalities.
- To upload ACDS and eRecs artifacts, the team spent a significant amount of time addressing/resolving portal publishing issues.
 - Useful to utilize common knowledge representation format to share artifacts

Challenges and Barriers (cont.)

- Limited clinical informatics expertise for terminology harmonization for services integration
 - Specify in detail CCD terminology model, and vendor complies with the spec.
- Difference of opinions on who should QA CCDs.
 - CDSC tested manually, but ideally a vendor would conduct QA with a web test harness
- Unacceptable failure rate in the LMR due to the slowness in generating the CCD.
 - Efforts are ongoing within the Services team to improve performance of the CCD Factory.
 - We are also analyzing other optimizations, such as direct data access or asynchronous calls.
- Matching records from service execution calls with those from RI preparation is proving to be challenging.
 - Need to clean up record identifiers.

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, MD, 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

- Which is more important: Open Source rules engine, or Open Source knowledge ?
- What is the right level of standardization for an enhanced CCD to support CDS?
- What guidance can the TEP provide to contractors (and the ONC) on the ability to 'certify' CDS in EHRs?

