Ensuring Quality in the Era of Digital Health
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From Paper to Pathway at Scale: Agile Knowledge Engineering in the Era of COVID019

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A Conceptual Model of an Integrated Decision Support System

Figure 1.
The Biomedical Informatics Fundamental Theorem

\[(\text{Brain} + \text{Computer}) > \text{Brain}\]

CDS Consortium Demonstrations: 2008-13

Toward a National Knowledge Sharing Service

- Clinical Decision Support Consortium
  Middleton B, PI: 2008-13, AHRQ-funded: HHSA290200810010

- Major accomplishments:
  - Knowledge artifacts published: 11 clinical rules, 50+ classification rules and 375 immunization schedule rules
    - 8 clinical sites implemented using 5 different EHRs
  - More than 240 users utilize CDS services
  - Established legal framework for collaboration
  - Since 2010 more than 1.7M CCD transactions were processed
  - 31 entities (companies and academics) in a pre-competitive environment
  - Contributed to ONC-sponsored Health-e-Decisions efforts: KAS 1 and KAS 2

Mid-Valley IPA (NextGen)
Salem, Oregon

Kaiser Roseville
UC Davis
Kaiser Sacramento
Kaiser San Rafael
Kaiser San Francisco
California

PECARN TBI CDS
**Apervita** | Trusted Cloud-Based Platform for Collaboration

**Our Mission**
Empower payers, providers and their stakeholders to more efficiently and effectively transact at scale—clinically, operationally & financially.
About Apervita  | Industry Leader

Deep Expertise in Quality Innovation

First entity to certify electronic clinical quality measures (eCQMs) from NCQA using a clinical quality language (CQL) compute engine (February 2020). Now HEDIS certified measures, and ONC Certification.

Healthcare enterprises using Apervita QMeasure™ CQL tools can build, test, & execute measures in just 14 hours per measure on average, compared to 6 months traditionally required to code each measure in SQL or SAS.

High-velocity build/test/execution of quality measures empowers payers & providers to:

- Quickly collaborate on meaningful, clinician-friendly measures
- Quickly identify & fix data issues
- Proactively improve quality reporting on timely/continuous basis
Quality Measures Development & Execution

**Challenge**
2,700+ hospitals seeking accreditation went through a painfully time-consuming and manual quality measure calculation and submission process

**Solution**
The premier Apervita quality measures use case: A cloud-Based, national-scale platform for quality reporting

**How it works**
- Standards-based cloud application for clinical data ingestion and connection
- eCQMs applied to secure data—and only results shared

**Results and advantages**
- Data is not manipulated, always standard
- Data access strictly controlled, no copying/sending
- Results available continuously, not months
- Radically reduced vendor and internal costs
- Reduce implementation costs and time through digital measures

95% reduction in effort & cost
Results available 100x faster
One Platform to Solve Interoperability, Quality & Accountability

Quality Improvement
- Regulatory Submission
- Quality Measure
- ACO Reporting
- Clinical Pathways
- Clinical Practice Guidelines
- Digital Measure Translation
- Custom Measures
- Care Gap Analysis
- CDS Intervention

Enable the Industry

Value-Based Contract Administration
- Payer-Provider Collaboration
- Automate Contract Creation
- VBC Full-Life Cycle Support
- Contract Settlement

Interoperability
- Patient Access
- Applications Data Exchange
- Application Exchange
- Patient Reported Outcomes
- Social Determinants of Health
- eCase Reporting

Patients | Payers | Partners | Providers | Vendors | Regulators
Pathways | Best Practices for Performance Improvement

Pathway (HL7 CPG) delivered into workflow, delighting clinicians, & adding value

Clinical Practice Guidelines (CPGs) with visualization of where patient has been—and where they should be going
Agile KE Overview

• Cross-functional, Integrated Team
  • Agile CPG Team, Concurrent L1/2/3 Development

• “Chunking” (composite artifacts)
  • Progression of incremental, focused parts

• Iteration, rapid-cycle feedback
  • Together with incremental parts

• Test-driven Knowledge Engineering
  • Specify by Example -> Incremental Testing -> Validation

• Leverage Knowledge Base
  • ‘Intelligent’ Knowledge Content Management System
Levels of Representation Reconceptualized
Framework for Describing *Nature* of Representation

**Tradition Knowledge Engineering Approach:**
- Process Steps that mimicked Progression of Levels-
  - L2 only on Final L1
  - L3 only on completion of L2

**Agile KE:**
- Concurrent, iterative, integrated, and cross-functional
- Different Expertise work on Different Levels concurrently
- Knowledge Increments across Levels

**Waterfall GDP, KE, CDS, & Implementation**
- L1
- L2
- L3
- L4

**Agile Integrated Cross-functional CPG-IG Approach**
- L1
- L2
- L3
- L4

- Shared Tooling
- Shared Information
- Incremental
- Concurrent Development
- Iterative, Rapid Feedback
- Test-Driven
- Reuse Content

Boxwala AA, *et al.* JAMIA 2011, 18 Suppl 1, i132-9
Agile Knowledge Engineering Work Flow
Fourth Iteration of Covid-19 Severity Score (L1/L2) v1 L1 Illustration from C19-Consortium GDG
v3 of L1 Severity Score from C-19 Consortium GDG
Vision: The National Knowledge Ecosystem

1. Guideline Development
2. Knowledge Translation, Specification
3. Content Governance
4. Knowledge Implementation
5. Use, Evaluation, and Feedback

Thank you!

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