Towards Computable Guidelines and Beyond with FHIR

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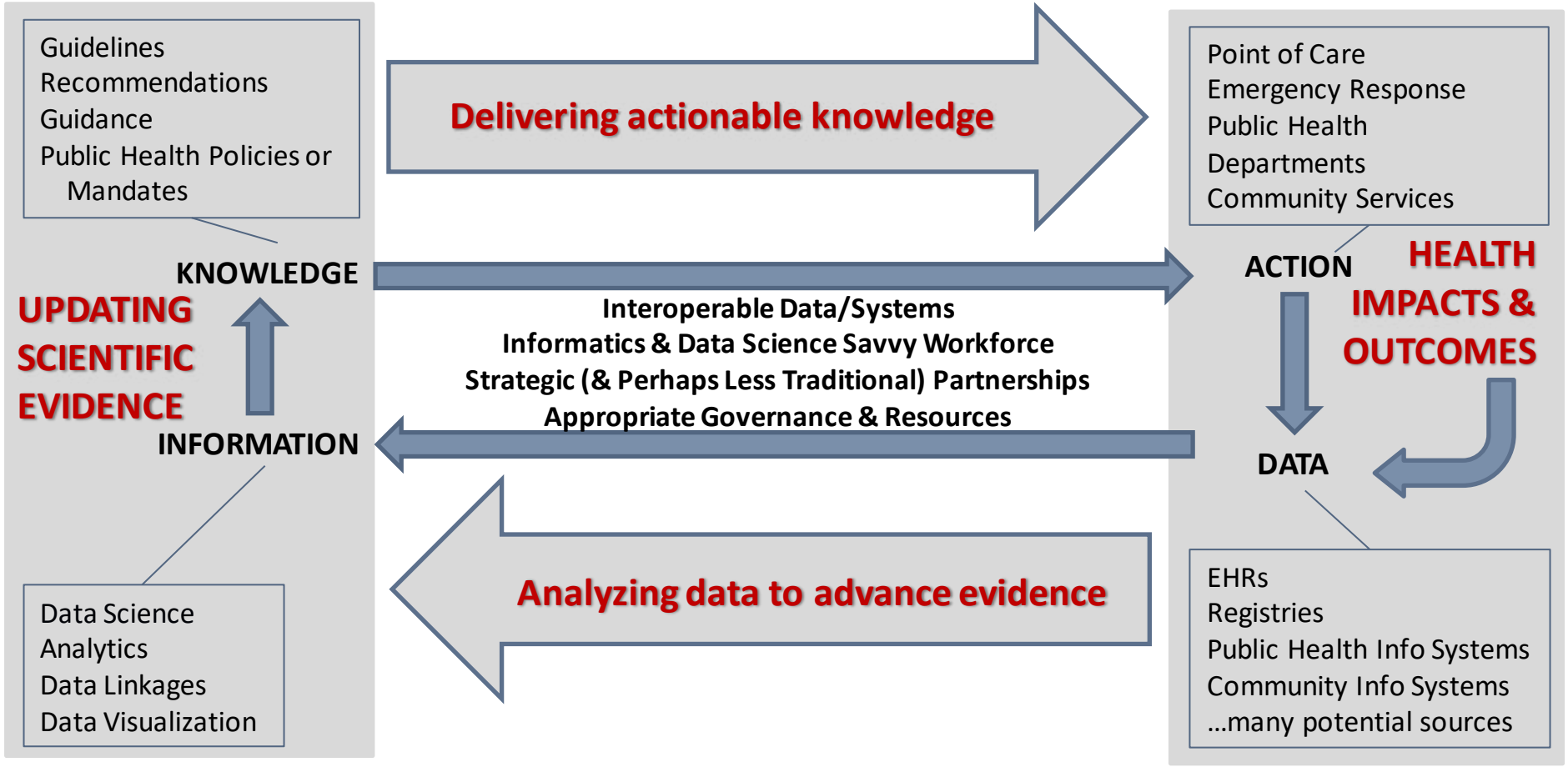
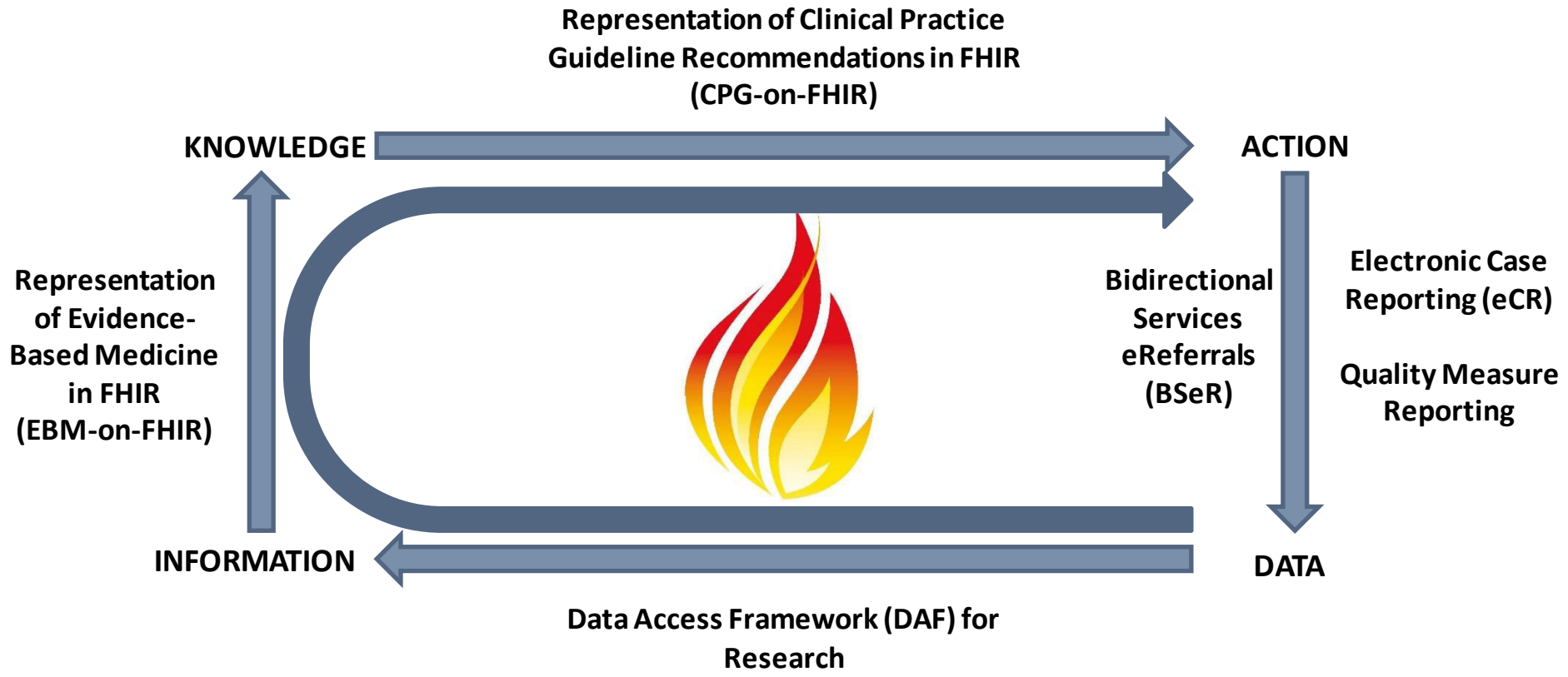
The Data Lifecycle & Impacts to the Public's Health

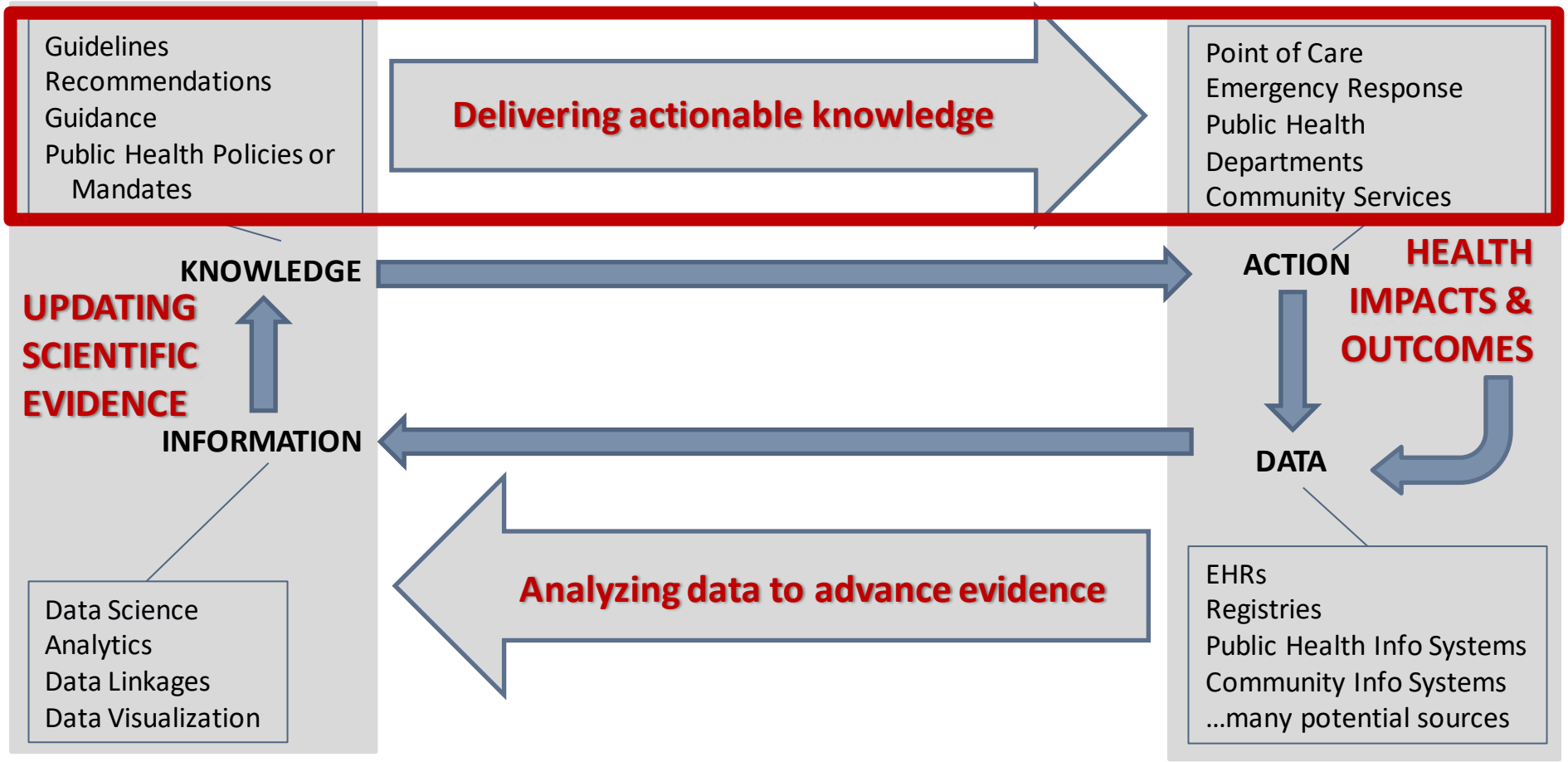


How FHIR Facilitates the Data Lifecycle (examples)



NOTE: This is not an exhaustive list of examples

The Data Lifecycle & Impacts to the Public's Health



Today's Guideline Development and Implementation

Long Implementation Time

Develop guidelines

Research Results

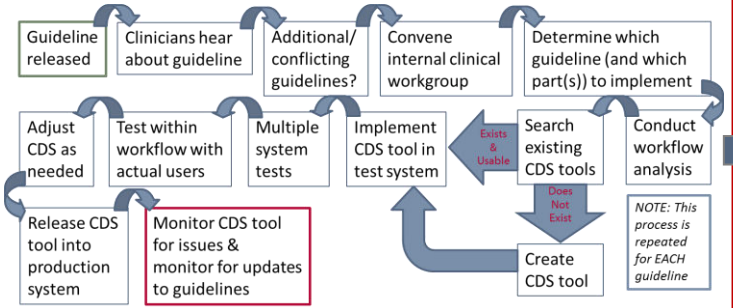
Literature Review

Meta-analysis

Guideline Narrative

PDF

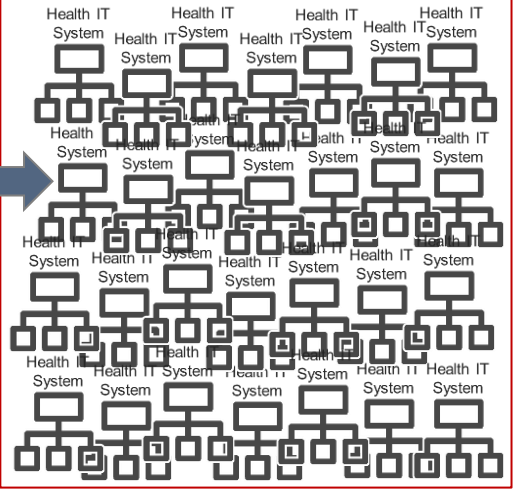
Interpret guidelines



Performed by up to 95% of ~5500 hospitals

Performed by up to 82% of ~355,000 clinics

Implement guidelines



https://dashboard.healthit.gov/quickstats/quickstats.php

Participating Stakeholder Groups

- Guideline authors
- Health IT developers
- Communicators
- Clinicians
- Patients / Patient Advocates
- Medical Societies
- Public Health Organizations
- Evaluation experts
- Standards experts
- Clinical decision support developers
- Clinical quality measure developers
- Policy or technical support for implementation

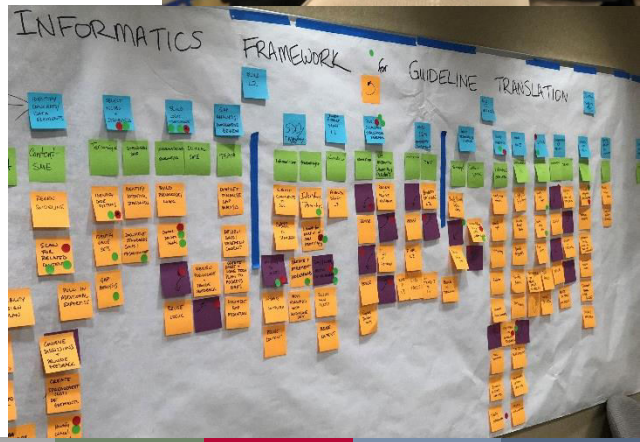
CDC Kaizen Event: Scope & Value Streams

SCOPE:

- **START**: Guidelines Creation
- **END**: Evaluation

VALUE STREAMS (Focus Areas):

- Guidelines Creation
- Informatics
- Dissemination Tools and Communication
- Translation and Implementation
- Evaluation



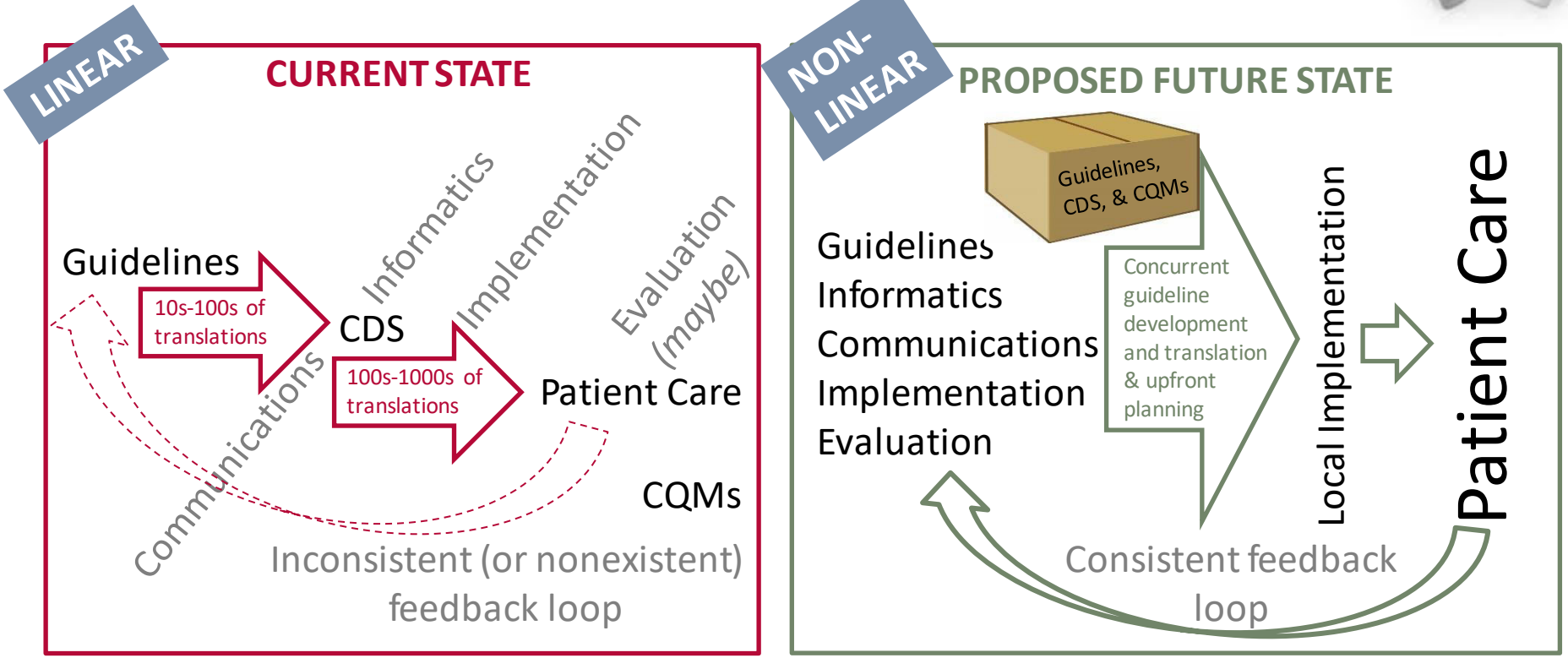
Adapting Clinical Guidelines for the Digital Age

Problem: Long Lag Time, Inconsistencies, and Inaccuracies in Translation	**Reason**: Playing the "Telephone Game"	**Solution**: Developing Tools and Guidelines Together
		
Leads to an average of 17 years for scientific evidence to apply in patient care	Multiple translations of guidelines add complexity, opportunity for error, and variation across sites/providers	Can help evidence apply to patient care more easily, quickly, accurately, and consistently

https://www.cdc.gov/ddphss/clinical-guidelines/index.html

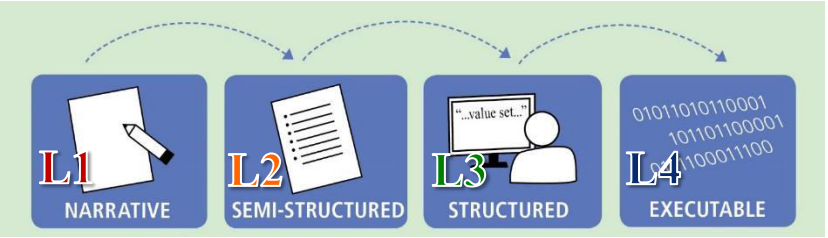
Adapting Clinical Guidelines for the Digital Age:

Redesigning Guideline Development and Implementation



https://www.cdc.gov/ddphss/clinical-guidelines/index.html

Translating Evidence to Executable CDS

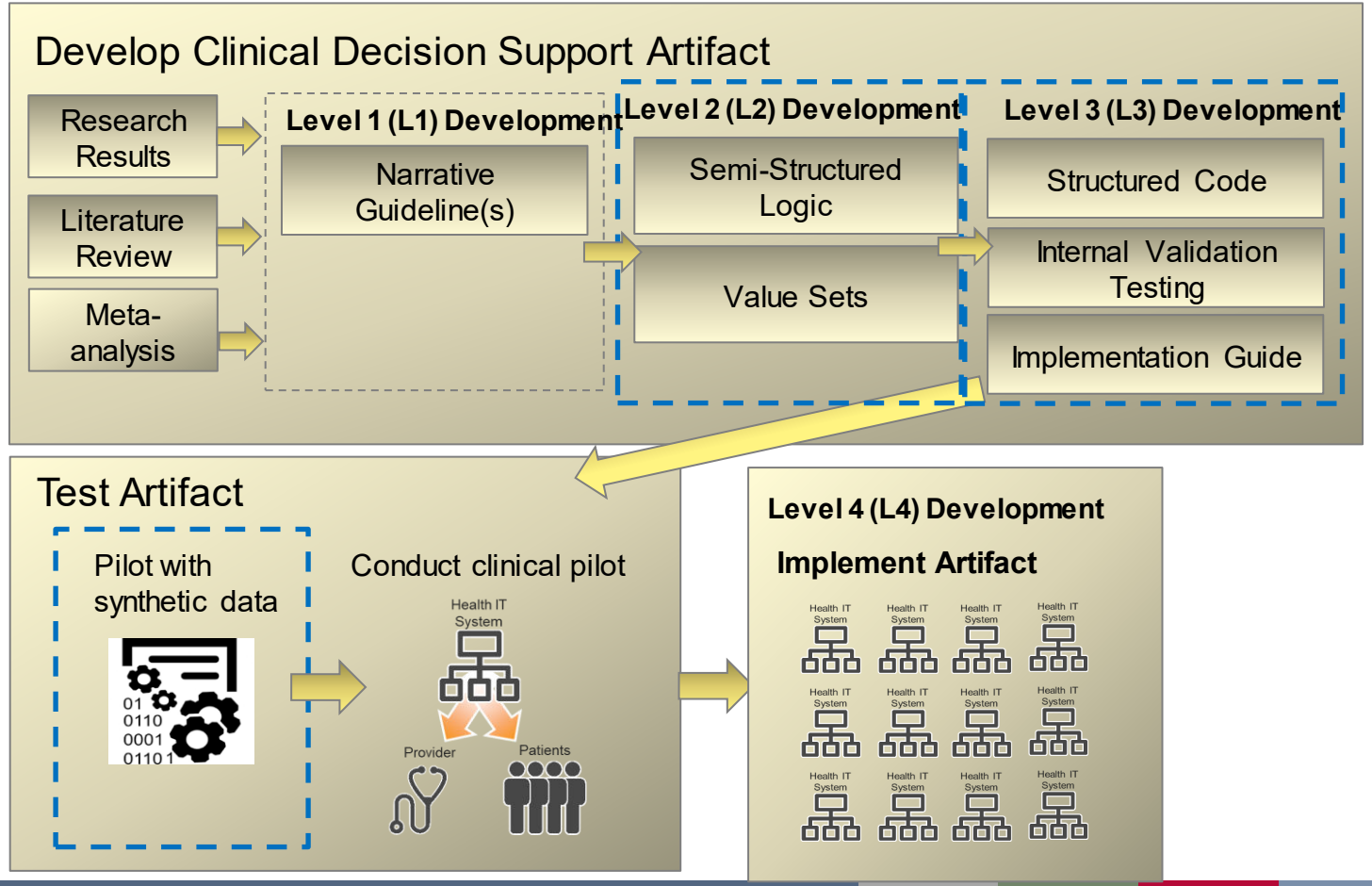


Knowledge Level	Description	Example
L1	Narrative	Guideline for a specific disease that is written in the format of a peer-reviewed journal article
L2	Semi-structured	Flow diagram, decision tree, or other similar format that describes recommendations for implementation **(HUMAN READABLE)**
L3	Structured	Standards-compliant specification encoding logic with data model(s), terminology/code sets, value sets that is ready to be implemented **(COMPUTER/MACHINE READABLE)**
L4	Executable	CDS implemented and used in a local execution environment (e.g., CDS that is live in an electronic health record (EHR) production system) or available via web services

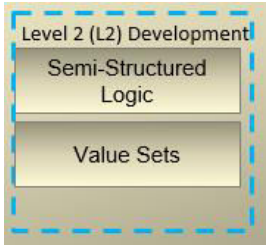
Adapted from: Boxwala, AA, et al.. A multi-layered framework for disseminating knowledge for computer-based decision support. *J Am Med Inform Assoc* 2011(18) i132-i139.

Learning from the Development of CDS for Anthrax Emergencies

Overarching CDS Development Approach



Level 2: Semi-structured Representation

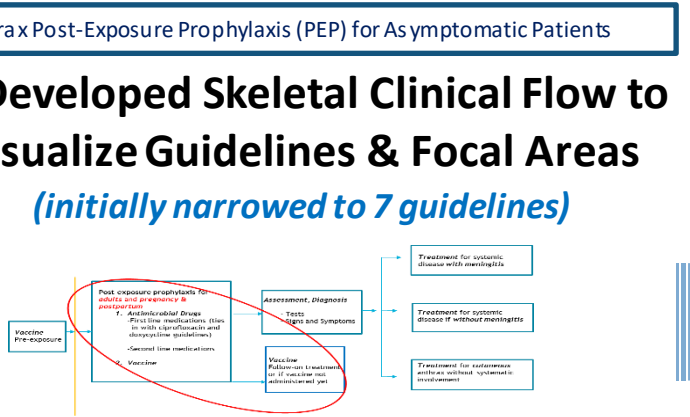


1. Identified Pertinent Guidelines

(17 total)

2. Developed Skeletal Clinical Flow to Visualize Guidelines & Focal Areas

(initially narrowed to 7 guidelines)



3. Assessed Guidelines per Defined Criteria

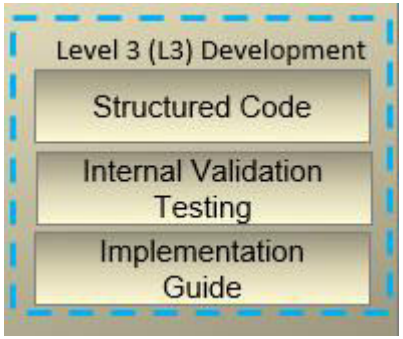
(selected 5 guidelines)

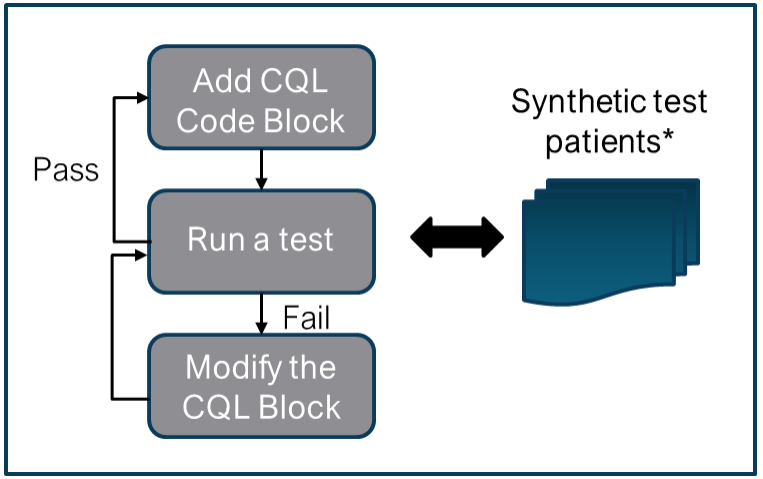
4. Assessed Recommendation Statement(s) to Derive Artifact

5. Documented Detailed Clinical Workflow with Semi-structured Representation of CDS

What if each clinical organization had to do this work?

Level 3: Iterative Development and Testing



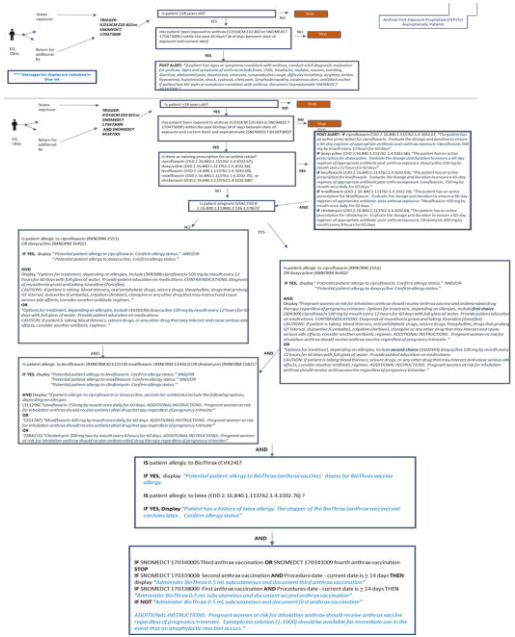


* Not the same as those used in synthetic pilot

- **Based on L2 semi-structured logic and value sets,**
  - Developed CDS code in the Clinical Quality Language (CQL) representation for clinical concepts, such as order sets and alerts
  - Incrementally tested (test-driven development)

Final Anthrax CDS for Anthrax Post-exposure Prophylaxis

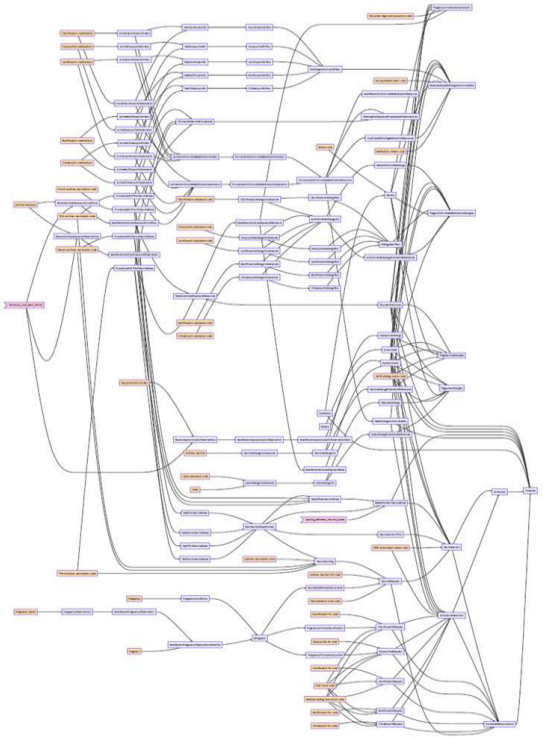
Detailed L2



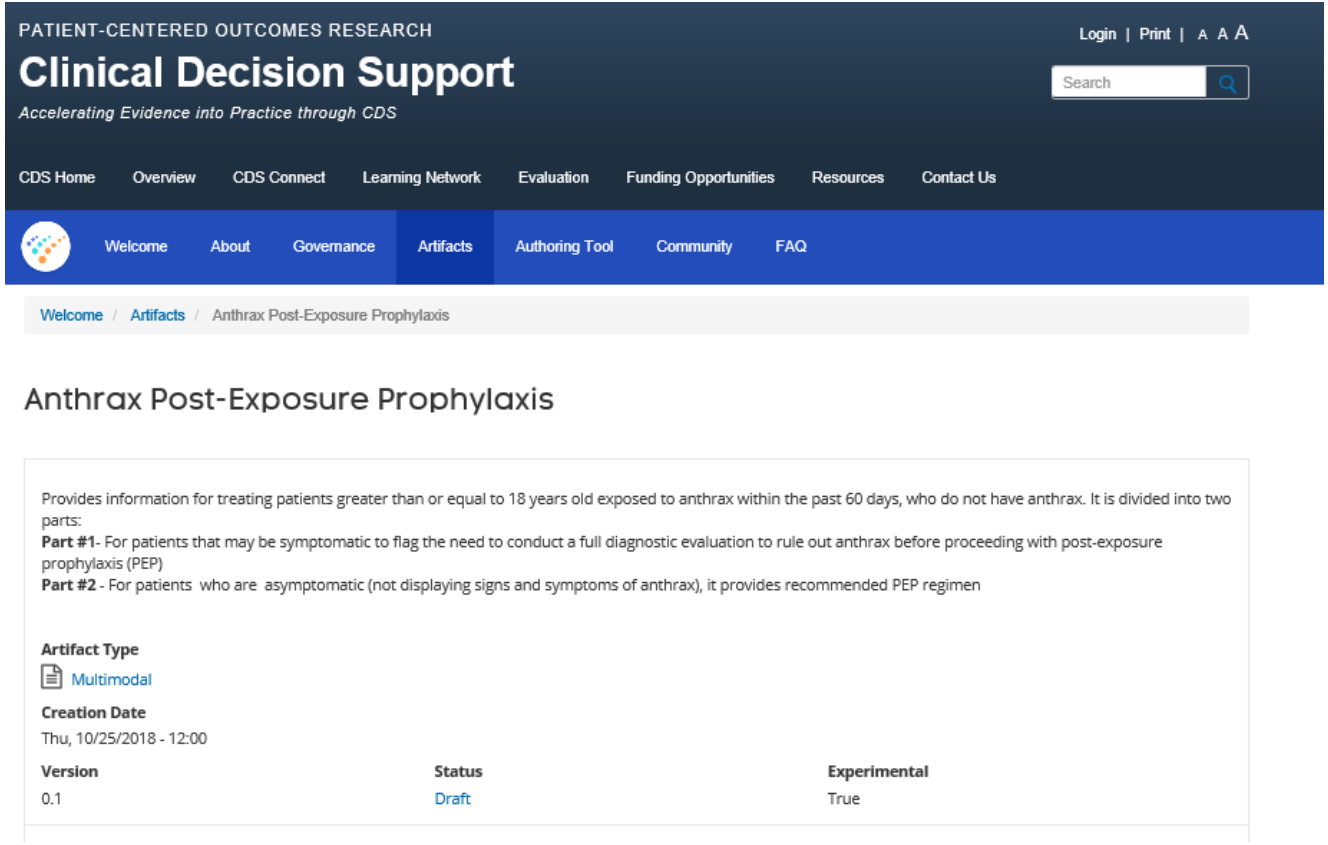
Complex **CDS artifact with:**

- **8 value sets**
- **105 CQL expressions**
- **232 dependencies**
- **1215 lines of code**

Detailed L3



Anthrax CDS Published on CDS Connect

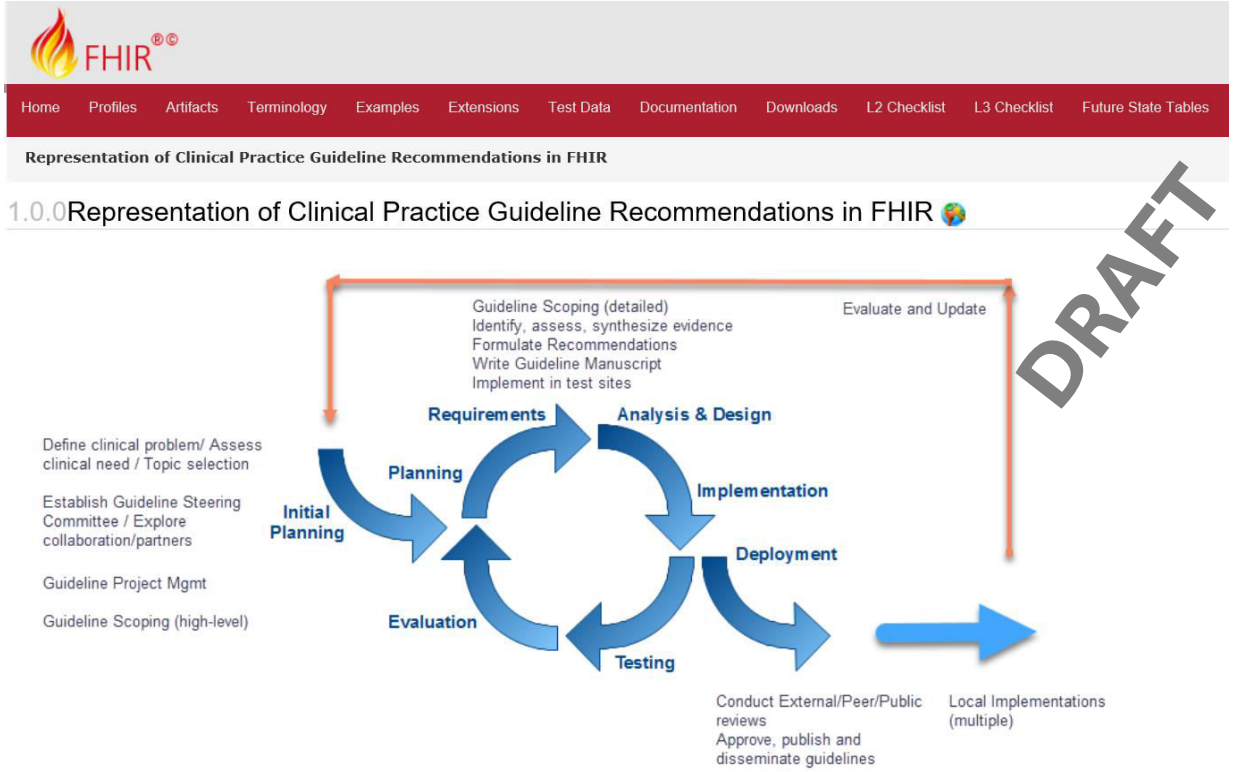


- **Metadata**
- **CQL**
- **Built-in synthetic test patients**
- **Implementation guide**
- **Validation report**

https://cds.ahrq.gov/cdsconnect/artifact/anthrax-post-exposure-prophylaxis

Formalizing into a Framework Implementation Guide

Implementation Guide: Representation of Clinical Practice Guideline Recommendations in FHIR



"CPG-on-FHIR"

Targeted for ballot:

September 2019

http://build.fhir.org/ig/HL7/cqf-recommendations/

Related FHIR DevDays Sessions

- For more detail and hands-on application, consider attending:
  - **Mechanics of FHIR in Reporting and Referrals** (PUBLIC HEALTH – Arun Srinivasan, John Loonsk)
  - **FHIR in Population Health Ecosystem** (PUBLIC HEALTH – John Loonsk, Jason Hall)
  - **Next Generation Quality Measurement with FHIR** (QUALITY MEASURES – Ben Hamlin/Sam Sayer)
  - ***Let's build!* Next Generation Quality Reporting with FHIR** (QUALITY MEASURES – Bryn Rhodes)
  - ***Let's build!* CDS Hooks Services** (CLINICAL – Dennis Patterson)
  - **A Computable Guideline in FHIR: Opioid Prescribing Support** (CDS – Bryn Rhodes, Maria Michaels)
  - ***Let's build!* Clinical Practice Guideline Recommendations with FHIR** (CDS – Bryn Rhodes)

For questions or more information please contact:

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