



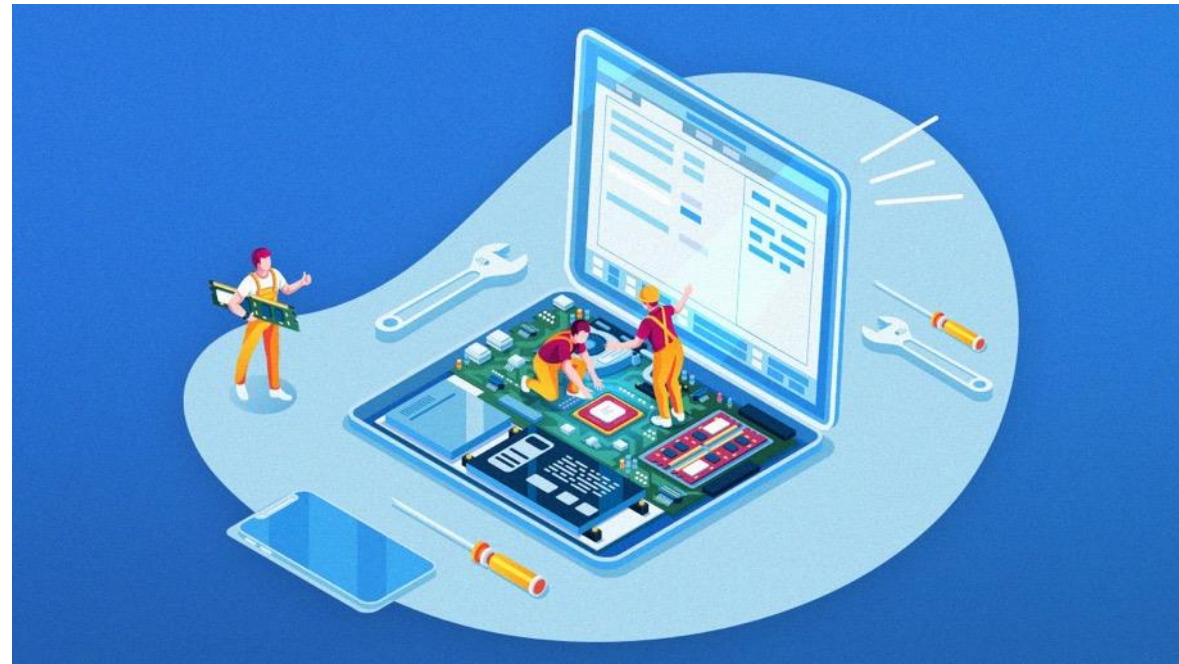
CurrentCare Upgrade and Opportunities for Data Integration: *FHIRing things up!*

Neil Sarkar, PhD, MLIS, FACMI



HealthShare Upgrade

- “HealthShare” is the underlying technology for RIQI’s HIE services, including CurrentCare
- After nearly two years of planning, upgrade formally started in fall 2021
- Base system upgraded in September – Six full versions! (2015 >> 2020)
- Total full downtime < 72 hours

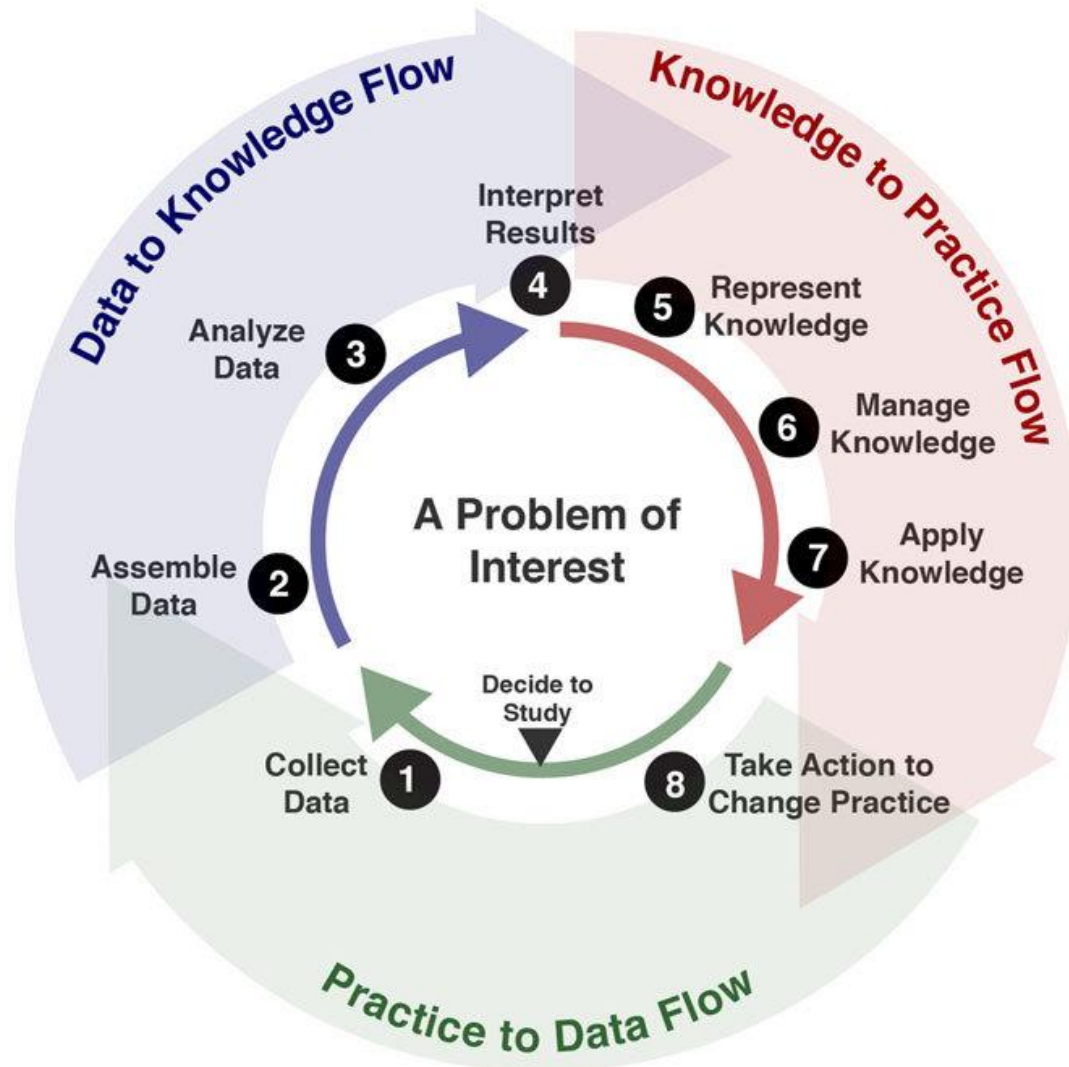


Why Upgrade?

- Performance enhancements, including newer data architecture
- Refreshed application aesthetics and functionality (search!)
- Reduction in maintenance costs and need for customizations
- Updated security and reduced technical vulnerabilities
- Enable contemporary technologies for supporting healthcare data interoperability -- FHIR!



Health Care as a Learning System



Flynn AJ, Friedman CP, Boisvert P, Landis-Lewis Z, Lagoze C. The Knowledge Object Reference Ontology (KORO): A formalism to support management and sharing of computable biomedical knowledge for learning health systems. *Learning Health Systems*. 2018 Apr;2(2):e10054.



21ST CENTURY CURES ACT

GOALS OF THE LEGISLATION

RESEARCH



Remove barriers to research collaboration



Invest in STEM education



Provide new incentives for the development of rare disease drugs

GETTING TREATMENTS TO PATIENTS MORE QUICKLY



Foster coordination to find cures more quickly



Modernize clinical trials to increase access to drugs and treatments



Incorporate patient feedback in drug development and review process

KEEPING JOBS HERE AT HOME



Ensure U.S. remains a global leader in medical innovation, protecting and creating jobs at home



Encourage development of new medical apps to save lives and create jobs

#CURESatOne

E&C



World Wide Web

The WorldWideWeb (W3) is a wide-area [hypermedia](#) information retrieval initiative aiming to give universal access to a large universe of documents.

Everything there is online about W3 is linked directly or indirectly to this document, including an [executive summary](#) of the project, [Mailing lists](#) , [Policy](#) , November's [W3 news](#) , [Frequently Asked Questions](#) .

[What's out there?](#)

Pointers to the world's online information, [subjects](#) , [W3 servers](#), etc.

[Help](#)

on the browser you are using

[Software Products](#)

A list of W3 project components and their current state. (e.g. [Line Mode](#) ,[X11 Viola](#) , [NeXTStep](#) , [Servers](#) , [Tools](#) ,[Mail robot](#) ,[Library](#))

[Technical](#)

Details of protocols, formats, program internals etc

[Bibliography](#)

Paper documentation on W3 and references.

[People](#)

A list of some people involved in the project.

[History](#)

A summary of the history of the project.

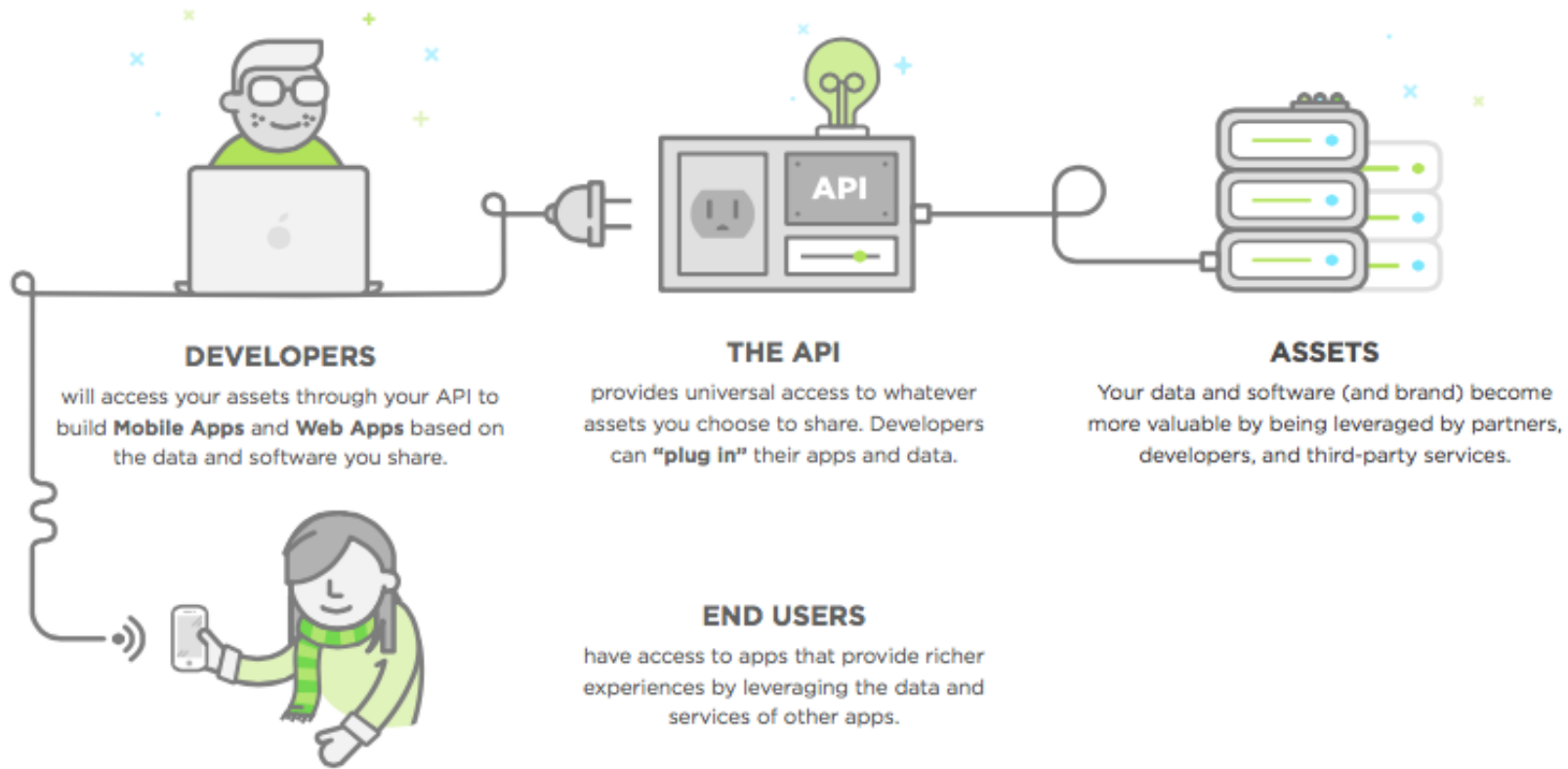
[How can I help ?](#)

If you would like to support the web..

[Getting code](#)

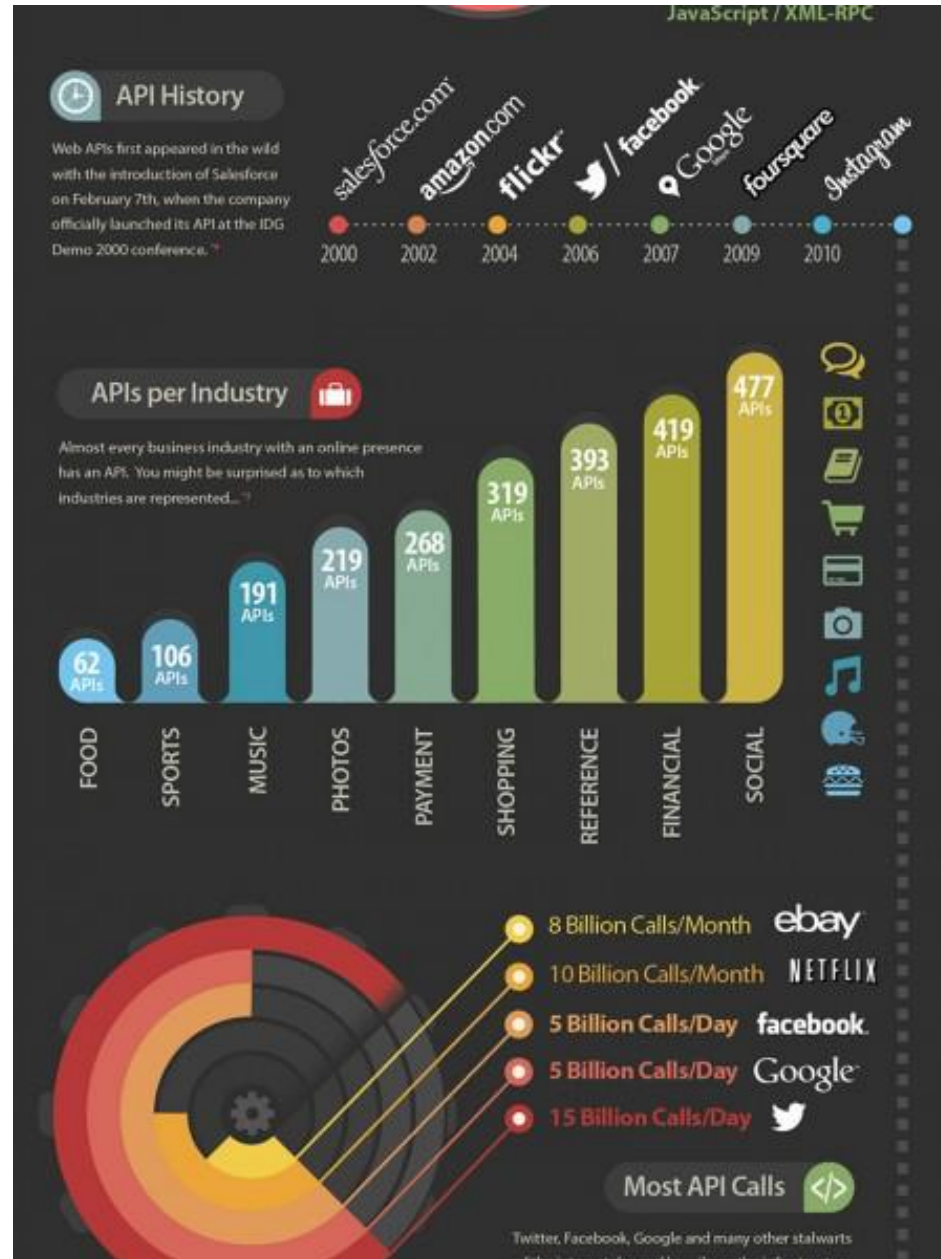
Getting the code by [anonymous FTP](#) , etc.





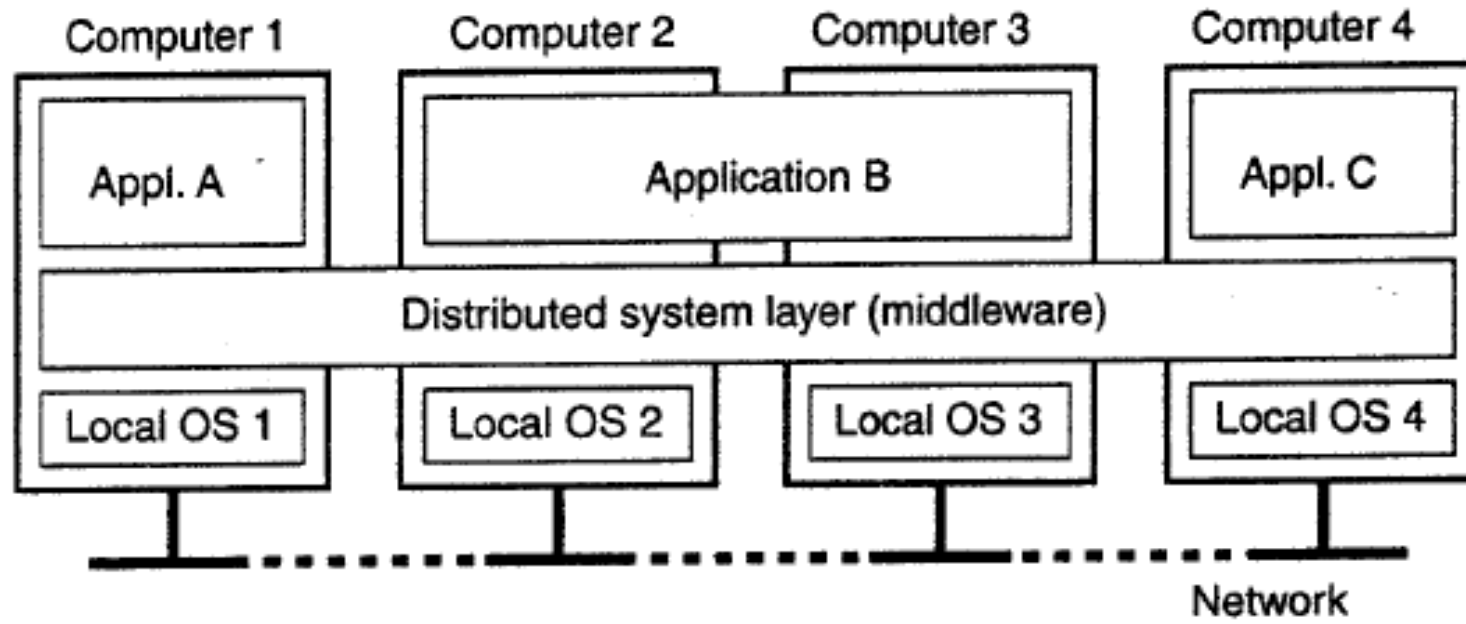
<https://www.upwork.com/hiring/development/intro-to-apis-what-is-an-api/>

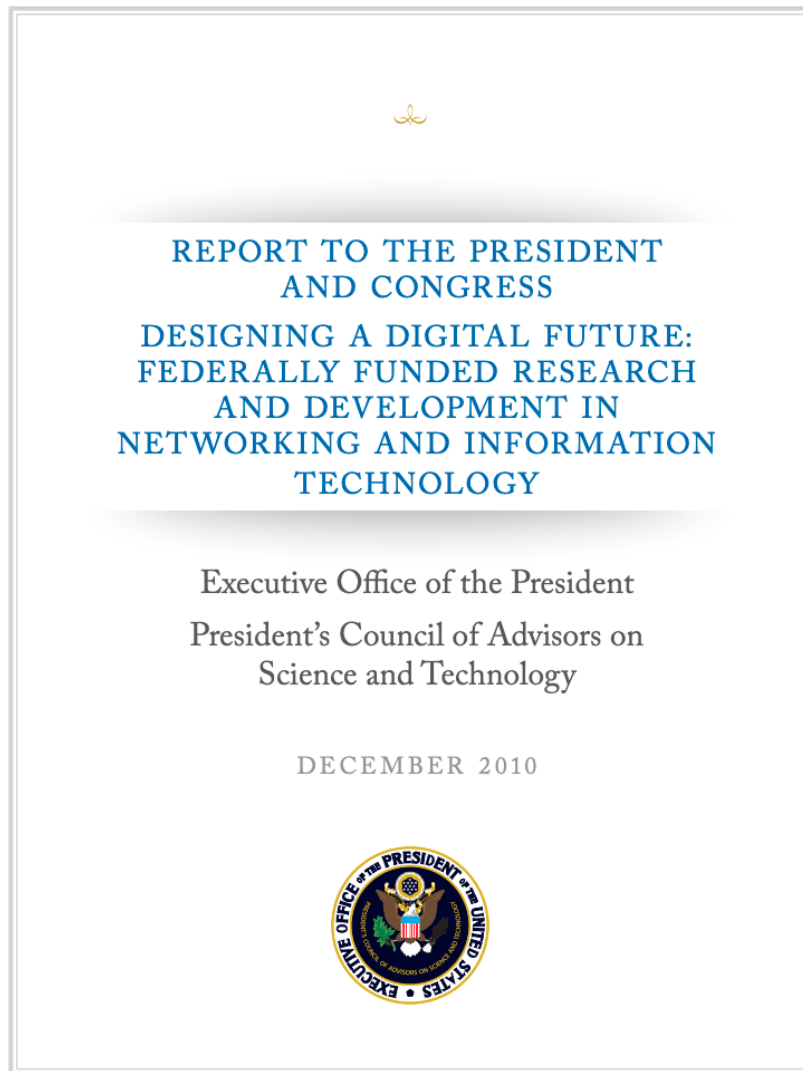




<https://visual.ly/community/infographic/computers/api>







Interoperable Interfaces and Demonstration Testbeds Drive Innovation and Economic Growth

The impact of NIT on key national priorities, including healthcare, energy, and transportation, will be magnified and accelerated through the use of *well-defined* and *interoperable interfaces*, and *demonstration testbeds*. These are mechanisms that breed unfettered innovation.

An *interface* enables one NIT component to connect to and work with others, whether through a network, by exchanging data, or by executing programs. Examples of widely used interfaces include the Internet communication protocols, the HTML document format, and the Microsoft Windows and Apple iPhone software platforms. These interfaces have all been essential to the development of multi-billion dollar NIT industries: the Internet, the World Wide Web, the personal computer, and smart phones.

Interoperable interfaces allow equipment or software from different vendors to work together or communicate. They allow new, innovative creations to work with older, established services. For example, innovation in Web browsers has been possible in part because new browsers use the established HTML document format and HTTP network protocol, and thus are able to access all existing Web content. Innovation has also proceeded on the other side of the interfaces – in Web servers – and in similar fashion a new server implementation works with old browsers because of the standardized interfaces.



The future of efficient health services requires an interface definition for electronic health data and for mechanisms to allow providers and patients to share data. The system must work as well for individual self-employed physicians as it does for regional healthcare organizations. An interoperable specification will spur diversity and innovation in the creation of software that lets doctors and patients make best use of healthcare data.



A Robust Health Data Infrastructure

Contact: Dan McMorrow — dmcorrow@mitre.org

November 2013

JSR-13-700
















Approved for publication 4/09/2014. Distribution only by sponsor: Director, Health IT
Agency for Healthcare Research and Quality

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McLean, Virginia 22102-7508
(703) 983-6997



JASON recommends that healthcare interoperability be reoriented away from "siloed legacy systems" toward a centrally orchestrated interoperability architecture based on open APIs and advanced intermediary applications and services. In particular, the report recommends an urgent focus on creating a "unifying software architecture" to "migrate" data from these legacy systems to a new centrally orchestrated architecture to better serve clinical care, research, and patient uses. This architecture would be based on the use of "public" APIs for access to clinical documents and discrete data from EHRs, coupled with enablement of increased consumer control of how data is used.



USCDI v1		
Assessment and Plan of Treatment 	Laboratory  <ul style="list-style-type: none"> • Tests • Values/Results 	Provenance *NEW  <ul style="list-style-type: none"> • Author • Author Time Stamp • Author Organization
Care Team Members 	Medications  <ul style="list-style-type: none"> • Medications • Medication Allergies 	Smoking Status 
Clinical Notes *NEW  <ul style="list-style-type: none"> • Consultation Note • Discharge Summary Note • History & Physical • Imaging Narrative • Laboratory Report Narrative • Pathology Report Narrative • Procedure Note • Progress Note 	Patient Demographics  <ul style="list-style-type: none"> • First Name • Last Name • Previous Name • Middle Name (including middle initial) • Suffix • Birth Sex • Date of Birth • Race • Ethnicity • Preferred Language • Address *NEW • Phone Number *NEW 	Unique Device Identifier(s) for a Patient's Implantable Device(s) 
Goals  <ul style="list-style-type: none"> • Patient Goals 	Problems 	Vital Signs  <ul style="list-style-type: none"> • Diastolic Blood Pressure • Systolic Blood Pressure • Body Height • Body Weight • Heart Rate • Respiratory rate • Body Temperature • Pulse oximetry • Inhaled oxygen concentration
Health Concerns 	Procedures 	<ul style="list-style-type: none"> • Pediatric Vital Signs *NEW <ul style="list-style-type: none"> - BMI percentile per age and sex for youth 2-20 - Weight for age per length and sex - Occipital-frontal circumference for children >3 years old
Immunizations 		





HL7® FHIR®

ARGONAUT PROJECT

Technology Vendors

Accenture

Apple

athenahealth

Cerner

Epic

Change Healthcare

MEDITECH

Surescripts

The Advisory Board Company/Optum

Provider Organizations

Beth Israel Deaconess Medical Center

Intermountain Health

Mayo Clinic

Partners Healthcare

SMART at Boston Children's Hospital

Staff (current and past)

Prime contractor: HL7

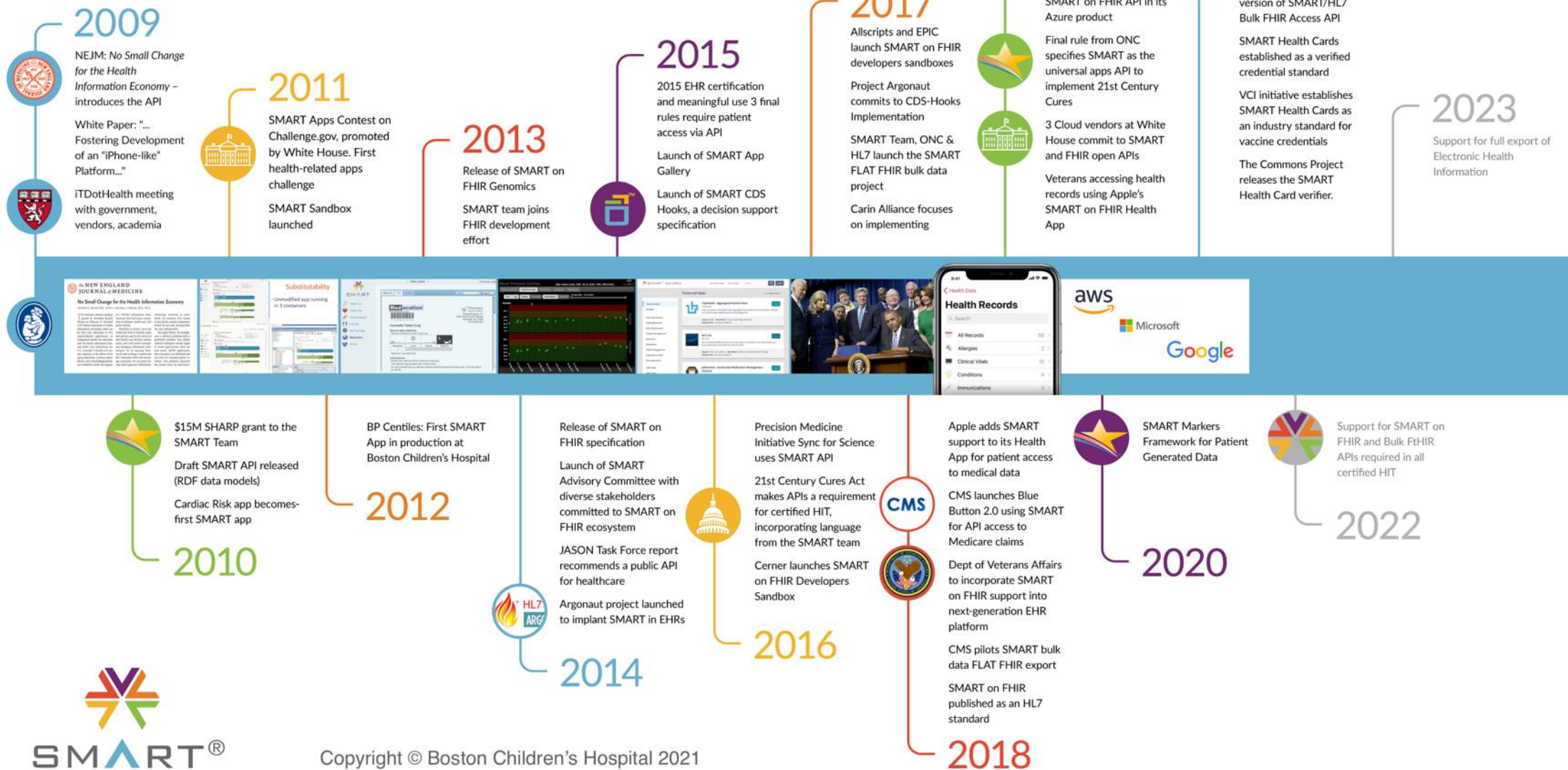
FHIR initiatives: Grahame Grieve, Josh Mandel, Brett Marquard, Eric Haas

OAuth initiatives: Dixie Baker, Josh Mandel

Project Management: Micky Tripathi, Jennifer Monahan



A SMART Evolution



2009

NEJM: *No Small Change for the Health Information Economy* - introduces the API
 White Paper: "...Fostering Development of an "iPhone-like" Platform..."
 iTDotHealth meeting with government, vendors, academia

2011

SMART Apps Contest on Challenge.gov, promoted by White House. First health-related apps challenge
 SMART Sandbox launched

2013

Release of SMART on FHIR Genomics
 SMART team joins FHIR development effort

2015

2015 EHR certification and meaningful use 3 final rules require patient access via API
 Launch of SMART App Gallery
 Launch of SMART CDS Hooks, a decision support specification

2017

Allscripts and EPIC launch SMART on FHIR developers sandboxes
 Project Argonaut commits to CDS-Hooks Implementation
 SMART Team, ONC & HL7 launch the SMART FLAT FHIR bulk data project
 Carin Alliance focuses on implementing

2019

CMS commits to SMART Bulk Data specs
 Microsoft launches SMART on FHIR API in its Azure product
 Final rule from ONC specifies SMART as the universal apps API to implement 21st Century Cures
 3 Cloud vendors at White House commit to SMART and FHIR open APIs
 Veterans accessing health records using Apple's SMART on FHIR Health App

2021

Information blocking rules take effect
 Epic launches initial version of SMART/HL7 Bulk FHIR Access API
 SMART Health Cards established as a verified credential standard
 VCI initiative establishes SMART Health Cards as an industry standard for vaccine credentials
 The Commons Project releases the SMART Health Card verifier.

2023

Support for full export of Electronic Health Information



\$15M SHARP grant to the SMART Team
 Draft SMART API released (RDF data models)
 Cardiac Risk app becomes first SMART app

2010

BP Centiles: First SMART App in production at Boston Children's Hospital

2012

Release of SMART on FHIR specification
 Launch of SMART Advisory Committee with diverse stakeholders committed to SMART on FHIR ecosystem
 JASON Task Force report recommends a public API for healthcare
 Argonaut project launched to implant SMART in EHRs

2014



Precision Medicine Initiative Sync for Science uses SMART API
 21st Century Cures Act makes APIs a requirement for certified HIT, incorporating language from the SMART team
 Cerner launches SMART on FHIR Developers Sandbox

2016



Apple adds SMART support to its Health App for patient access to medical data
 CMS launches Blue Button 2.0 using SMART for API access to Medicare claims
 Dept of Veterans Affairs to incorporate SMART on FHIR support into next-generation EHR platform
 CMS pilots SMART bulk data FLAT FHIR export
 SMART on FHIR published as an HL7 standard

2018



SMART Markers Framework for Patient Generated Data

2020



Support for SMART on FHIR and Bulk FHIR APIs required in all certified HIT

2022



Leveraging FHIR: **beta** Pain Management tab

SHELLEY, FRAN
09/03/1949 - 72 Yrs - Female

Chartbook

- Clinical Summary
- Encounters
- Documents
- Allergies
- Conditions
- Medications
- Immunizations
- Lab Results
- Diagnostic Studies
- Demographics

Diagnoses

Description	Code	Source	Status	Last Updated	Details
History of colon polyps	Z86.010	LIFESPAN	Active		
History of colon polyps [Z86.010]	History of colon polyps [Z86.010]	LIFESPAN	Active		
Low back pain		LIFESPAN	Active		
Seizures	97	LIFESPAN	Active		
Seizure	R56.9	LIFESPAN	Active		
Seizures	97	LIFESPAN	Active		
Headache	52	LIFESPAN	Active		

Lab Results

- Order
- BASIC METABOLIC PANEL
- Biological Markers and Adulterants
- Opiates Profile by EIA (P177)
- Ethylglucuronide by EIA
- Bas Metab 2000 Prl SerPI
- Glumeter
- Comprehensive Metabolic
- Bas Metab 2000 Prl SerPI

Back to: Patient Search Results >

SHELLEY, FRAN
09/03/1949 - 72 Yrs - Female

Chartbook

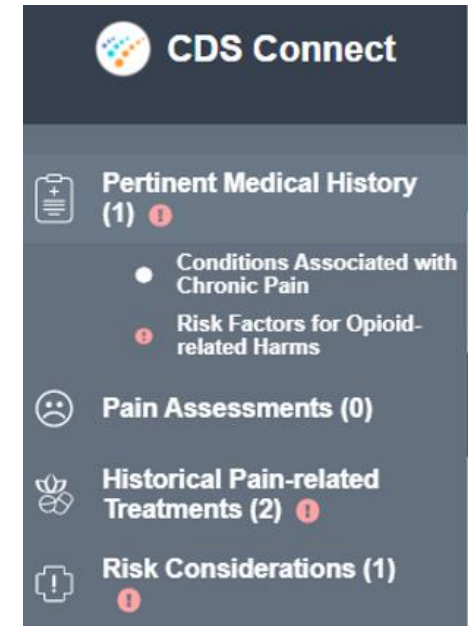
- Clinical Summary
- Encounters
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- Lab Results
- Diagnostic Studies
- Demographics
- Pain Management



What is the Pain Management Summary?

An Off-the-Shelf App that:

1. Leverages contemporary HIT approaches for integration
 - Open-source “CDS Connect” app inside Viewer
 - SMART-on-FHIR
2. Summarizes relevant CurrentCare data for pain management
3. Facilitates shared decision making for chronic pain



For more info, visit:

RIQI.org/PainSummary



Sample 1: Patient does not match criteria

Home [Back to: Patient Search Results](#) > CURRENTCARE VIEWER

SHELLEY, FRAN
09/03/1949 - 72 Yrs - Female

FRAN SHELLEY
72 YRS FEMALE

Factors to Consider in Managing Chronic Pain

This patient does not meet the applicable criteria.

WARNING: This summary applies to patients 18 years or older who meet at least one of the following criteria:

- Has a condition likely to indicate chronic pain
- Has an active opioid medication in the last 180 days
- Has an active adjuvant analgesic medication in the last 180 days

Please see the [CDC Guideline for Prescribing Opioids for Chronic Pain](#) for additional information and prescribing guidance.

Development Tools [show/hide]
These development tools are for troubleshooting issues and intended to be used by technical support.

Chartbook

- Clinical Summary
- Encounters
- Documents
- Allergies
- > Conditions
- > Medications
- Immunizations
- Lab Results
- Diagnostic Studies
- > Demographics
- Pain Management**

CDS Connect



Sample 2: Patient matches criteria

Back to: Patient Search Results > CURRENTCARE VIEWER andrea

TEST, Sixteen
03/13/1945 - 77 Yrs - Male

4 Total Entries 8 Total Flags

Factors to Consider in Managing Chronic Pain

TAKE NOTICE: This summary is not intended for patients who are undergoing **end-of-life care** (hospice or palliative) or **active cancer treatment**.

CDS Connect

- Pertinent Medical History (1)**
 - Conditions Associated with Chronic Pain
 - Risk Factors for Opioid-related Harms
- Pain Assessments (0)**
- Historical Pain-related Treatments (2)**
- Risk Considerations (1)**

Pertinent Medical History (1)

Conditions Associated with Chronic Pain

no entries found

Risk Factors for Opioid-related Harms

Name	Status	Start	End	Recorded
65 years or older	active			

Pain Assessments (0)

Sample 2: continued

Back to: Patient Search Results > CURRENTCARE VIEWER andrea

TEST, Sixteen
03/13/1945 - 77 Yrs - Male

Chartbook

- Clinical Summary
- Encounters
- Documents
- Allergies
- > Conditions
- > Medications
- Immunizations
- Lab Results
- Diagnostic Studies
- > Demographics
- Pain Management

Pertinent Medical History (1)

Pain Assessments (0)

Historical Pain-related Treatments (2)

- Opioid Medications
- Non-Opioid Medications
- Non-Pharmacologic Treatments
- Stool Softeners and Laxatives

Risk Considerations (1)

Historical Pain-related Treatments (2)

Opioid Medications

Name	Type	Start	End
Oxycodone-Acetaminophen 5 Mg-325 Mg Tablet	Request	2022-Feb-14	
12 HR Oxycodone Hydrochloride 60 MG Extended Release Oral Tablet	Request	2022-Jan-27	

Non-Opioid Medications

no entries found

Non-Pharmacologic Treatments

no entries found

Stool Softeners and Laxatives

no entries found

What information is currently included?

Factors to Consider in Managing Chronic Pain

Section	In Pain Summary in CurrentCare Viewer	In Other Tabs in CurrentCare Viewer	Not Available in CurrentCare Viewer
Pertinent Medical History	<ul style="list-style-type: none"> Risk Factor: Age > 65 	<ul style="list-style-type: none"> Conditions Associated with Chronic Pain Other Risk Factors 	
Pain Assessments			<ul style="list-style-type: none"> Pain Assessments
Historical Pain-Related Treatments	<ul style="list-style-type: none"> Active Opioid & Non-Opioid Pain-Related Meds & Laxatives 	<ul style="list-style-type: none"> Historic Opioid & Non-Opioid Pain-Related Meds & Laxatives 	<ul style="list-style-type: none"> Non-Pharmacologic Treatments
Risk Considerations	<ul style="list-style-type: none"> Urine Drug Screens Active Benzodiazepine & Naloxone Meds 	<ul style="list-style-type: none"> Historic Benzodiazepine & Naloxone Meds 	<ul style="list-style-type: none"> Most Recent MME

For more info, visit:

RIQI.org/PainSummary



Counts, Flags & Tooltips

Counts & Flags

5 Total Entries	4 Total Flags
------------------------	----------------------

Urine Drug Screens ⓘ

no entries found

Benzodiazepine Medications ⓘ

Name ⌵

ⓘ LORazepam (ATIVAN) 0.5 MG tablet

Flags

Hover for Explanations

Benzodiazepine Medications ⓘ

Name ⌵

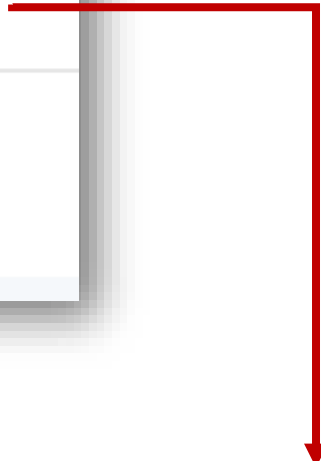
ⓘ LORazepam (ATIVAN) 0.5 MG tablet

flag: Evidence of Benzodiazepine medication

Tooltips

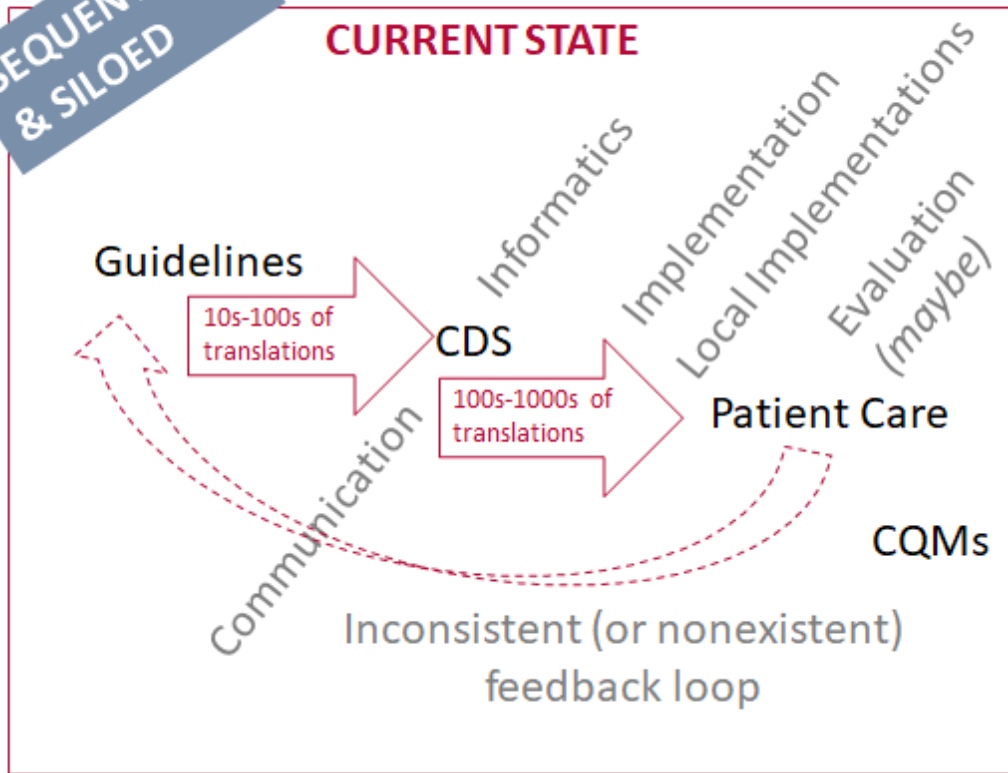
Click for Inclusion Criteria

<u>Name</u> ⌵	<u>Status</u> ⌵	<u>Lookback</u> ⌵
Benzodiazepine medication statements and orders	any	2 years

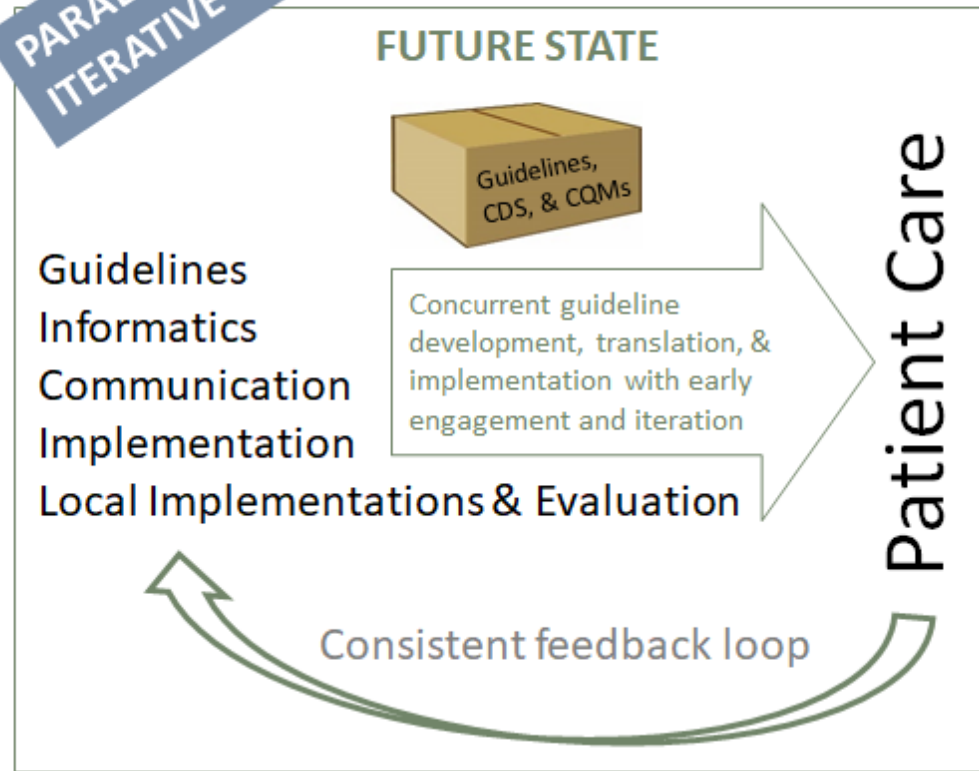


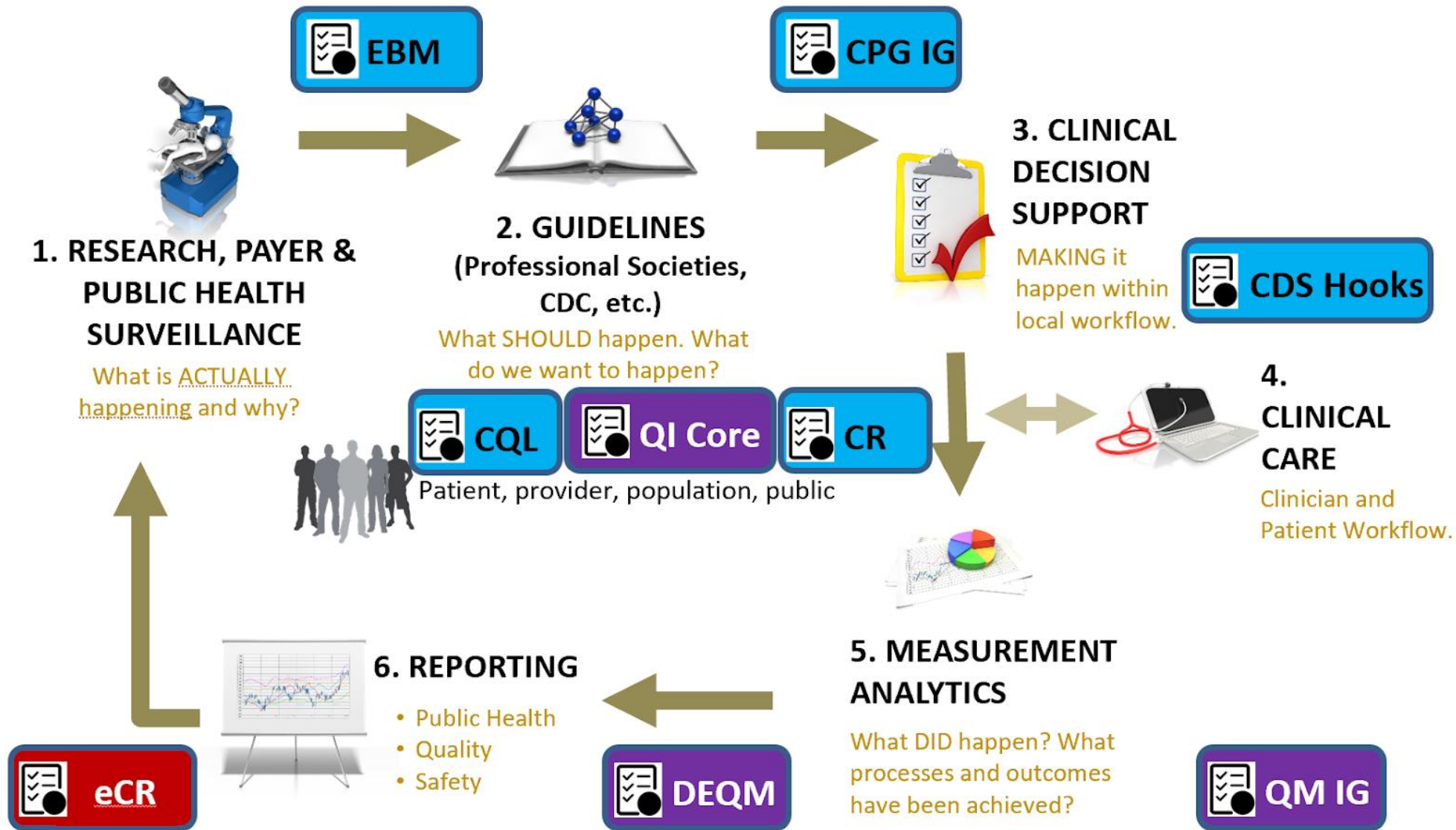


SEQUENTIAL & SILOED



PARALLEL & ITERATIVE





THANK YOU

[HTTPS://WWW.RIQI.ORG](https://www.riqi.org)

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