Leading Edge Acceleration Projects in Health IT

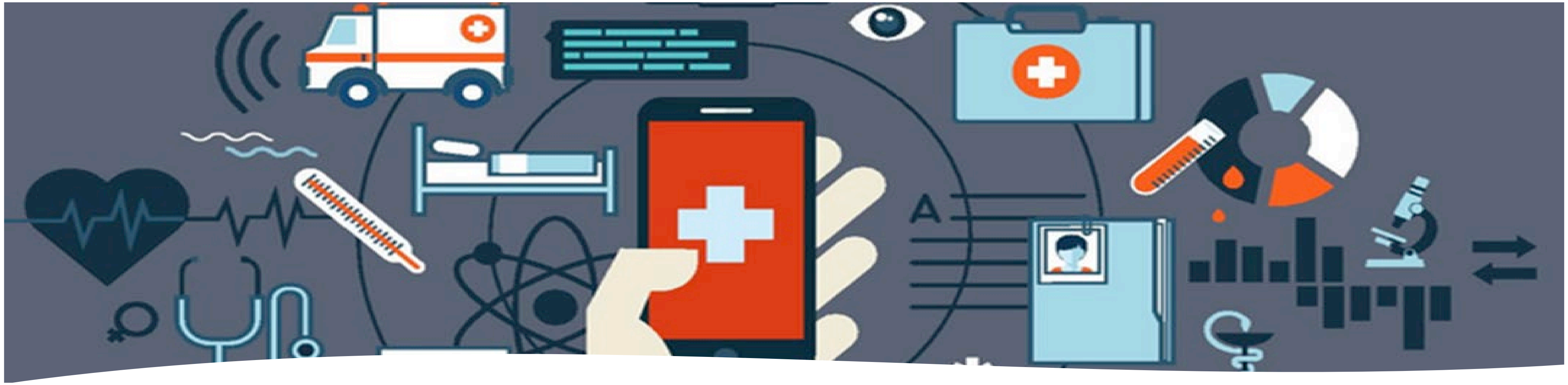
ONC Annual Meeting

January 28th 2020

The Office of the National Coordinator for Health Information Technology

The Office of the National Coordinator for Health Information Technology

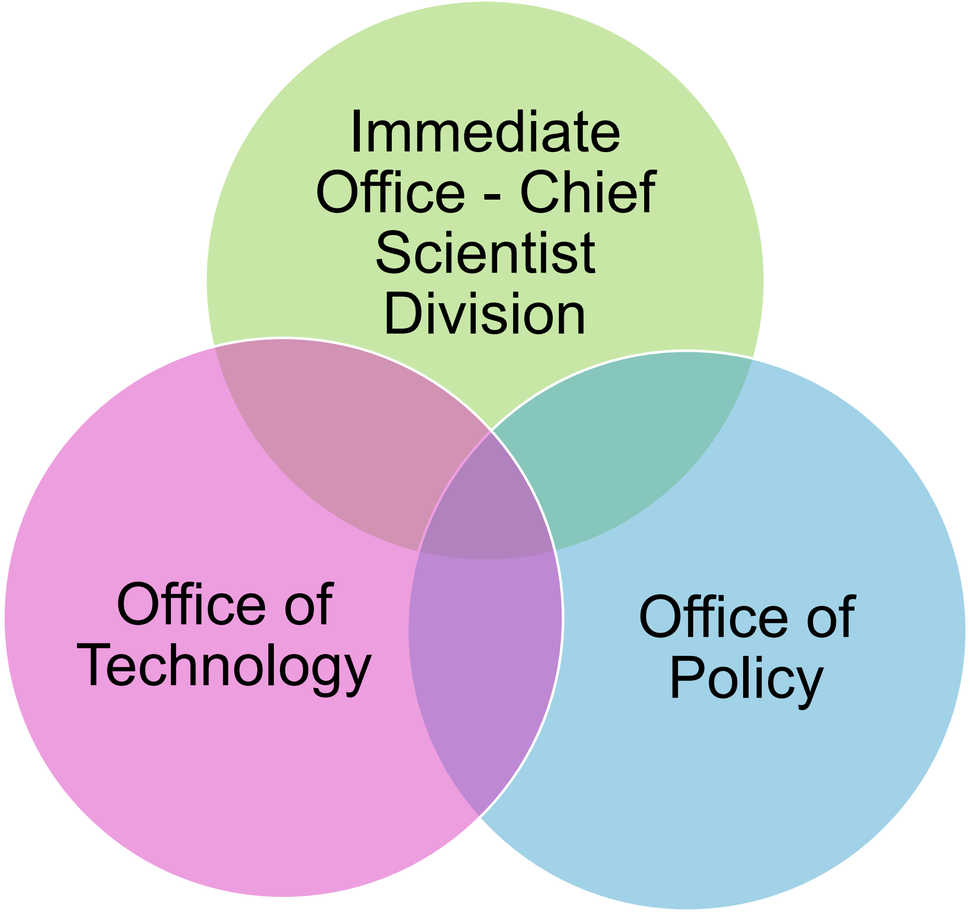
LEAP in Health IT



Addresses well-documented and emerging challenges inhibiting the development, use and/or advancement of well designed, interoperable health IT scalable across the healthcare industry.

https://www.healthit.gov/topic/onc-funding-opportunities/leading-edge-acceleration-projects-leap-health-information

ONC Coordination for LEAP in Health IT Across Offices



The Office of the National Coordinator for Health Information Technology

LEAP Focus Areas

2018

- Expand population-level data-focused APIs
- Advance clinical knowledge at point-of-care

2019

- Implement HL7® FHIR® Consent Resource
- Enhanced patient engagement technologies for care and research

2020

To Be Determined

Significantly enhance the performance of health IT solutions for care and research

LEAP 2018 Funded Projects

Boston Children's Hospital

Pop Health on FHIR

A SMART Approach to Universal Healthcare Reporting

Bulk Data Export

MedStar Health
National Center for Human Factors in Healthcare

Mobilizing a Million Hearts - Leveraging Health IT Architecture to Advance Clinical Knowledge and Care Coordination

LEAP 2019 Funded Projects

San Diego Health Connect — Better Information • Better Care™

Scalable Consent Framework for the Advancement of Interoperability with FHIR based APIs

The University of Texas at Austin — UT Health Austin

FHIRedApp: An API-based Patient Engagement Platform for the 21st Century

SAN DIEGO HEALTH CONNECT

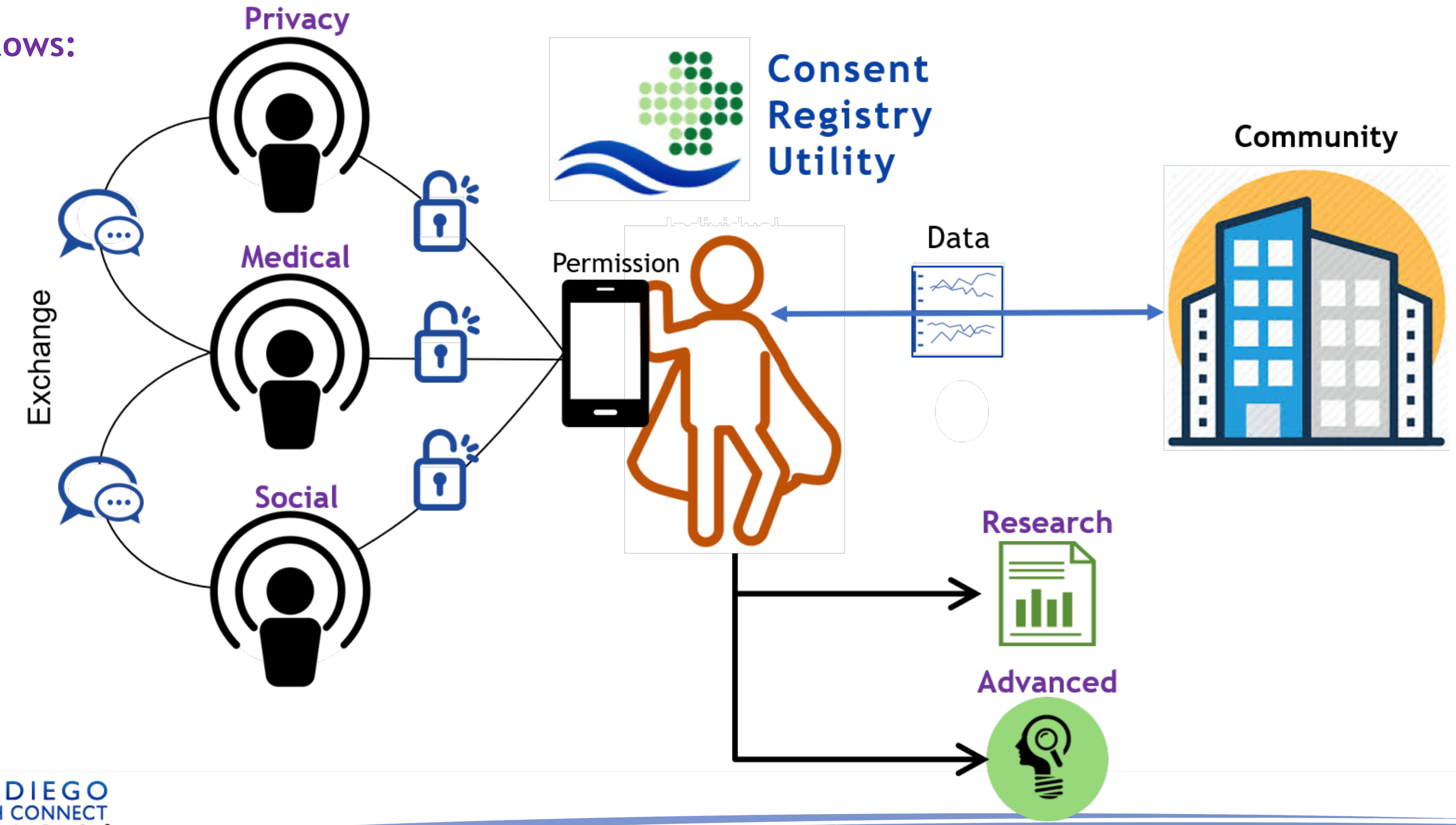
Better Information • Better Care™

The Problem

Today, ***facilities***, not humans, determine what information is shared with whom, when and under what conditions.

The Solution

5 Workflows:



The FHIR Consent Solution

For each use case will consider applicable CA and Federal laws and regulations governing the form of the:

- Consent
- Contents
- Period of effectiveness
- Description of the info. the consent covers
- Purpose(s) for which the information may be disclosed
- Any restrictions on disclosure
- Timeframe the consent is valid
- Methods for tracking expiration of the consent(or early termination)
- The ability to document additional information necessary to permit the individual to make an informed decision before giving consent

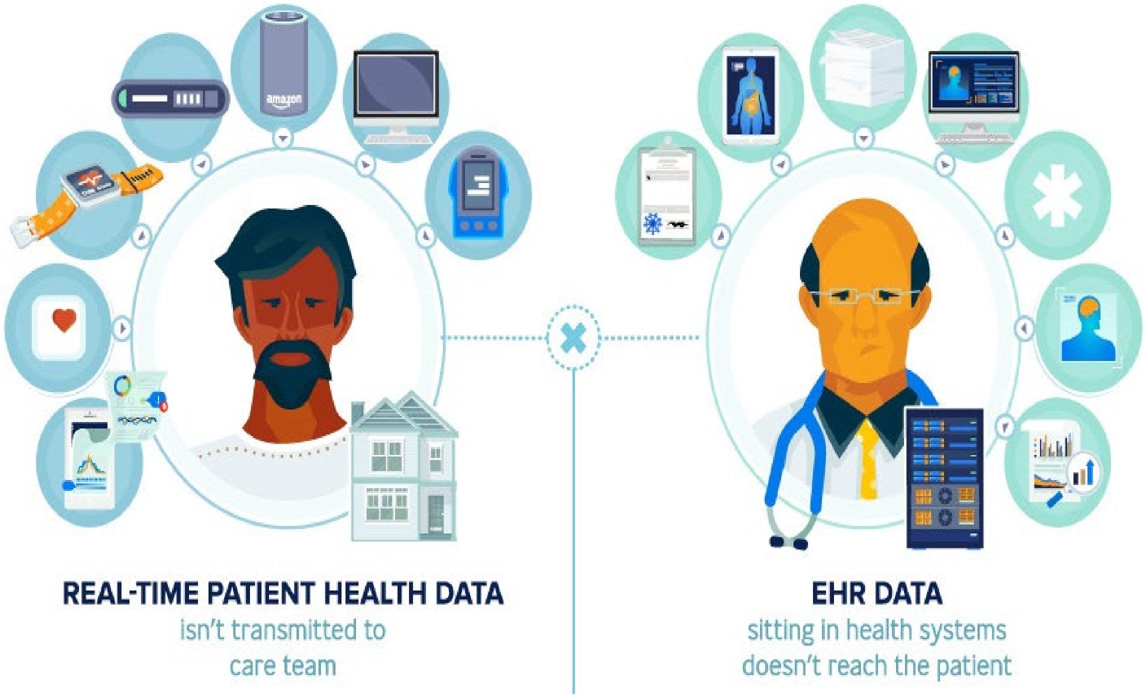
The University of Texas at Austin

UT Health Austin

The Problem

Patient's ability to access, share, and contribute relevant healthcare data for medical care and research is limited

Patients and healthcare ecosystems have been largely disconnected for too long.



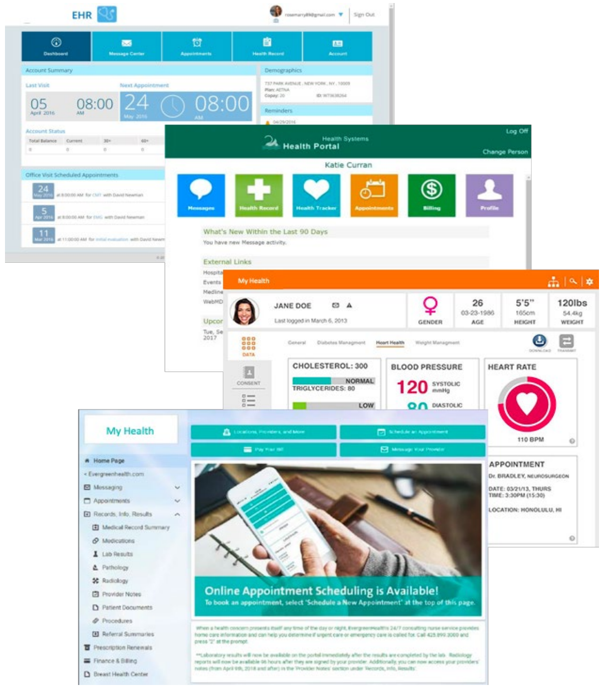
Patient engagement technologies (PET) are evolving too quickly for patients and providers to keep up with them

Inconsistent Design
(lack standardization)

Varied Functionality
(different info needed)

Multiplicity
(each provider has one)

Continuously Changing
(pace of innovation)

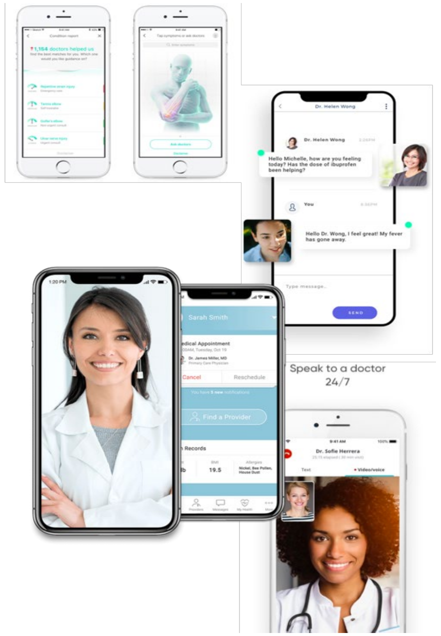


The Solution

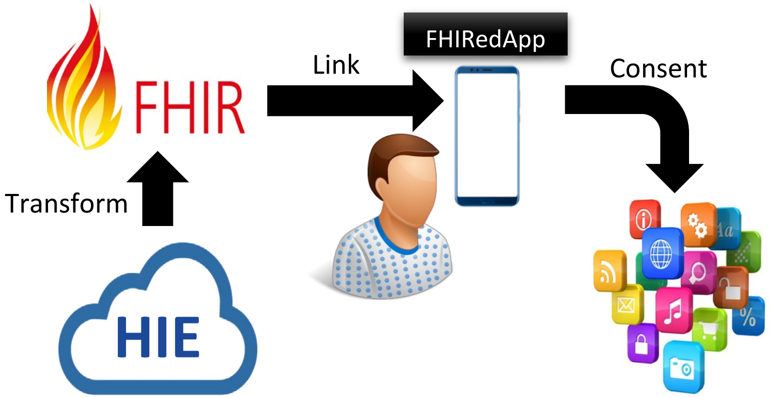
Design, Develop, and Demonstrate patient engagement platform (**FHIRedApp**) to make it **easy** for patients to access and provide access to their data

Healthcare Systems

Vulnerable and marginalized populations



3rd party Apps and service providers



Community Engagement

- CAB -Community Strategy Team
- CST - Community Advisory Board
- CES - Community Engagement Studios

Use-centered Design

- HIL - Human information interaction Lab
- Generative research phase
- User evaluation phase

Technical Solution

- Health Information Exchange (HIE) and Patient Reported Outcomes (PRO) data transformed to FHIR
- Use of FHIR APIs
- Privacy Preserving Record Linkage
- Aunt Bertha (social care) + StudyApp (research)

Rethink COMMUNITY

Rethink CARE

Rethink HEALTH

Rethink Everything

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@Akhurshid1

MedStar Health

National Center for Human Factors in Healthcare

MedStar Health
National Center for
Human Factors in Healthcare

ONC LEAP:
Mobilizing a Million Hearts:
Leveraging Health IT Architecture to Advance Clinical Knowledge and Care Coordination

Kristen Miller, DrPH, CPPS

Scientific Director, National Center for Human Factors in Healthcare, MedStar Health
Associate Professor of Emergency Medicine, Georgetown University School of Medicine
Affiliate Faculty, Innovation Center for Biomedical Informatics, Georgetown Medical Center

Project Aims

ONC Leap addresses well-documented and fast emerging challenges inhibiting the development, use, and/or advancement of well-designed interoperable health information technology. The purpose of the project is to:

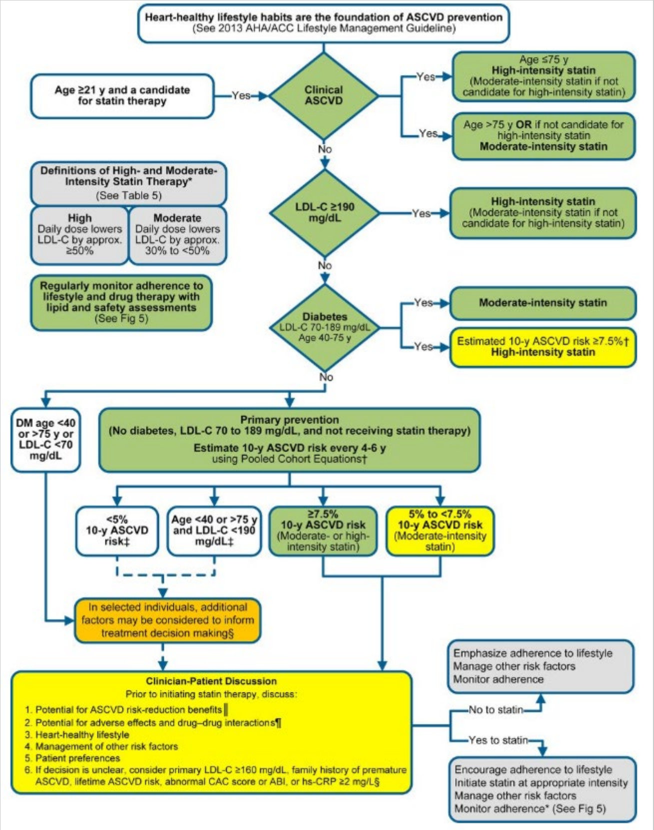
1. Support evidence-based clinical cognitive support that prompts management and preventative care.

2. Serve as proof-of-concept to transform risk calculators into active surveillance tools leading to guideline based workflow support through SMART on FHIR technology.

3. Leverage the technology to facilitate communication and coordination within providers, and between providers and patients as engaged members of their care with reduced clinical burden.

Background: Million Hearts

- Cardiovascular disease remains the leading cause of death in the US.
- The American Heart Association and American College of Cardiology recommend use of the Atherosclerotic Cardiovascular Disease (ASCVD) risk estimator: evaluates 10-year and lifetime risk for ASCVD.
- Variables include: age, race, total and high-density lipoprotein (HDL) cholesterol levels, low level lipoprotein (LDL) cholesterol, systolic blood pressure, use of statin therapy, antihypertensive medication, use of aspirin therapy, smoking status, and diabetes status.



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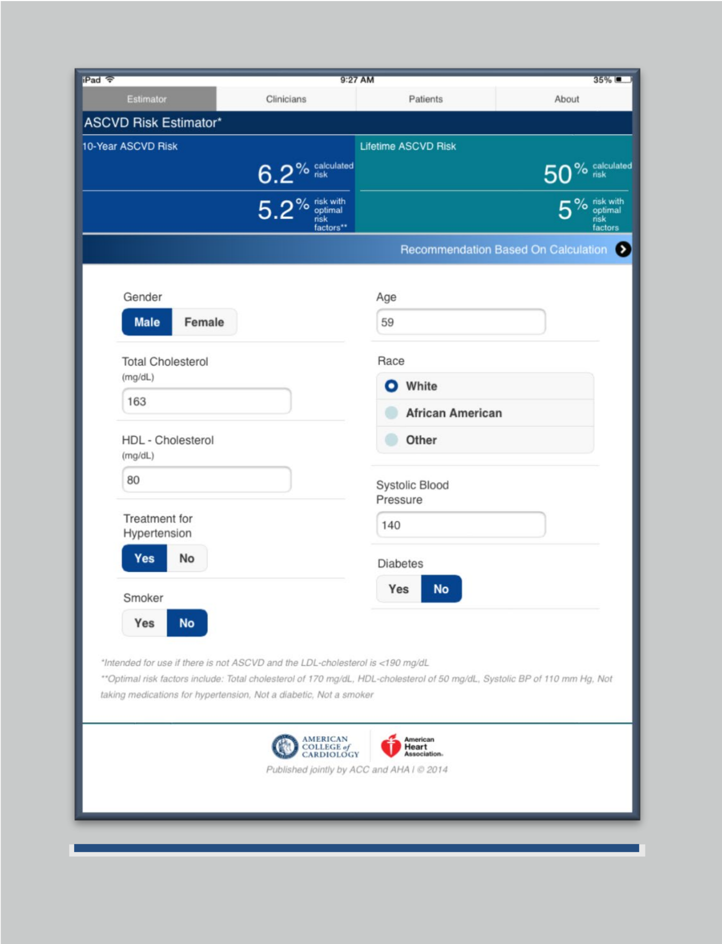
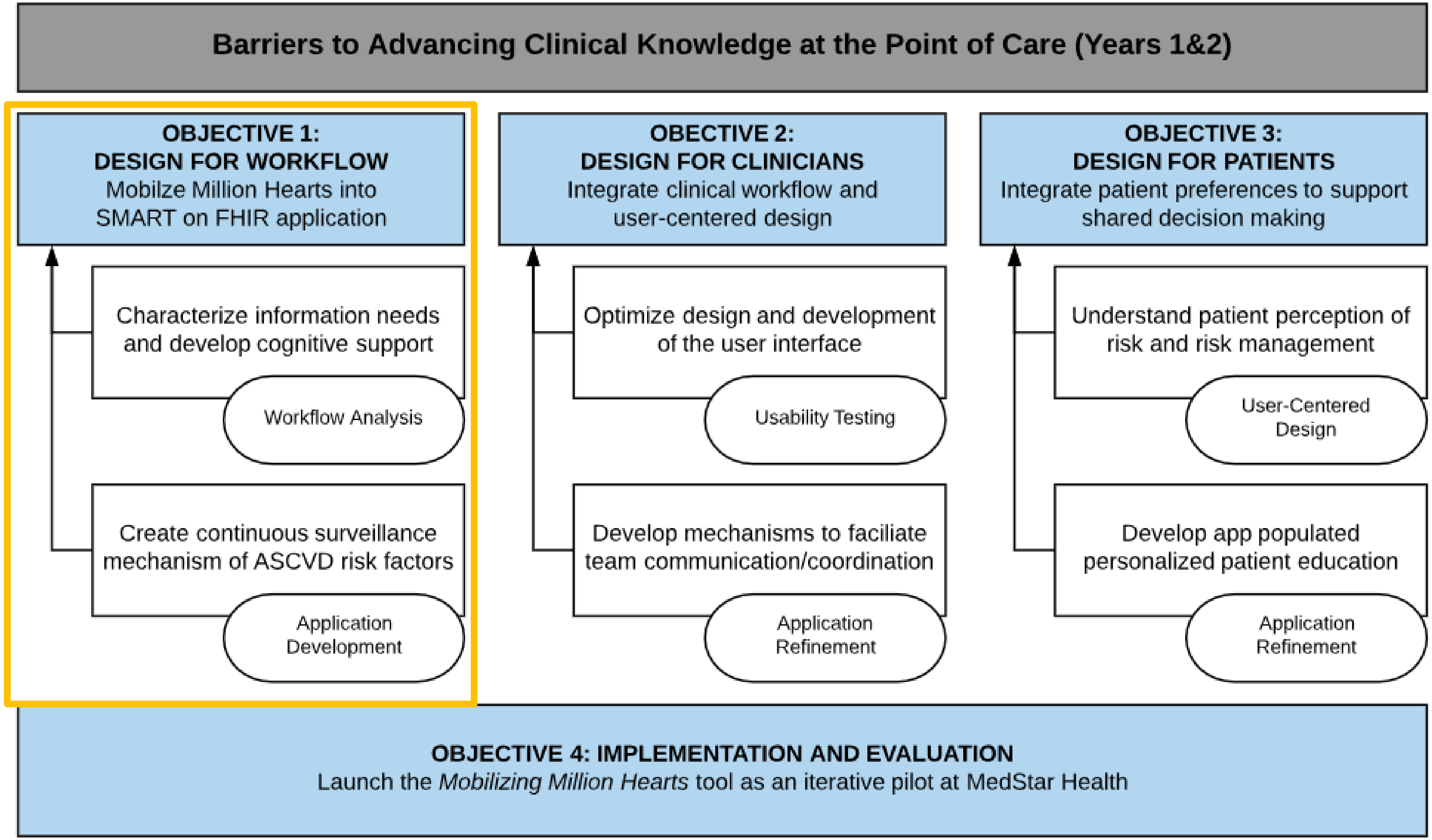
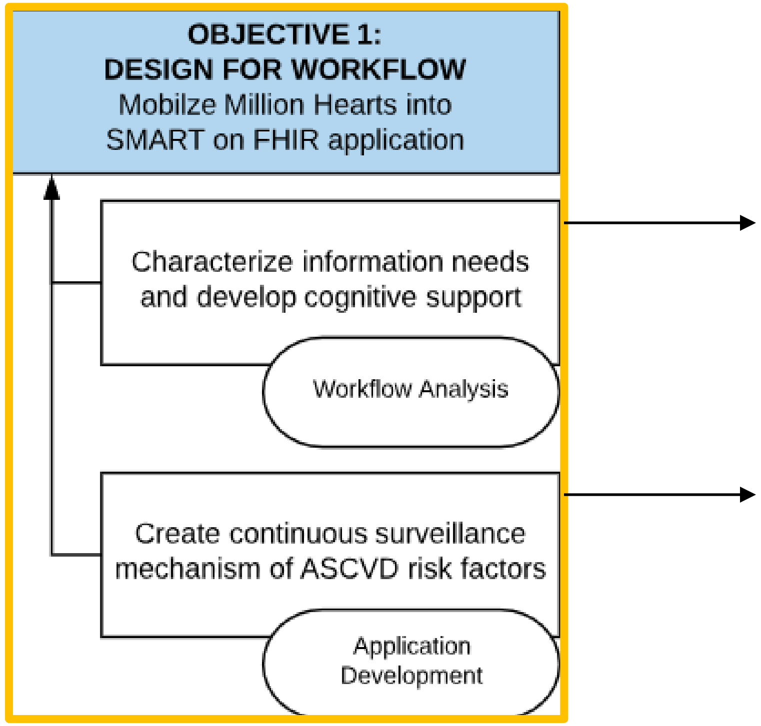
Million Hearts Optimization



Our research addresses the following:

- Optimizing health IT tools that currently exist: removing the burden of active surveillance, pushing technology to bring relevant data to the clinician
- Reducing time required to integrate clinical guidelines at the point of care by leveraging different technological advancements in a single solution
- Developing solutions that are not product centric – our solution sits outside of the EHR and does not rely on the vendor to support modifications
- Developing solutions that are truly integrated into clinician and patient workflow
- Developing scalable solutions that change the way we think about patient data and decision support (multi-layered support and visualizations)


Barriers to Advancing Clinical Knowledge at the Point of Care (Years 1&2)
OBJECTIVE 1:
DESIGN FOR WORKFLOW
Mobilze Million Hearts into SMART on FHIR application
Characterize information needs and develop cognitive support
Workflow Analysis
Create continuous surveillance mechanism of ASCVD risk factors
Application Development
OBECTIVE 2:
DESIGN FOR CLINICIANS
Integrate clinical workflow and user-centered design
Optimize design and development of the user interface
Usability Testing
Develop mechanisms to faciliate team communication/coordination
Application Refinement
OBJECTIVE 3:
DESIGN FOR PATIENTS
Integrate patient preferences to support shared decision making
Understand patient perception of risk and risk management
User-Centered Design
Develop app populated personalized patient education
Application Refinement
OBJECTIVE 4: IMPLEMENTATION AND EVALUATION
Launch the Mobilizing Million Hearts tool as an iterative pilot at MedStar Health



- Systematic literature review initiated of how cardiovascular risk is measured and communicated across various CDS tools.
- Stakeholder interviews and clinical observations to conceptualize and develop thorough workflow analysis.

- Detailed technical specifications mapping desired prototype functions to features to technical capabilities. These specifications were developed by the research team and delivered to the technical team to guide prototyping.
- Finalizing of visual mockups to illustrate UX needs and to incorporate technical specifications into a visual reference for the technical team to guide prototyping.

Technical Specifications (sample)

Features of Dynamic Risk Educator		
Function	**Feature**	**Tech**
Calculate & Recalculate scores	• Auto populate. ○ Auto populate risk score and patient values into dynamic risk calculator. ○ Option for MD to free type and edit value. ○ Option for MD to use a slider bar within validated ranges to change values. • Auto populate the Yes/No boxes for hypertension treatment, on a statin, etc. have ability when opened.	FHIR and CCL Call, MSH FHIR and UX
Display	• Clear indication that this dynamic calculator does NOT write to record. • Consider reference ranges tailored to individuals' demographic baseline and comorbidities. • Consider different graphic representations of risk besides bar.	*MPage with custom component FHIR
Date stamp	• Show time frame of when data was captured next to each lab value. • Hover over for specific date.	*FHIR
Patient Portal	• Explore integration potential.	...
Educational Engagement	• Discharge summaries. • Links to education resources (diet, exercise, smoking cessation programs, etc.).	...
Risk Level Indicators	• Explore risk bar to provide context and "best case" scenario.	App Programming

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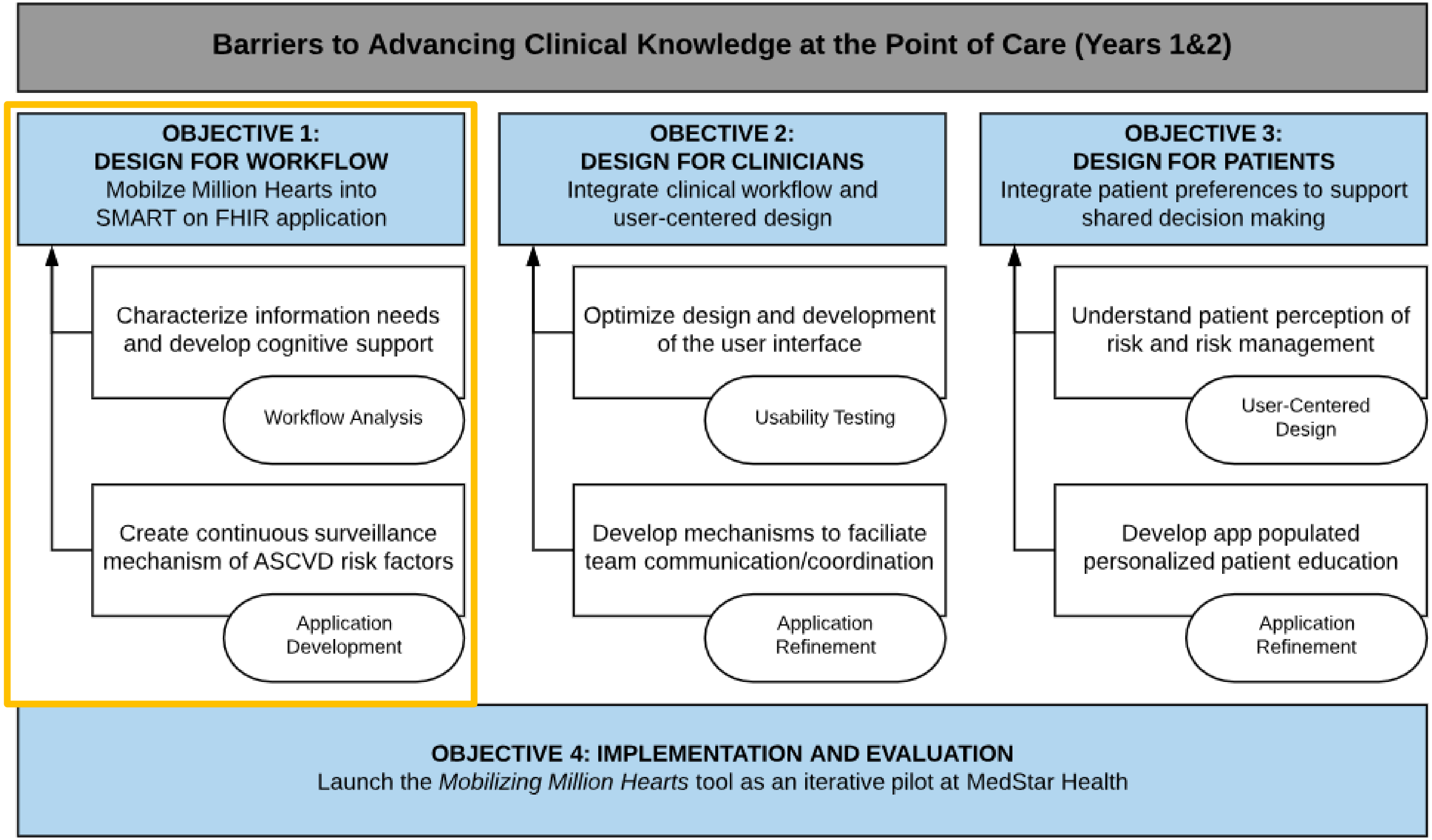
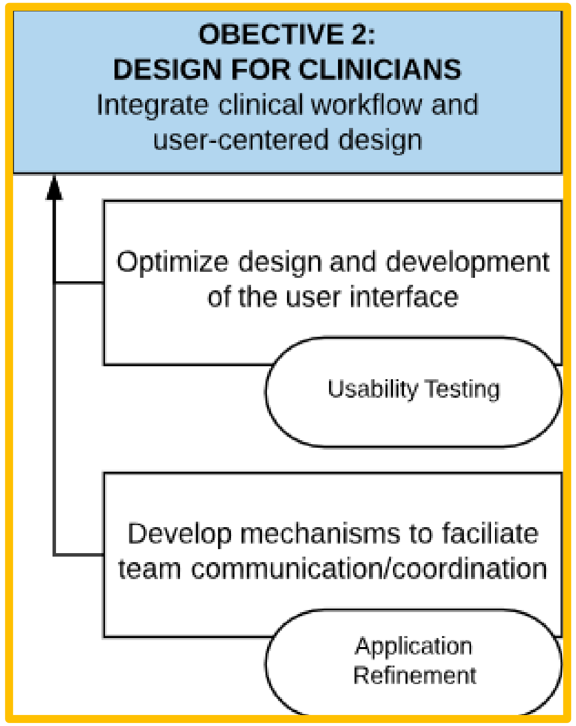
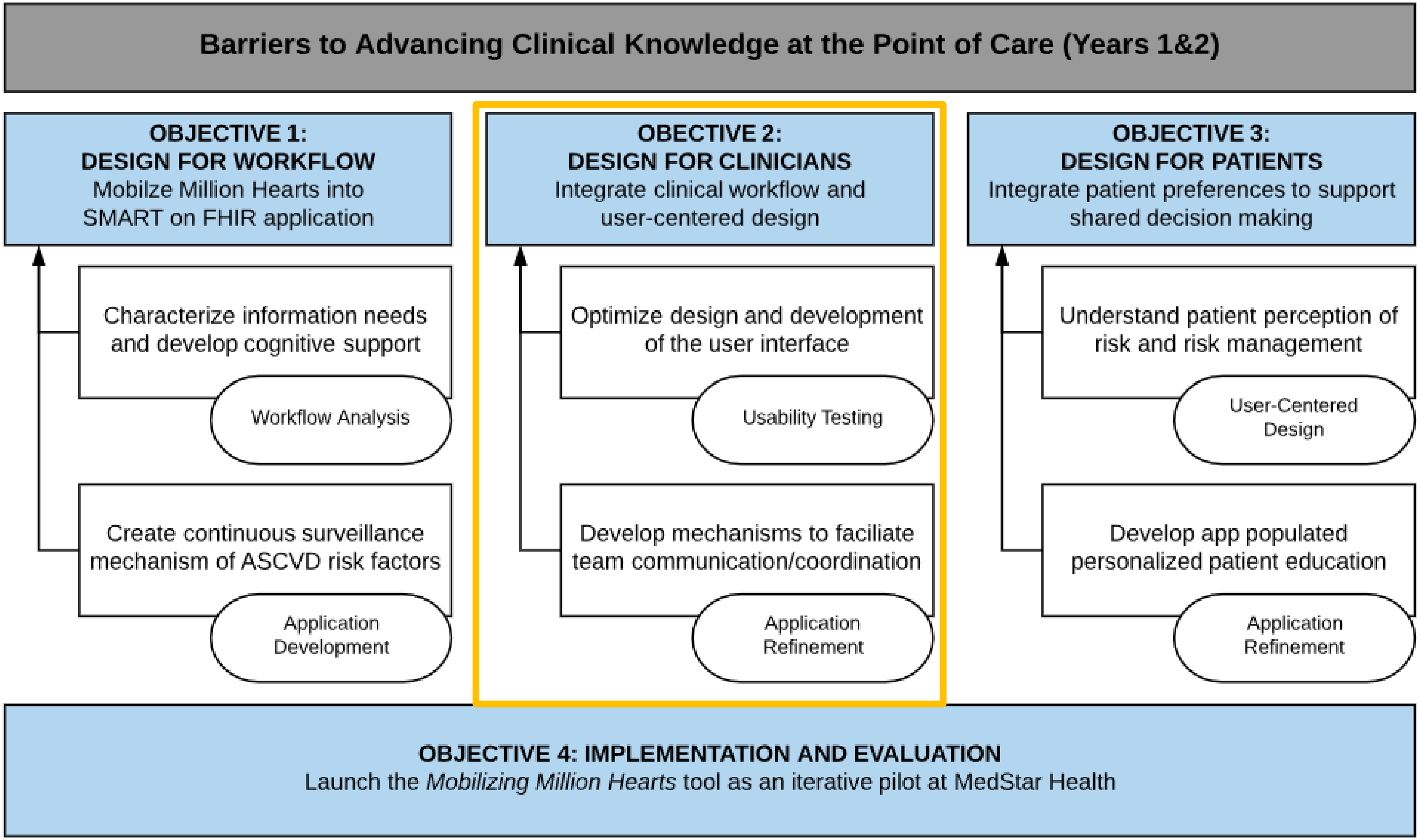




Usability Testing Methods:

- Stakeholder Interactions with Prototype and Interview
  - 8 Cardiologists
  - 7 Primary Care Physicians
  - Eye Tracking
- Data Analysis
  - Qualitative Coding
  - Video Analysis
- Synthesis
  - Revision of prototype functions and specifications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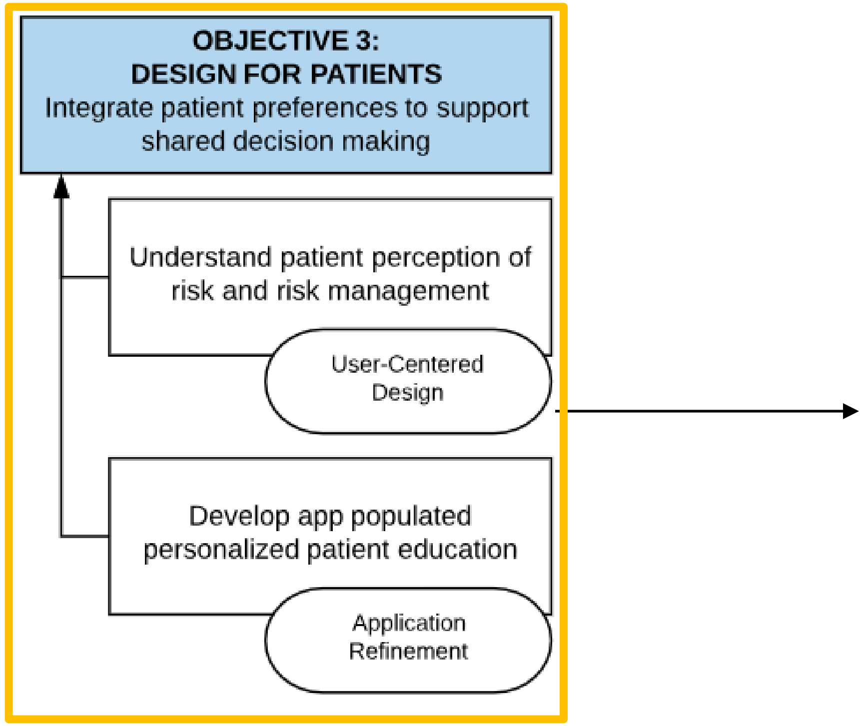
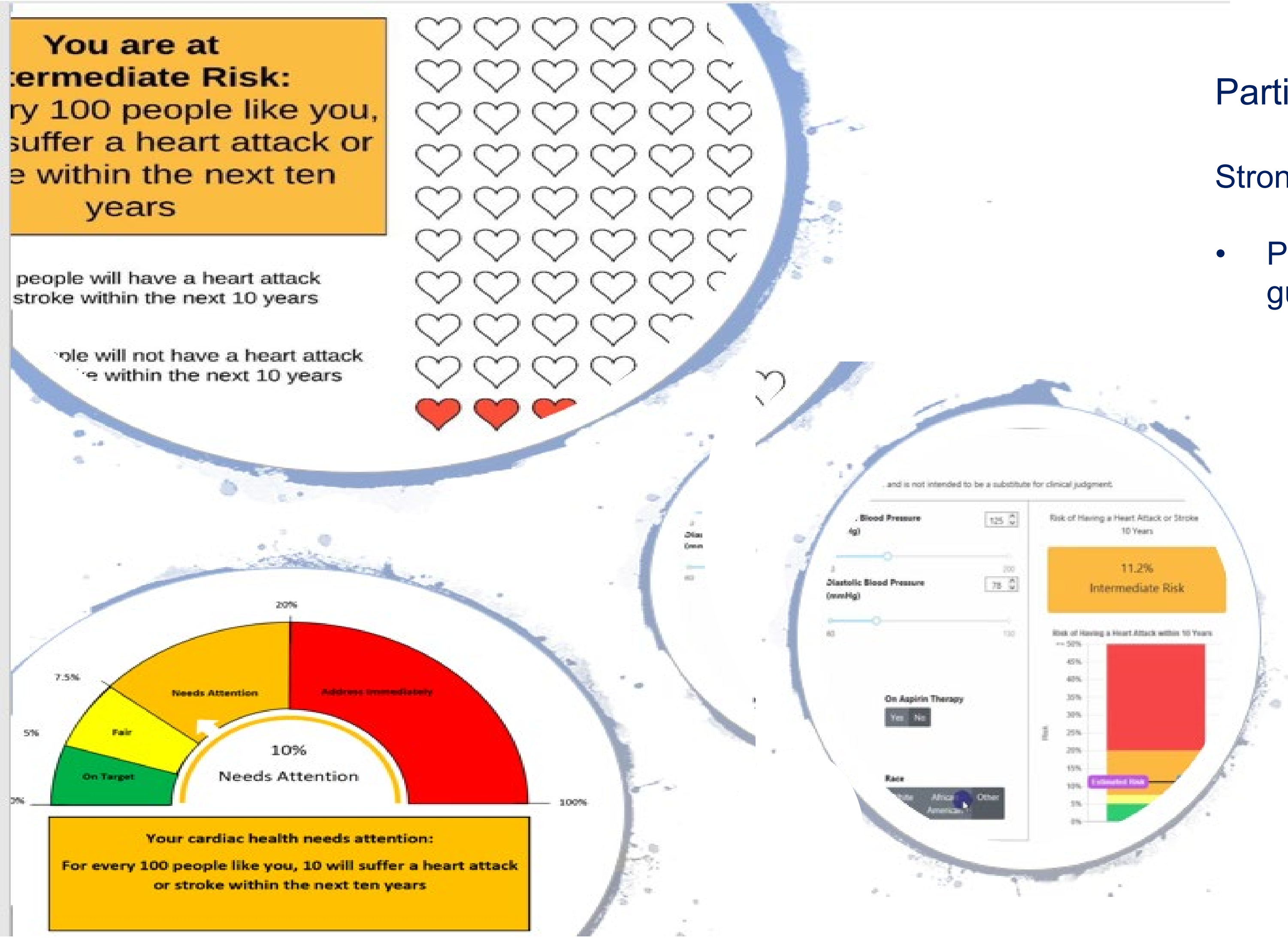


User-Feedback Methods

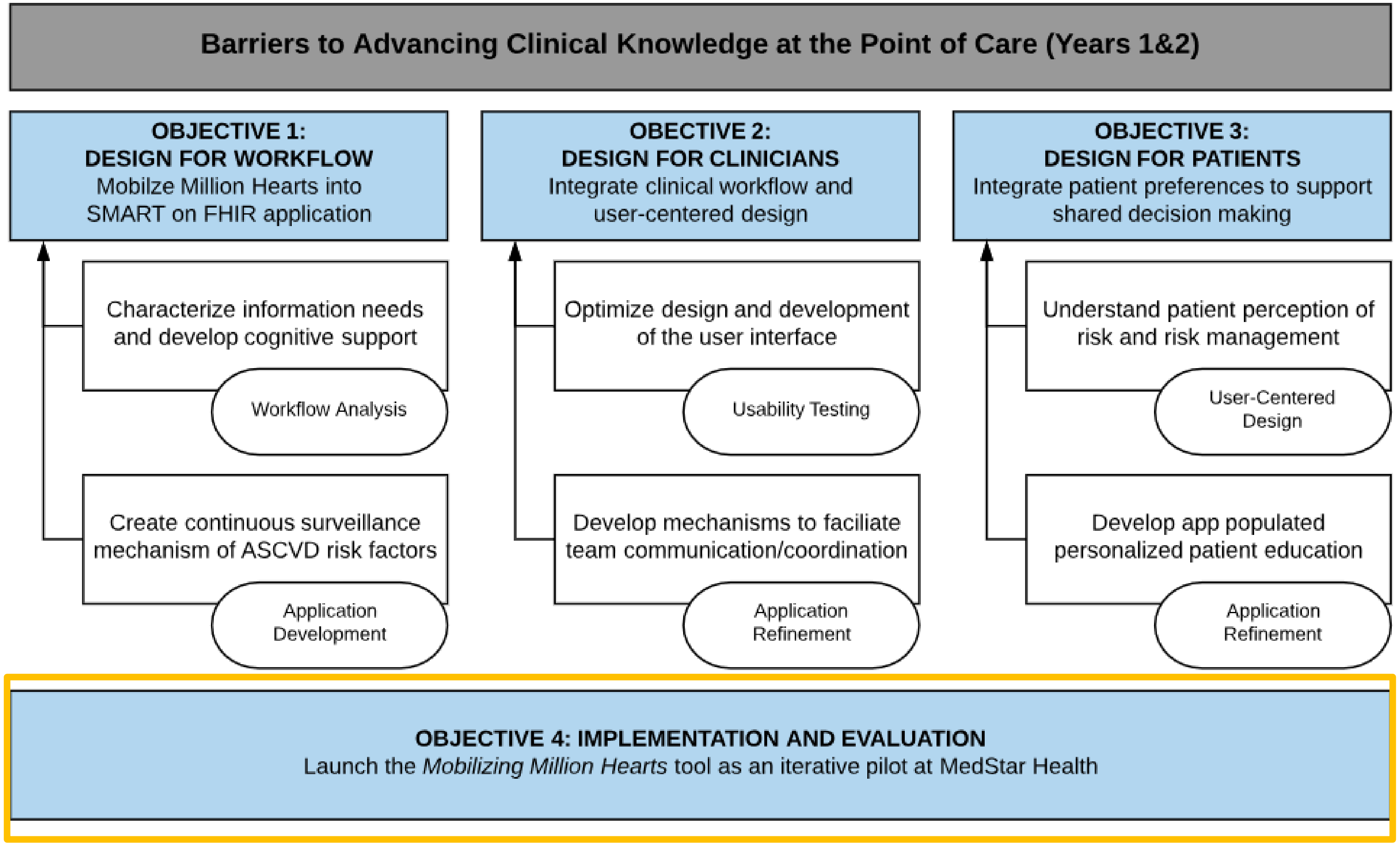
- Stakeholder Interactions with Different Prototypes and Interview
  - 9 Patients
  - 3 Prototypes
- Interviews focused on patient understanding and engagement with their cardiovascular health
- Data Analysis
  - Qualitative Coding
- Synthesis
  - Revision of prototype functions and specifications



Participant Feedback

Strong preference for:

- Personalized displays that provide actional steps and guidance aligning with their care plan
    - Translating numeric risk into words (qualitative interpretation of output)
        - Access to tools outside of care visit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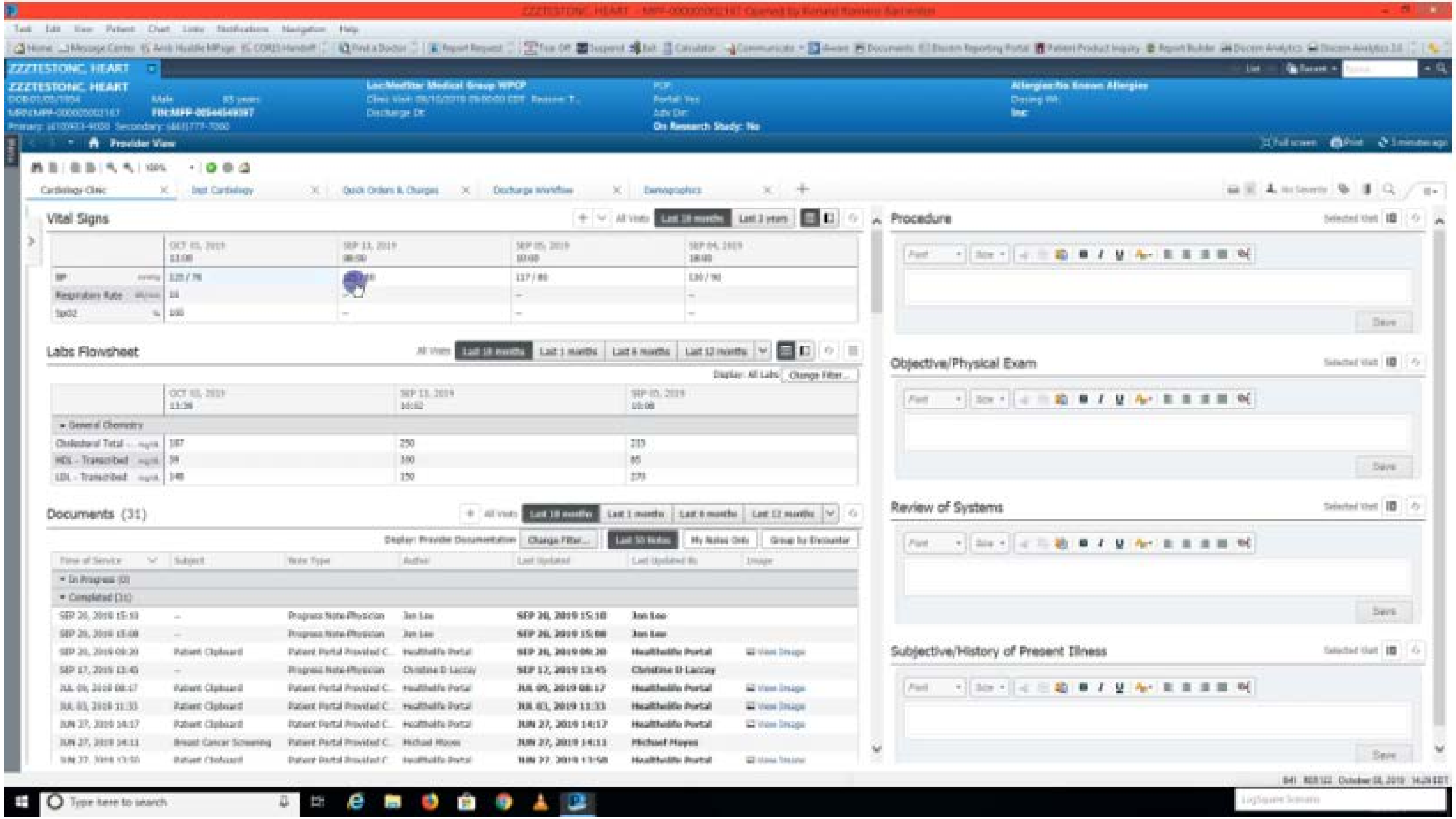
Current State ASCVD Risk Calculation



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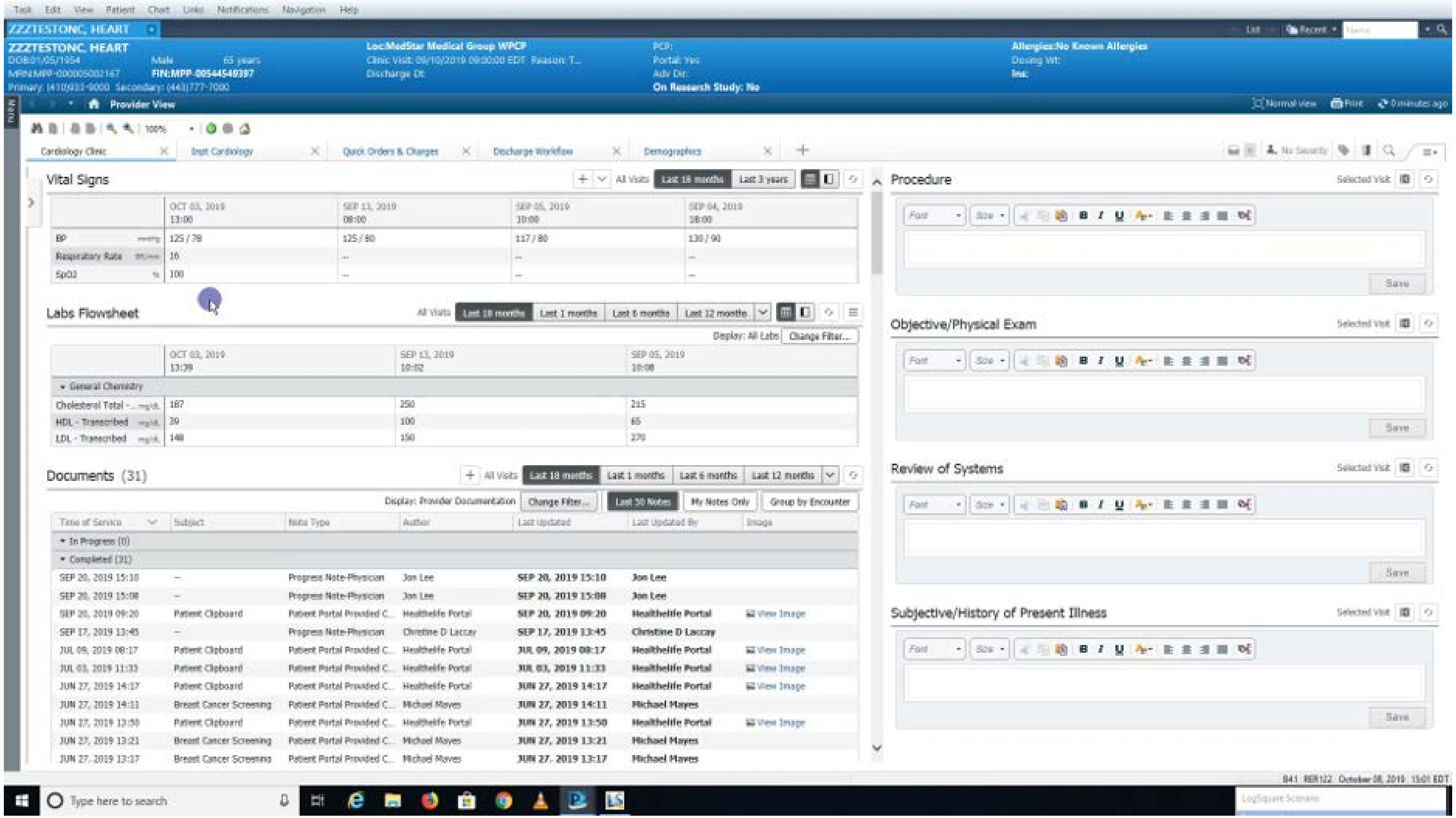
Mobilizing Million Hearts Future State



Clinician-Facing ASCVD Risk Estimator

ASCVD Risk Estimator

This calculation is based on asymptomatic, normative population samples and is not intended to be a substitute for clinical judgment.

Last Updated:	6 days ago	**Last Updated:**	6 days ago
Total Cholesterol (mg/dL):	187	**Systolic Blood Pressure (mmHg):**	125
HDL Cholesterol (mg/dL):	39	**Diastolic Blood Pressure (mmHg):**	78
LDL Cholesterol (mg/dL):	148		
Age:	65	**History of Diabetes:**	No
Sex:	Male	**Smoker:**	No
Race:	Other		
Hypertension Treatment:	No		
Statin:	No		
Aspirin Therapy:	Yes		

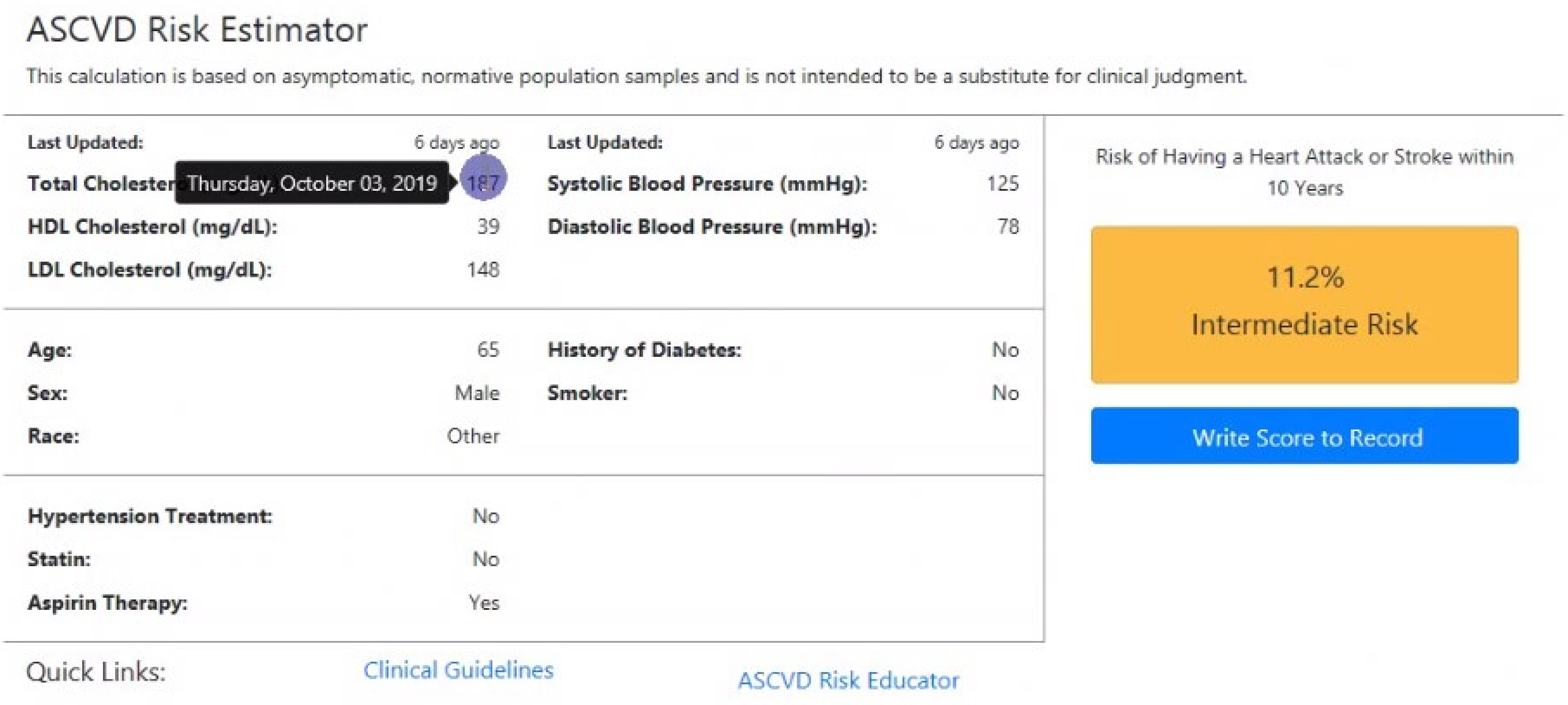
Risk of Having a Heart Attack or Stroke within 10 Years

11.2%
Intermediate Risk

Write Score to Record

Quick Links: Clinical Guidelines ASCVD Risk Educator

Clinician-Facing ASCVD Risk Estimator



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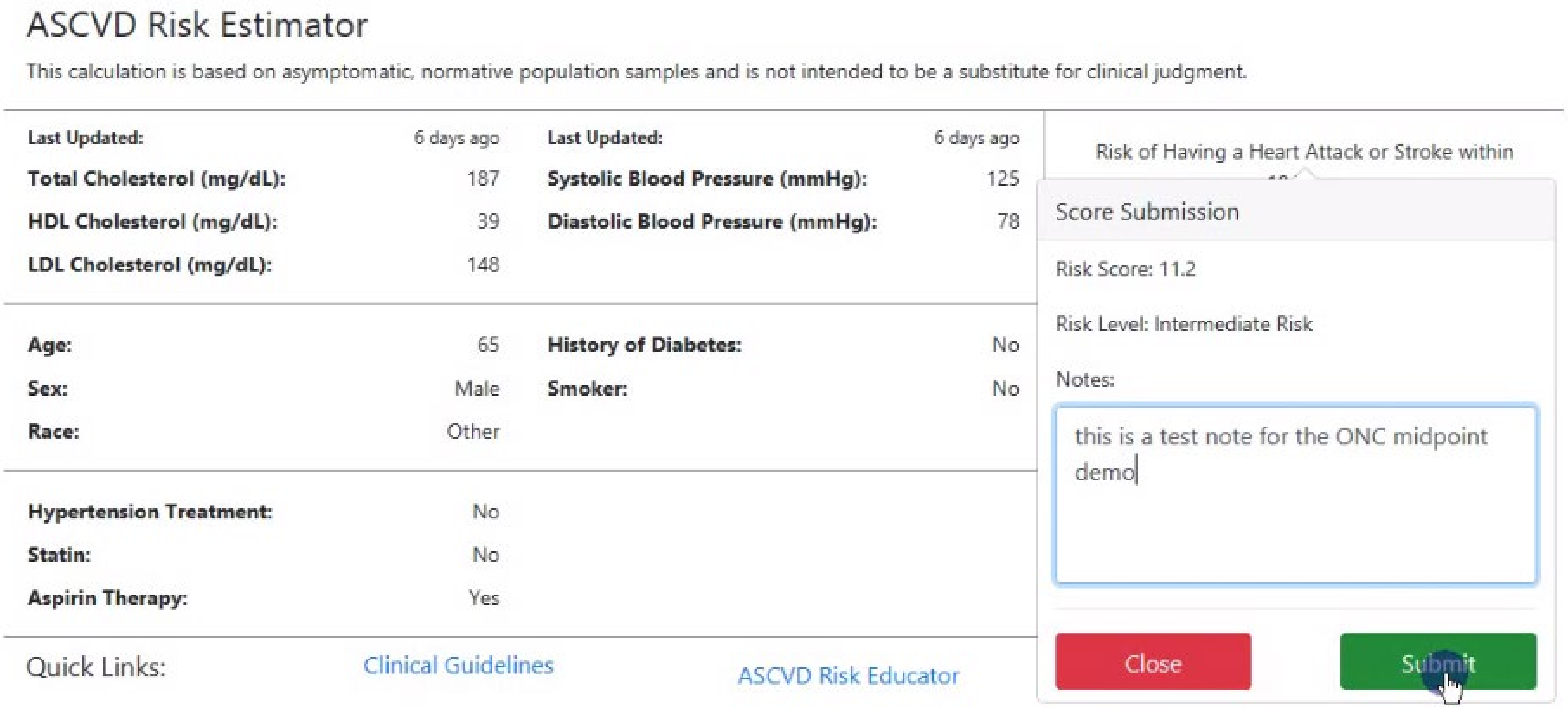

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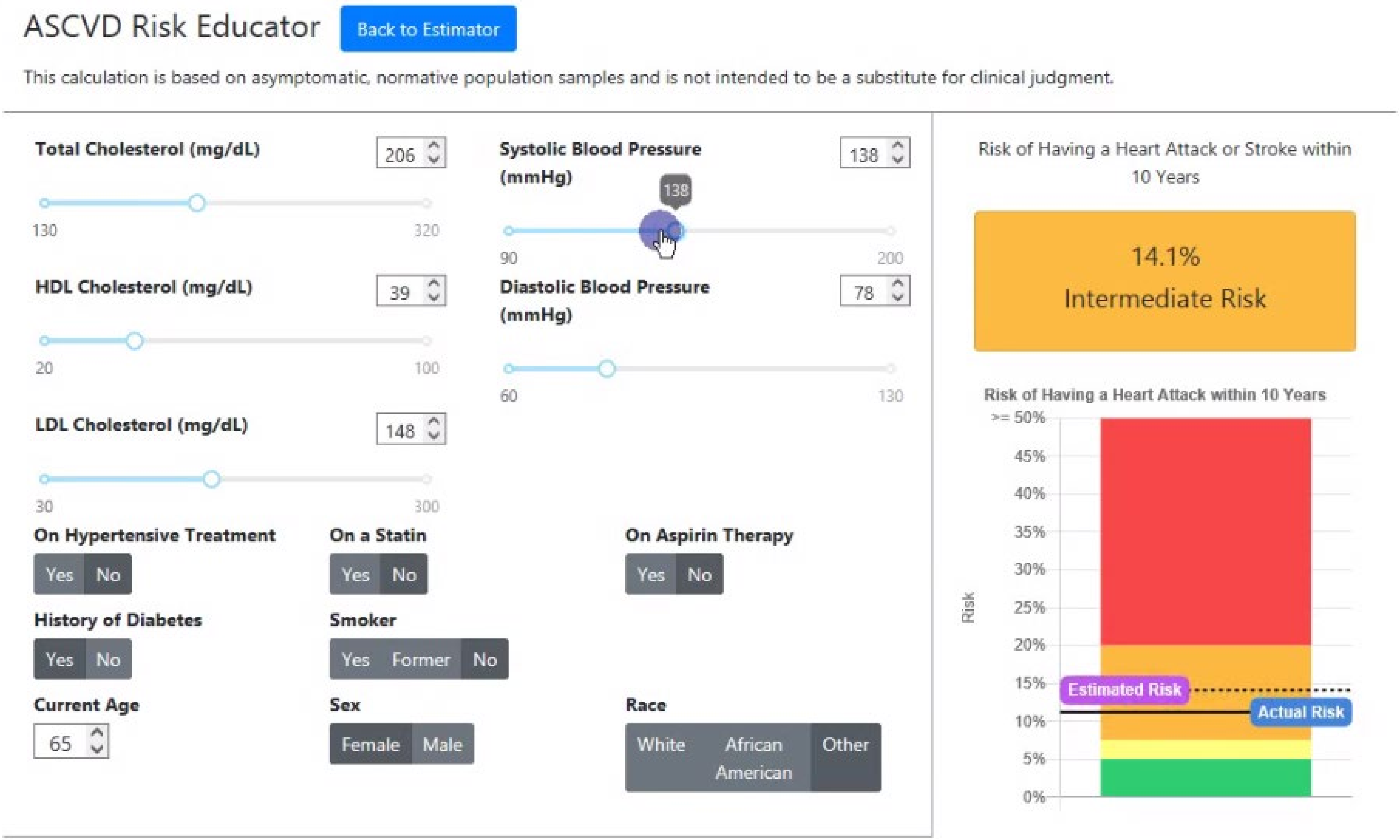
Patient-Facing ASCVD Risk Educator



3 Month Pilot

- **System Outcomes**
  (usage, API calls, load time)
- **Provider Outcomes**
  (surveys, video capture, interviews)

6 Month Pilot

- **Developer Outcomes**
  (technical challenges, resources)
- **Patient Outcomes**
  (preference, usability)

OBJECTIVE 4: IMPLEMENTATION AND EVALUATION
Launch the *Mobilizing Million Hearts* tool as an iterative pilot at MedStar Health

Challenges to Date

Strategic

- Optimizing inputs from multiple stakeholders and perspectives
- Validation costs and IT security challenges

Legal/ Ethical

- Personalizing population-level risk prediction
- Legal liability

Technical

- Applying SMART on FHIR and CDS Hooks solutions to systems that have not (yet) adopted
- Not all the desired data can easily and consistently be found in the FHIR resources (or may be documented in multiple places)
- SMART-on-FHIR apps behave differently within Cerner depending on the “profile”.

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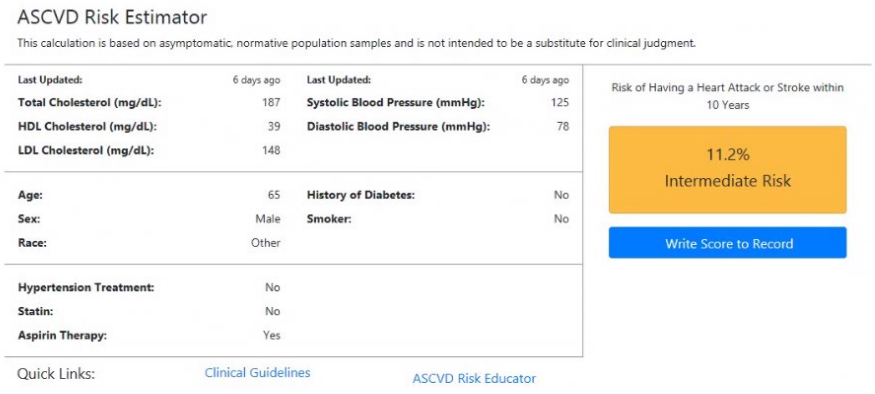

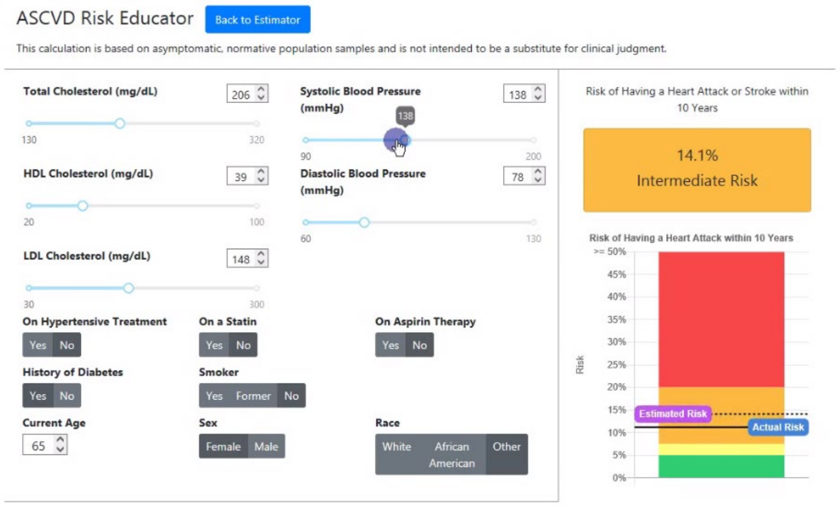

Thank you!

Kristen Miller
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chip

Boston Children's Hospital

Computational Health Informatics Program

Boston Children's Hospital

Leading Edge Acceleration Projects (LEAP)

SMART/HL7 Bulk Data Export

Population Health on FHIR

Kenneth D. Mandl, MD, MPH

Director, Computational Health Informatics Program
Boston Children's Hospital

Donald A.B. Lindberg Professor of Pediatrics
Professor of Biomedical Informatics
Harvard Medical School

@mandl

Disclosure

I and my spouse/partner have no relevant relationships with commercial interests to disclose.

Invention of the World Wide Web

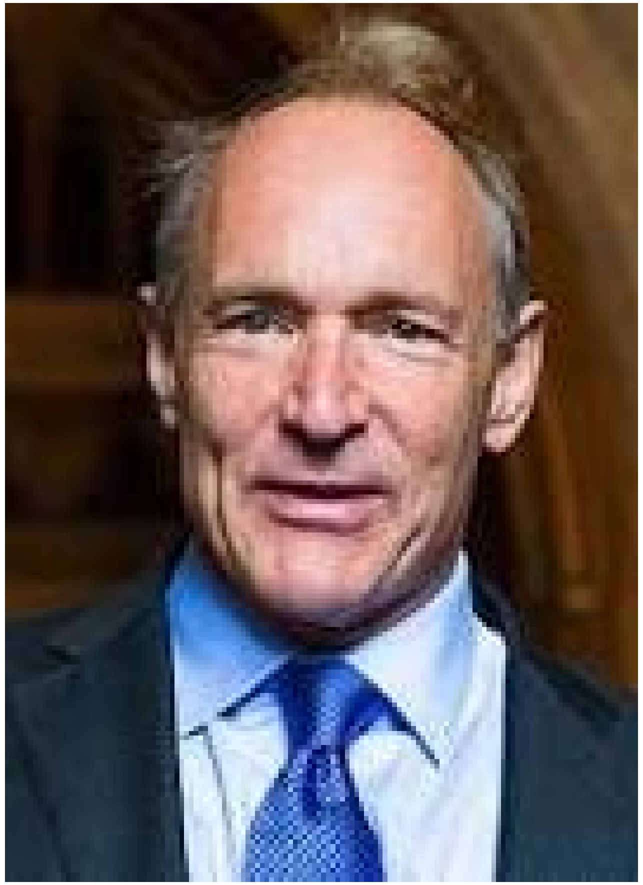
- Built over the existing TCP and IP protocols, it consisted of 4 building blocks:

- A textual format to represent hypertext documents, the *HyperText Markup Language* (HTML).

- A simple protocol to exchange these documents, the *HypertText Transfer Protocol* (HTTP).

- A client to display these documents, the first Web browser called *WorldWideWeb*.

- A server to give access to the document, an early version of *httpd*.



Problem #1

Apps don't

connect to health systems data

But has been hard to use the point of care

The NEW ENGLAND JOURNAL of MEDICINE

No Small Change for the Health Information Economy

Kenneth D. Mandl, M.D., M.P.H., and Isaac S. Kohane, M.D., Ph.D.

The economic stimulus package signed by President Barack Obama on February 17 included a $19 billion investment in health information technology. How can we best take advantage of this unprecedented opportunity to computerize health care and stimulate the health information economy while also stimulating the U.S. economy? A health care system adapting to the effects of an aging population, growing expenditures, and a diminishing primary care workforce needs the support of a flexible information infrastructure that facilitates innovation in wellness, health care, and public health.

Flexibility is critical, since the system will have to function under new policies and in the service of new health care delivery mechanisms, and it will need to incorporate emerging information technologies on an ongoing basis. As we seek to design a system that will constantly evolve and encourage innovation, we can glean lessons from large-scale information-technology successes in other fields. An essential first lesson is that ideally, system components should be not only interoperable but also substitutable.

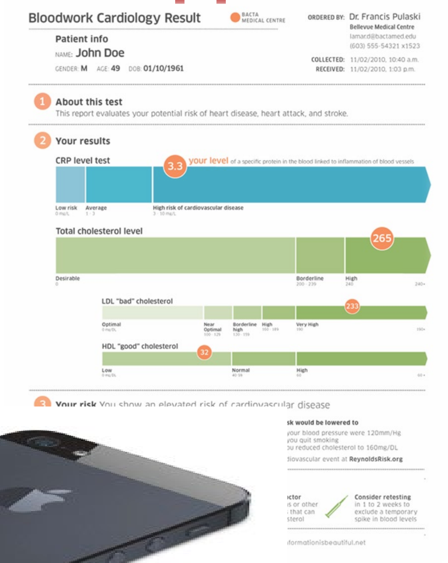
The Apple iPhone, for example, uses a software platform with a published interface that allows software developers outside Apple to create applications; there are now nearly 10,000 applications that consumers can download and use with the common phone interface. The platform separates the system from the functional-

Computational Health Informatics Program

Boston Children's Hospital

HARVARD MEDICAL SCHOOL

Designing the app store for health


Bloodwork Cardiology Result

BACTA MEDICAL CENTRE

ORDERED BY: Dr. Francis Pulaski
Bellevue Medical Centre
lamar.d@bactamed.edu
(603) 555-54321 x1523

Patient info
NAME: John Doe
GENDER: M AGE: 49 DOB: 01/10/1961

COLLECTED: 11/02/2010, 10:40 a.m.
RECEIVED: 11/02/2010, 1:03 p.m.

1 About this test
This report evaluates your potential risk of heart disease, heart attack, and stroke.

2 Your results

CRP level test — 3.3 your level of a specific protein in the blood linked to inflammation of blood vessels
Low risk | Average | High risk of cardiovascular disease

Total cholesterol level — 265
Desirable | Borderline | High

LDL "bad" cholesterol — 233
Optimal | Near Optimal | Borderline High | High | Very High

HDL "good" cholesterol — 32
Low | Normal | High

3 Your risk You show an elevated risk of cardiovascular disease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SMART®

HL7® FHIR®

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egulation, and Policy > Notice of Proposed Rulemaking to Improve the Interoperability of Health Inforn

Notice of Proposed Rulemaking to Improve the Interoperability of Health Information

The U.S. Department of Health and Human Services (HHS) recently proposed a new rule to support seamless and secure access, exchange, and use of electronic health information (EHI).

NOTICE OF PROPOSED NPRM RULEMAKING

The proposed rule is designed to increase innovation and competition by giving patients and their healthcare providers secure access to health information and new tools, allowing for more choice in care and treatment. It calls on the healthcare industry to adopt standardized application programming interfaces (APIs), which will help allow individuals to securely and easily access structured EHI using smartphone applications.

The proposed rule places a strong focus on a patient's ability to access their health information through a provision requiring that patients can electronically access all of their EHI (structured and/or unstructured) at no cost. Finally, to further support access and exchange of EHI, the proposed rule implements the information blocking provisions of the Cures Act. The rule proposes seven exceptions to the definition of information blocking.

The public comment period is now open for the proposed rule. We value all of your feedback – both positive and negative as it helps inform the rulemaking process. Below are the steps to submitting your comments:

Download the Proposed Rule [PDF - 3.2 MB]

Comment on the Proposed Rule

Comments on the proposed rule are due by 11:59 pm ET on May 3, 2019.

Fact Sheets on the Proposed Rule

Implementation of Cures Act and Executive Orders [PDF - 1.4 MB]

Conditions and Maintenance of Certification Requirements [PDF - 805 KB]

Information Blocking – Summaries of the 7 Exceptions [PDF - 578 KB]

Parsimonious Standards to Create Interop

1. SUBSTITUTABLE APPS

2. TRIGER-ABLE DECISION SUPPORT

3. PATIENT-GENERATED DATA

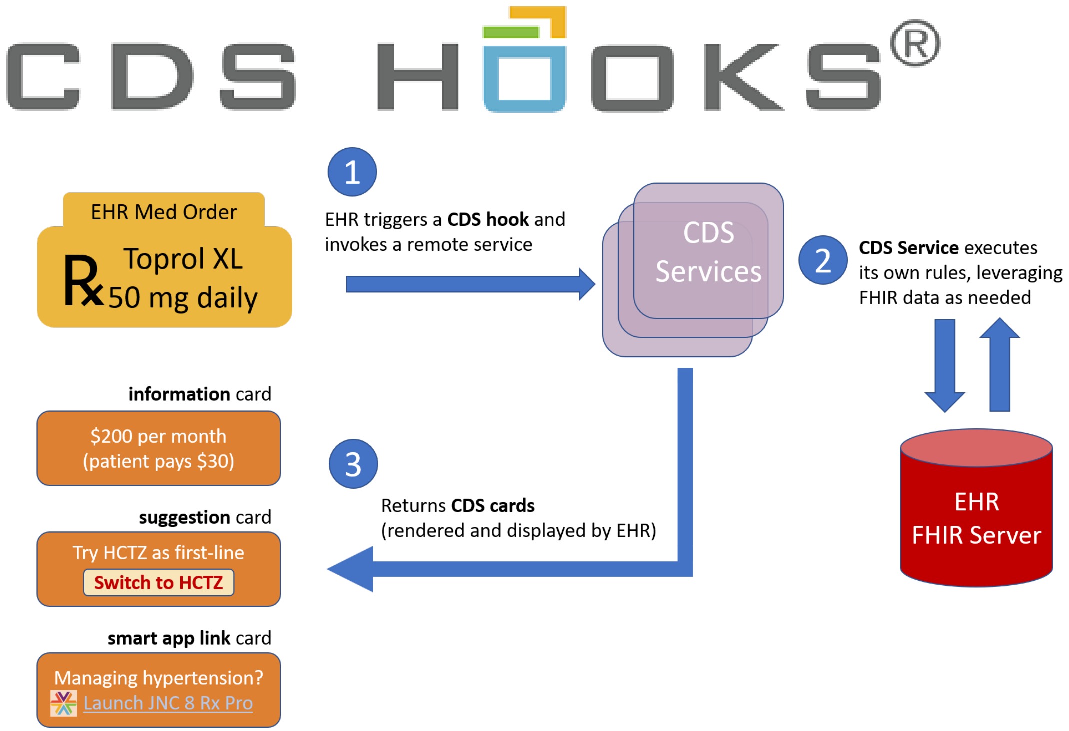
4. PUSH BUTTON POPULATION HEALTH

Problem #2

Can't launch apps

at just the right moment

Triger-able decision support



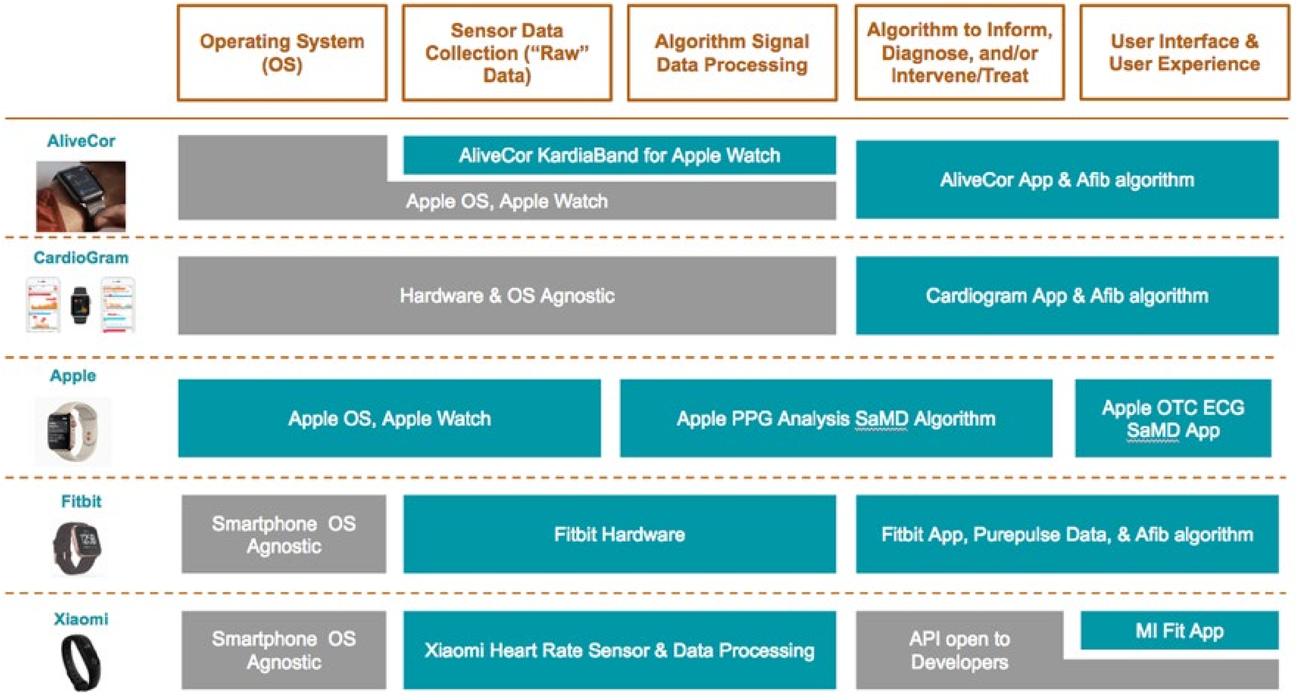
Problem #3

Patient generated data are

non-standardized and in a separate silo

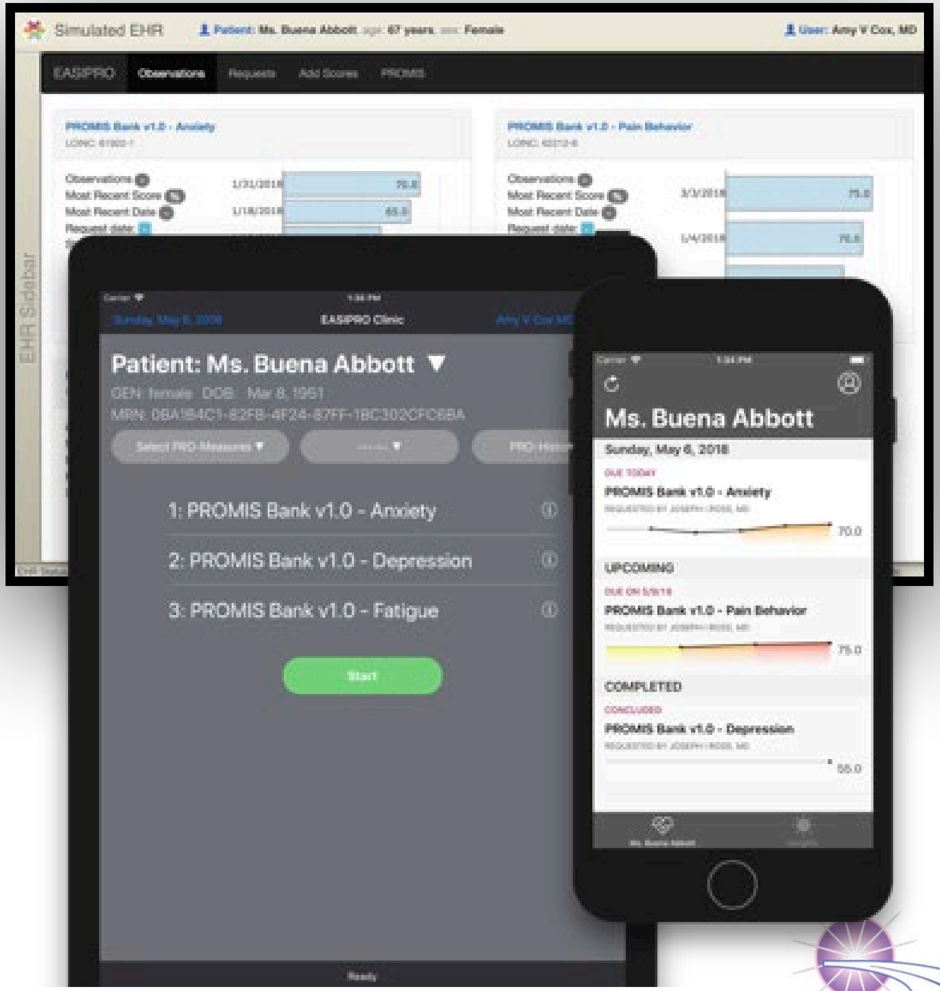
Modularity of software and sensor products to detect atrial fibrillation through connected technologies

Software built and maintained by listed manufacturer
Software built and maintained by third party

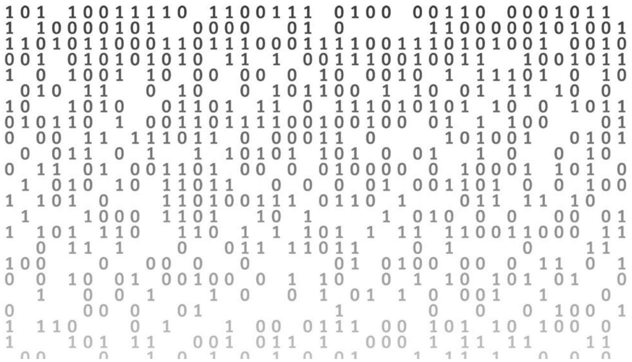


NPG Digital Medicine 2019

Interoperable, PRO apps—patient or provider generated



SMART Markers
(coming soon)



Problem #4

Getting data out of EHRs

into analytic platforms tends to require specialized teams

Manual Reporting, Duplication

- Hospital IT needs to create reports on the same data in hundreds of different formats (many of those data are in the USCDI)

Genomics research effort to use $8.5M grant to expand data sharing

By Fred Bazzoli

October 24, 2019, 2:54 p.m. EDT

Three large pediatric hospitals plan to use proceeds of a National Institutes of Health grant to expand and extend their data-sharing collaboration to other facilities.

The $8.5 million grant to the Genomics Research and Innovation Network (GRIN) will covers several years of efforts to expand it into a larger federation of medical centers that are able to share large amounts of genomic information while protecting patient privacy.

The grant comes from NIH's National Center for Advancing Translational Sciences.

ARTICLE | Genetics inMedicine

Open

The Genomics Research and Innovation Network: creating an interoperable, federated, genomics learning system

Kenneth D. Mandl, MD, MPH[1,2,3], Tracy Glauser, MD[4,5], Ian D. Krantz, MD[6,7], Paul Avillach, MD, PhD[1,2], Anna Bartels, MScPH[8], Alan H. Beggs, PhD[3,9,10], Sawona Biswas, MS, CGC[6], Florence T. Bourgeois, MD, MPH[1,3,10], Jeremy Corsmo, MPH[5,11], Andrew Dauber, MD, MMSc[5,12], Batsal Devkota, PhD[13], Gary R. Fleisher, MD[3,10], Allison P. Heath, PhD[13], Ingo Helbig, MD[7,14,15], Joel N. Hirschhorn, MD, PhD[3,16,17], Judson Kilbourn[1], Sek Won Kong, MD[1,3], Susan Kornetsky, MPH[18], Joseph A. Majzoub, MD[3,10,16], Keith Marsolo, PhD[19], Lisa J. Martin, PhD[5,20], Jeremy Nix, BS[21], Amy Schwarzhoff, MS, MBA[23], Jason Stedman, BA[2], Arnold Strauss, MD[5,24], Kristen L. Sund, PhD, MS[20], Deanne M. Taylor, PhD[7,14], Peter S. White, PhD[5,21,22], the Genomics Research and Innovation Network

Purpose: Clinicians and researchers must contextualize a patient's genetic variants against population-based references with detailed phenotyping. We sought to establish globally scalable technology, policy, and procedures for sharing biosamples and associated genomic and phenotypic data on broadly consented cohorts, across sites of care.

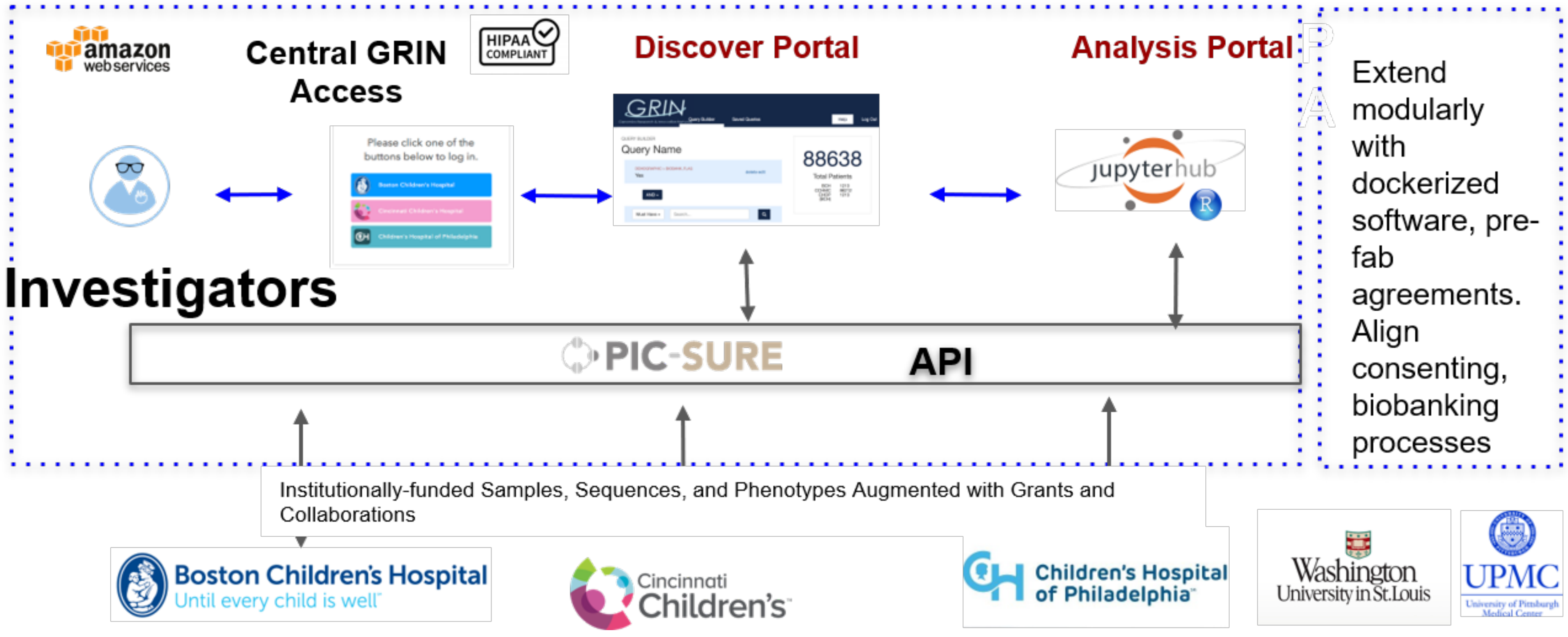
Methods: Three of the nation's leading children's hospitals launched the Genomic Research and Innovation Network (GRIN), with federated information technology infrastructure, harmonized biobanking protocols, and material transfer agreements. Pilot studies in epilepsy and short stature were completed to design and test the collaboration model.

Results: Harmonized, broadly consented institutional review board (IRB) protocols were approved and used for biobank enrollment, creating ever-expanding, compatible biobanks. An open source federated query infrastructure was established over genotype–phenotype databases at the three hospitals. Investigators securely access the GRIN platform for prep to research queries, receiving aggregate counts of patients with particular phenotypes or genotypes in each biobank. With proper approvals, de-identified data is exported to a shared analytic workspace. Investigators at all sites enthusiastically collaborated on the pilot studies, resulting in multiple publications. Investigators have also begun to successfully utilize the infrastructure for grant applications.

Conclusions: The GRIN collaboration establishes the technology, policy, and procedures for a scalable genomic research network.

Genetics in Medicine (2019) https://doi.org/10.1038/s41436-019-0646-3

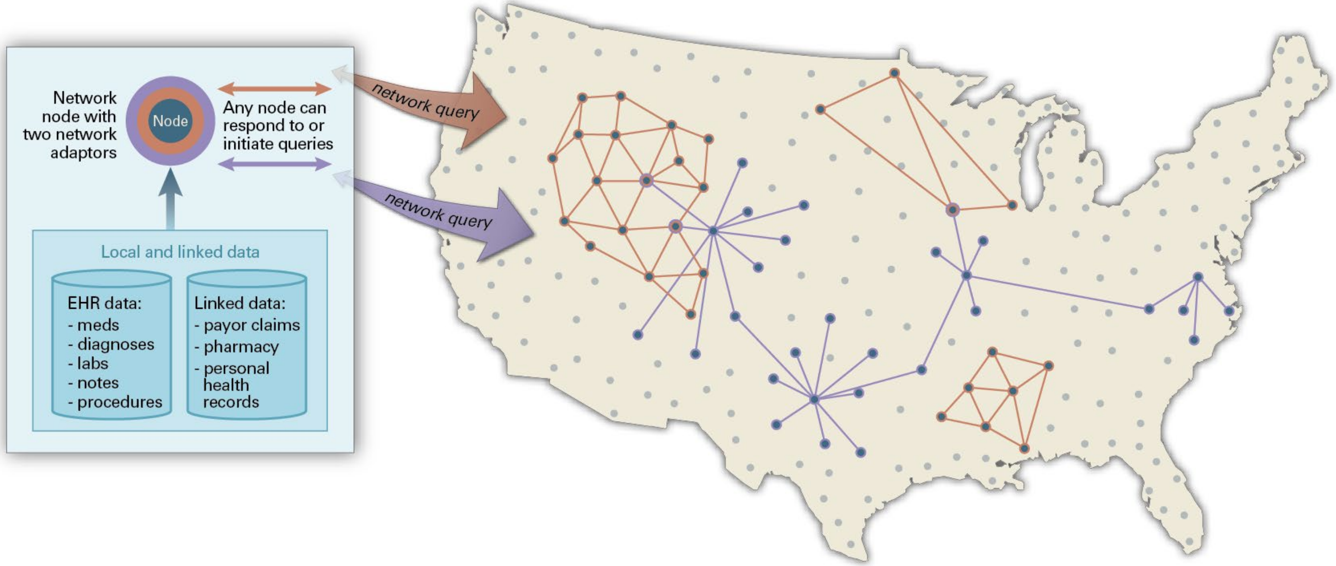
Keywords: genomic medicine; federated networks; electronic health records; biobanking; information technology



Existing Genomic Research and Innovation Network (GRIN)

Scaling-up

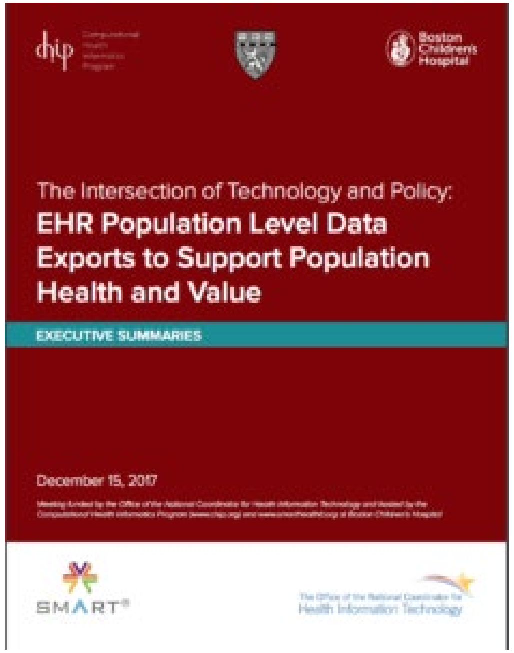
Federated EHR Networks: engaging health systems by making the data important to them



Federalist Principles for Federated Networks
Mandl, Nature Biotechnology

- Don Rucker: "If the health system is going to care about the data, they should be about payment."

Push button population health /FLAT FHIR


The Intersection of Technology and Policy:
EHR Population Level Data Exports to Support Population Health and Value
EXECUTIVE SUMMARIES
December 15, 2017

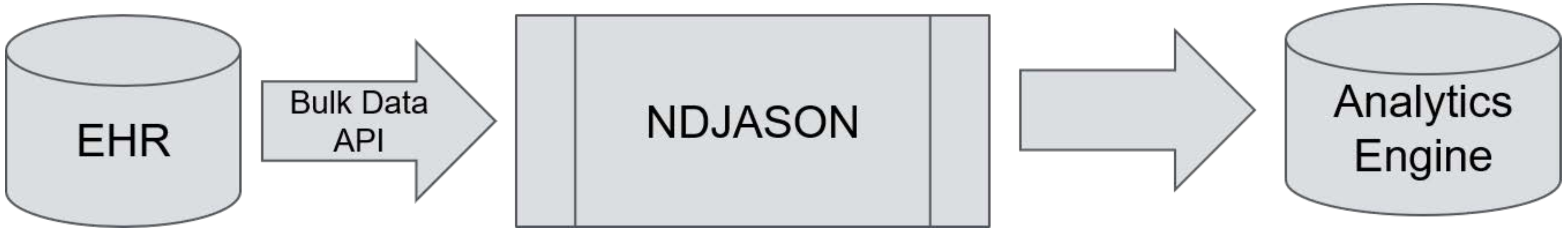
CENTERS FOR MEDICARE & MEDICAID SERVICES

Google

December 2017 Enhancing FHIR to support Bulk Data access

November 2019 Follow-up meeting

SMART/HL7 FHIR Bulk Data



- Reuse as much of existing FHIR semantics as possible
  - Data models
  - API format and data types
  - Implementation guide structure
- Use existing standards based authentication and authorization
  - Base on widely used OAuth (SMART) standard
- Structure for efficiently generating and loading large datasets
  - Asynchronous operation
  - One data type per file
  - Streaming data

The NEW ENGLAND JOURNAL of MEDICINE

A 21st-Century Health IT System — Creating a Real-World Information Economy

Kenneth D. Mandl, M.D., M.P.H., and Isaac S. Kohane, M.D., M.P.H.

Data generated as a by-product of the day-to-day work of delivery systems are a fundamental currency of the 21st Century Cures Act. How efficiently

of real-world evidence to advance treatment and research.

Fortunately, lawmakers included in the 21st Century Cures Act a provision that could transform

contains hundreds of thousands of apps because developers have a well-documented API that enables them to create software that seamlessly integrates with the op-

Computational Health Informatics Program

Focus on BCH ACO

- Each organization uses an internal data model and architecture for reporting

```
CREATE TEMP TABLE T50XYFWT0MQ000 as
select  a11.MRN  mrnchar
from  CONS_CURRENT_PATIENT_DIM  a11
  left outer join CONS_ENCOUNTER_DIM  a12
    on  (a11.PATIENT_KEY = a12.PATIENT_KEY)
  left outer join CONS_INSURANCE_FACT a13
    on  (a12.ENCOUNTER_KEY = a13.ENCOUNTER_KEY)
  left outer join CONS_INSURANCE_PLAN_DIM a14
    on  (a13.PLAN_KEY = a14.PLAN_KEY)
where (a11.INSURANCE_PLAN_KEY in (2407)
 or (a14.PLAN_ID in (24501)
 and a12.LATEST_CSN_FLAG in ('Y')))
group by  a11.MRN

CREATE TEMP TABLE T1ZL5FW2SMQ001 as
select  a11.DATE_OF_BIRTH  DATE_OF_BIRTH,
  a13.EVENT_END_DT_TM  EVENT_END_DT_TM,
  a11.MRN  mrnchar
from  CONS_CURRENT_PATIENT_DIM  a11
  left outer join CONS_ENCOUNTER_DIM  a12
    on  (a11.PATIENT_KEY = a12.PATIENT_KEY)
```

Computational Health Informatics Program

Boston Children's Hospital | HARVARD MEDICAL SCHOOL

Resulting Output

- This is the outgoing report to MassHealth for Adolescent Childhood Immunizations
- The output from the internal BCH data warehouse SQL query is below

Current Age	General PCP Name	Last Primary Care Appt Date	Last Primary Care Appt Clinic	Meningococcal Count	Meningococcal Last	Tdap Count	Tdap Last	HPV Count	HPV1	HPV2	HPV3	Measure Met
13	Joseph, Luc	10/19/2018	PCL	1	08/25/2017	1	08/25/2017	1	08/25/2017			N
13	Shah, Snehal N	03/29/2018	PCL									N
13	Spindel, Chelsea	12/01/2018	PCL	1	03/04/2016	1	03/04/2016	2	03/04/2016	08/23/2016		Y
13	Roth, Emily	05/03/2005	PCM									N
13	Badrinath, Seeta D	08/08/2018	PCL	1	06/02/2016	1	06/02/2016	3	10/29/2015	01/27/2016	06/02/2016	Y

Query with FHIR Bulk Data Analytics

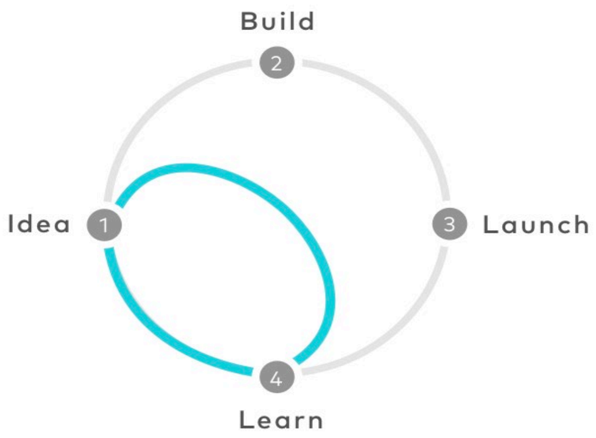
- Here's a query on top of FHIR using Bulk Data Exports as the data source
- The query is written on the Presto SQL query engine
- The output is exactly the same as the one that BCH currently runs

```
WITH patientVaccineRows as (SELECT
  json_extract_scalar(p.json, '$.id') AS patientId,
  json_extract_scalar(p.json, '$.name[0].family[0]') AS familyName,
  json_extract_scalar(p.json, '$.name[0].given[0]') AS givenName,
  json_extract_scalar(dr.json, '$.name.family[0]') AS drFamilyName,
  json_extract_scalar(dr.json, '$.name.given[0]') AS drGivenName,
  json_extract_scalar(i.json, '$.vaccineCode.coding[0].code') AS code,
  json_extract_scalar(i.json, '$.vaccineCode.text') AS text,
  split_part(json_extract_scalar(i.json, '$.date'), 'T', 1) AS date
```

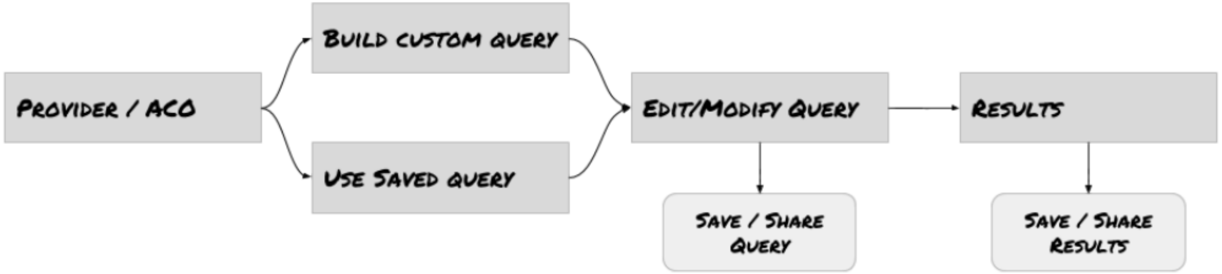
The proposition

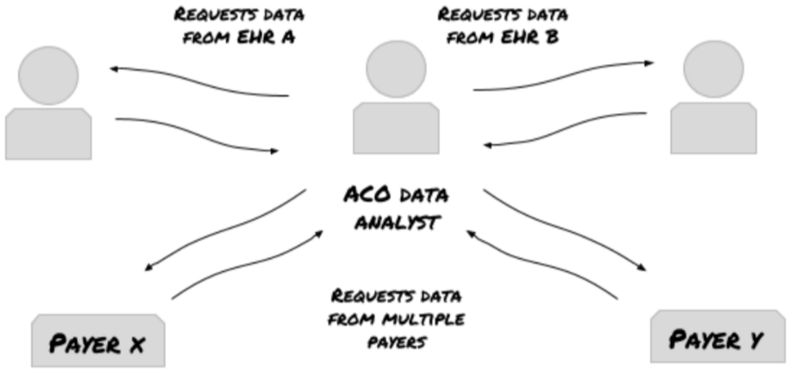
- Bulk data exports in a consistent, standardized format
- Generalizable analytics on top

Design Sprint Process



The sprint gives teams a shortcut to learning without building and launching.

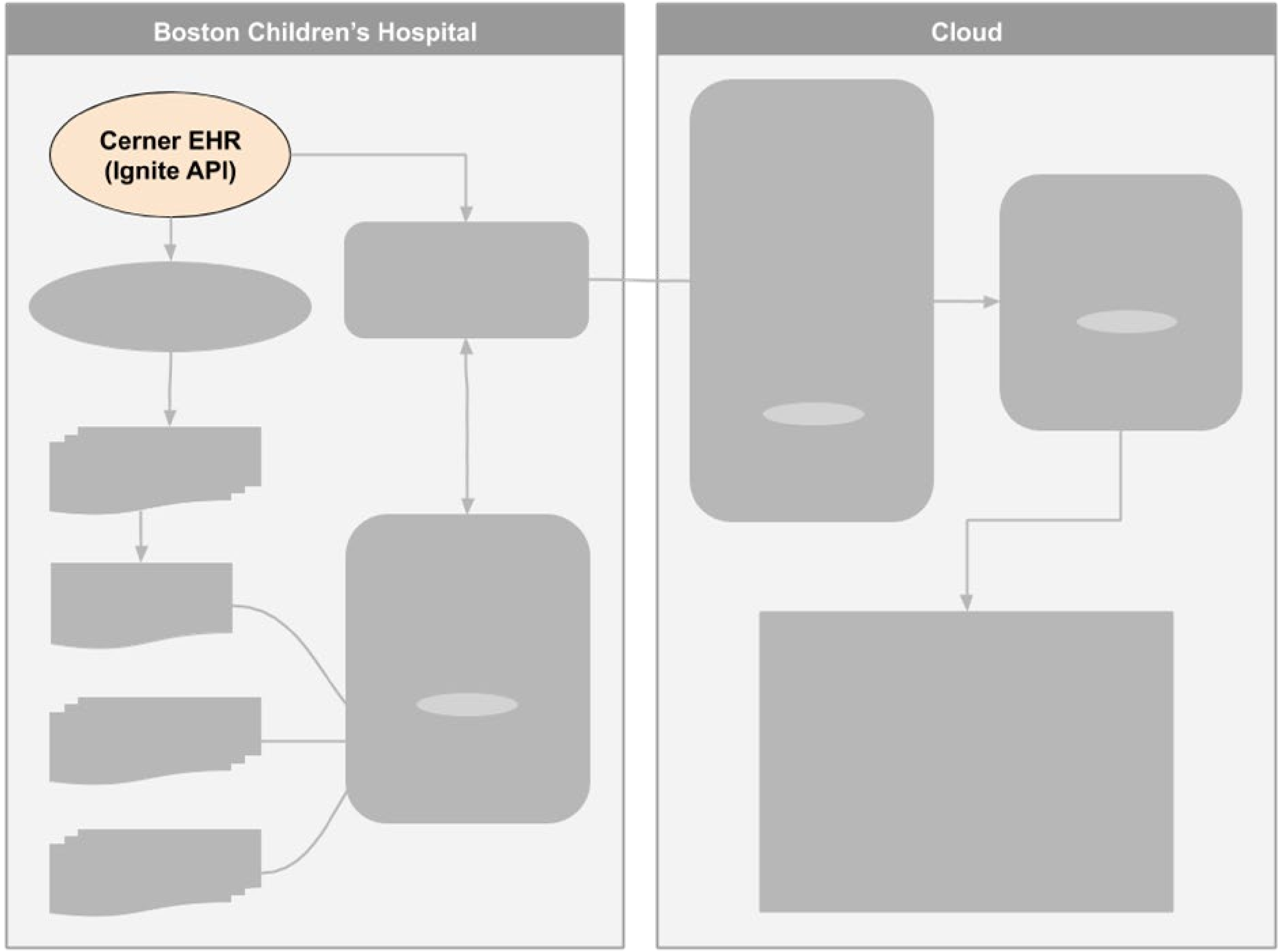




LEAP POP-HEALTH APP

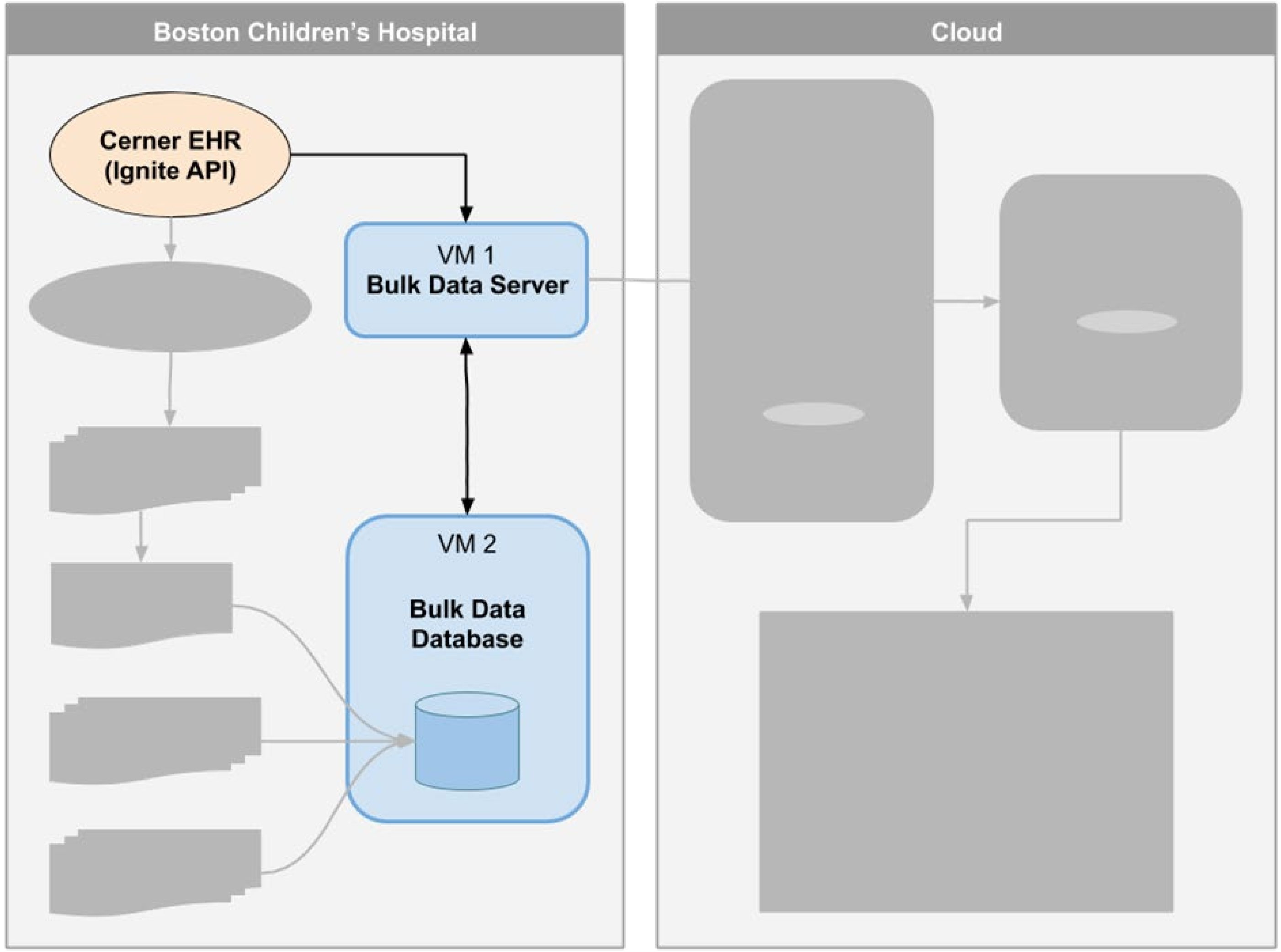
Population-level app based on bulk data

BOSTON CHILDREN’S HOSPITAL EHR



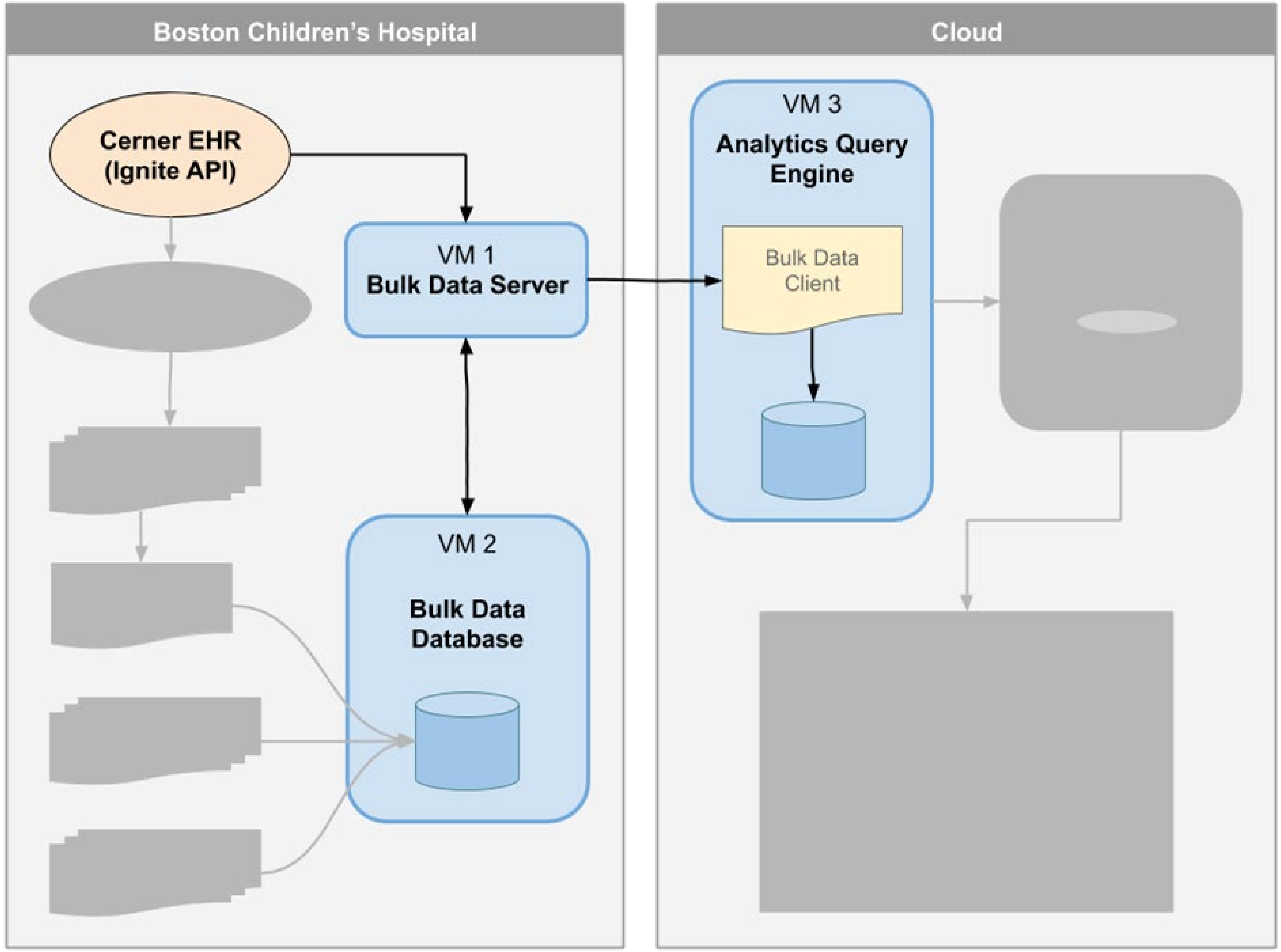
- Boston Children’s Hospital Cerner EHR
- Cerner Ignite API
- FHIR DSTU-2 and R4
- Does NOT support bulk data

BULK DATA SERVER



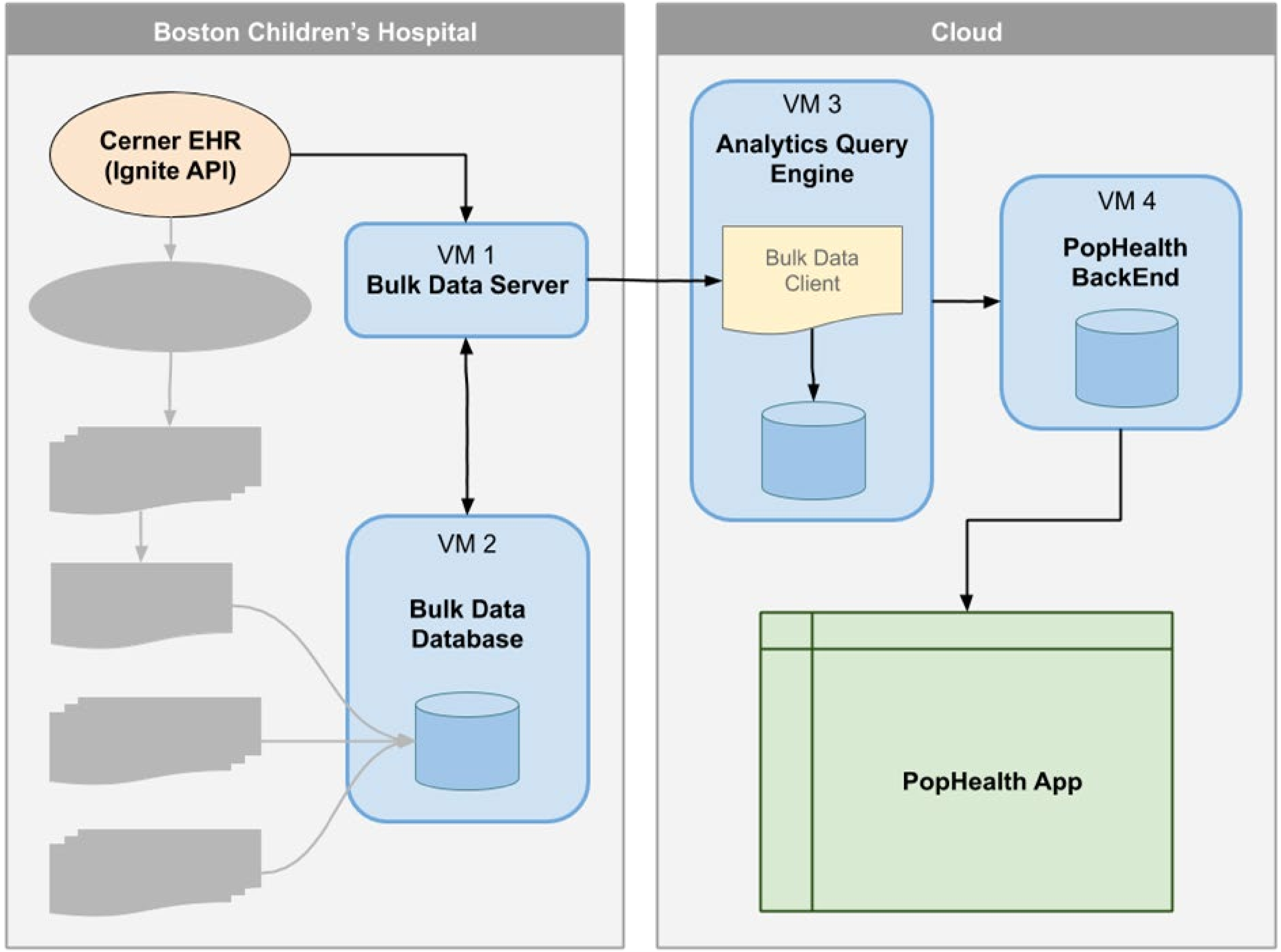
- Connects to any FHIR-enabled EHR
- Exposes standard bulk-data API
- Can act as a proxy
- Synchronizes automatically
- Caches data
- Acts as data aggregator

ANALYTICS QUERY ENGINE



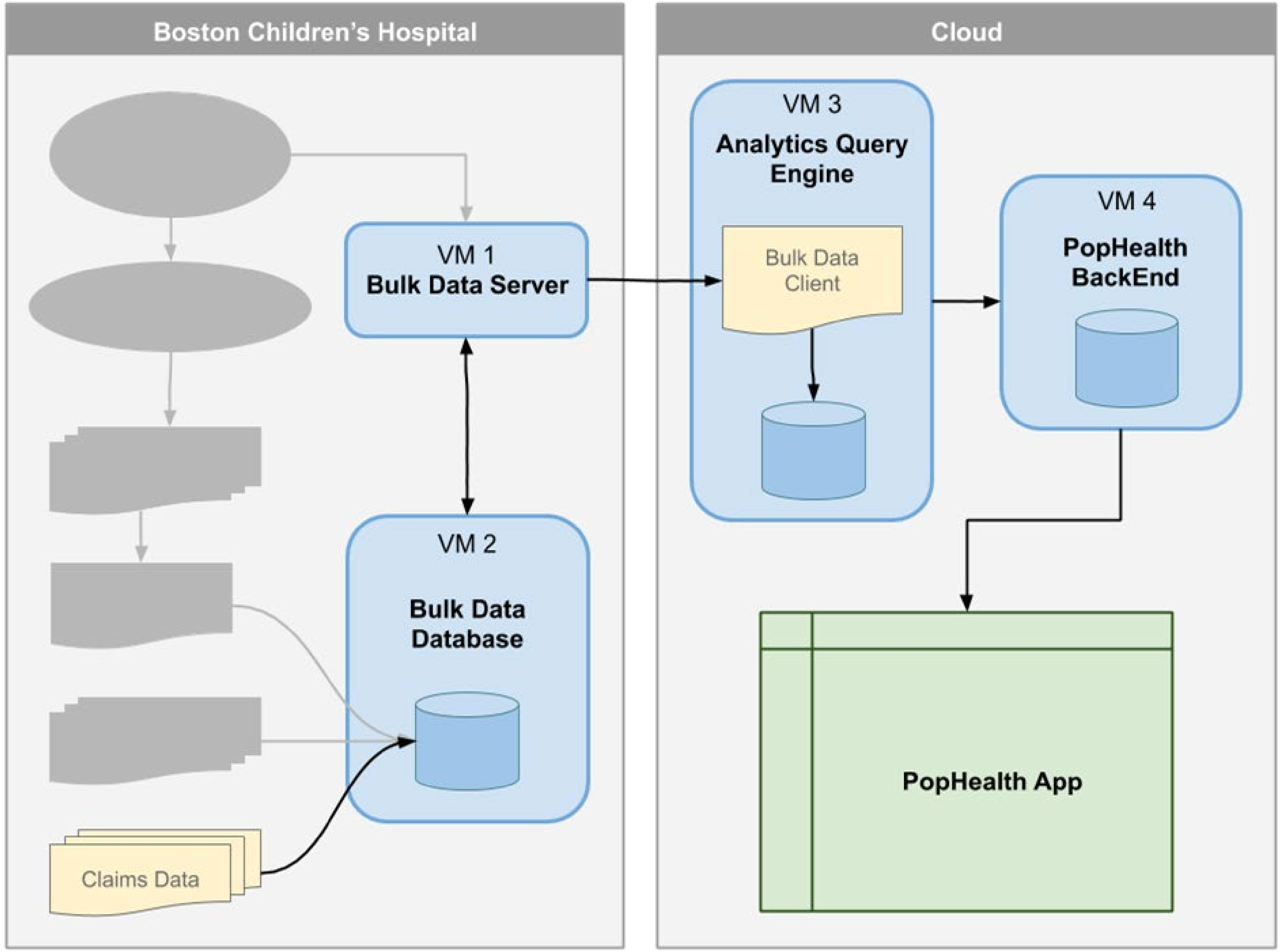
- Consumes standard bulk-data NDJSON
- Converts and stores data in Presto
- Improves performance in large datasets
- Exposes SQL interface

POP-HEALTH APP



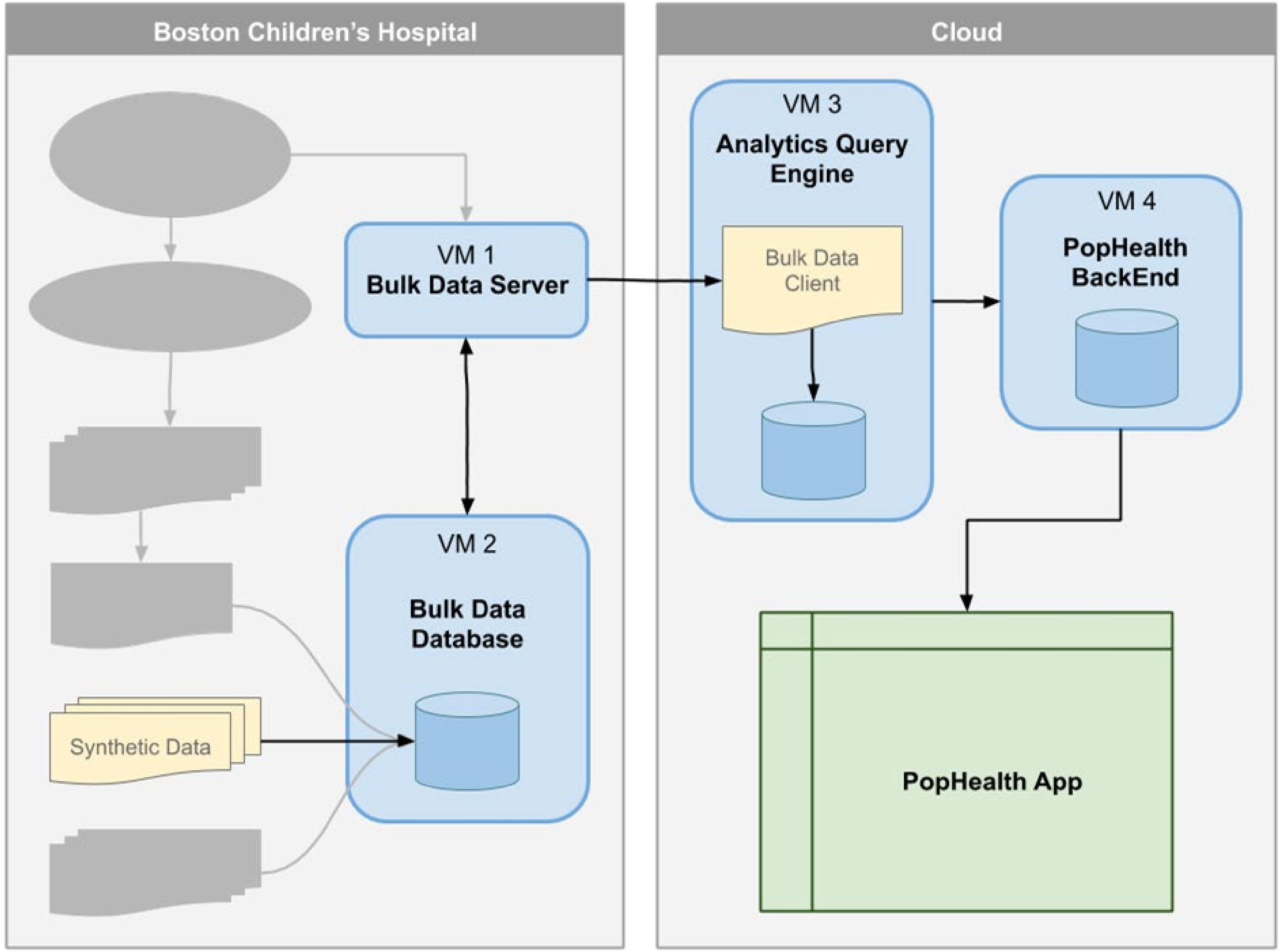
- Sends SQL queries to AQE
- Caches historical data
- Provides user management
- Supports multiple pre-configured QMs
- Includes SQL query builder

CLAIMS DATA



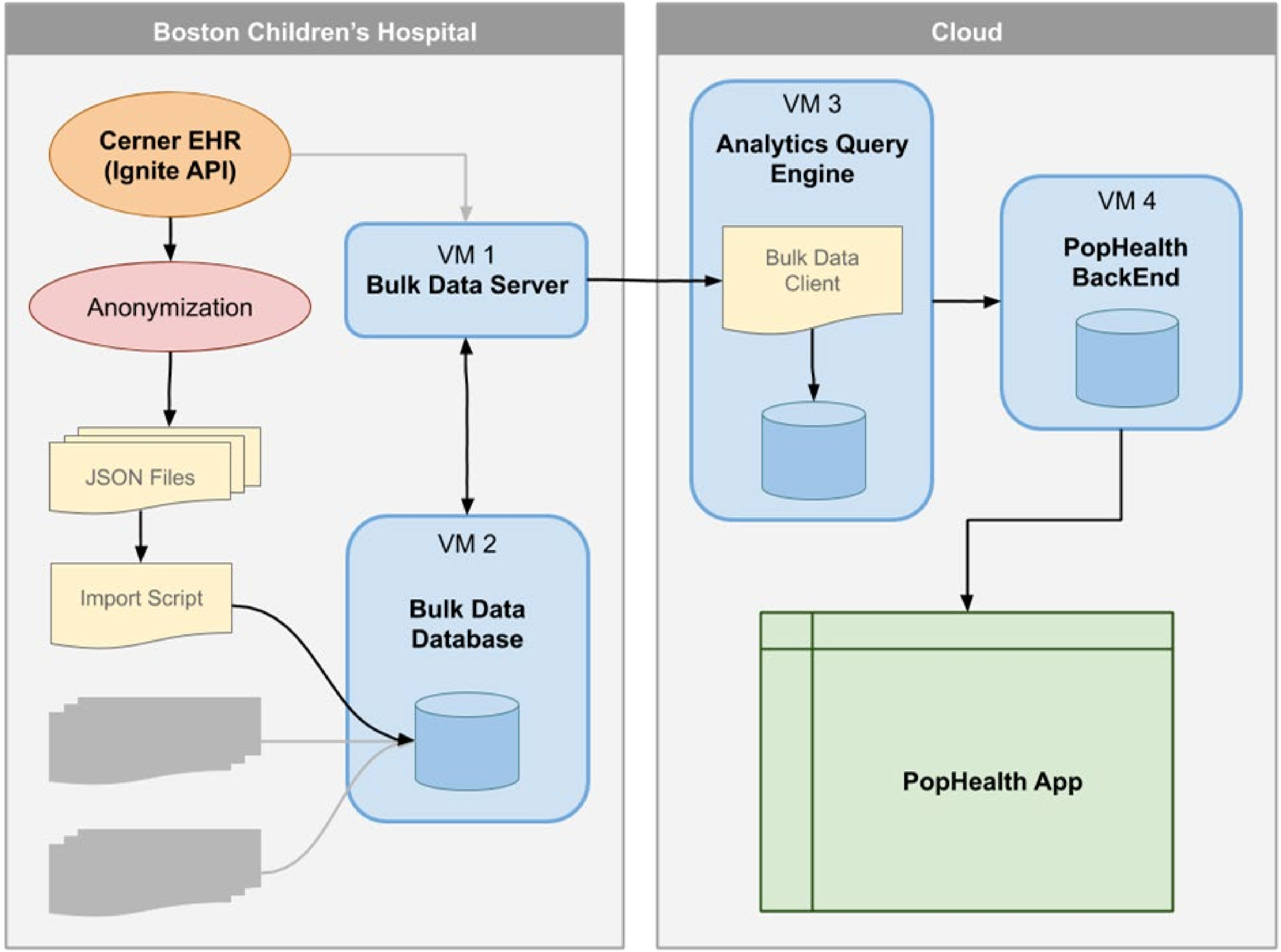
- Claims data from various sources can be merged into the bulk-data database.

SYNTHETIC DATA

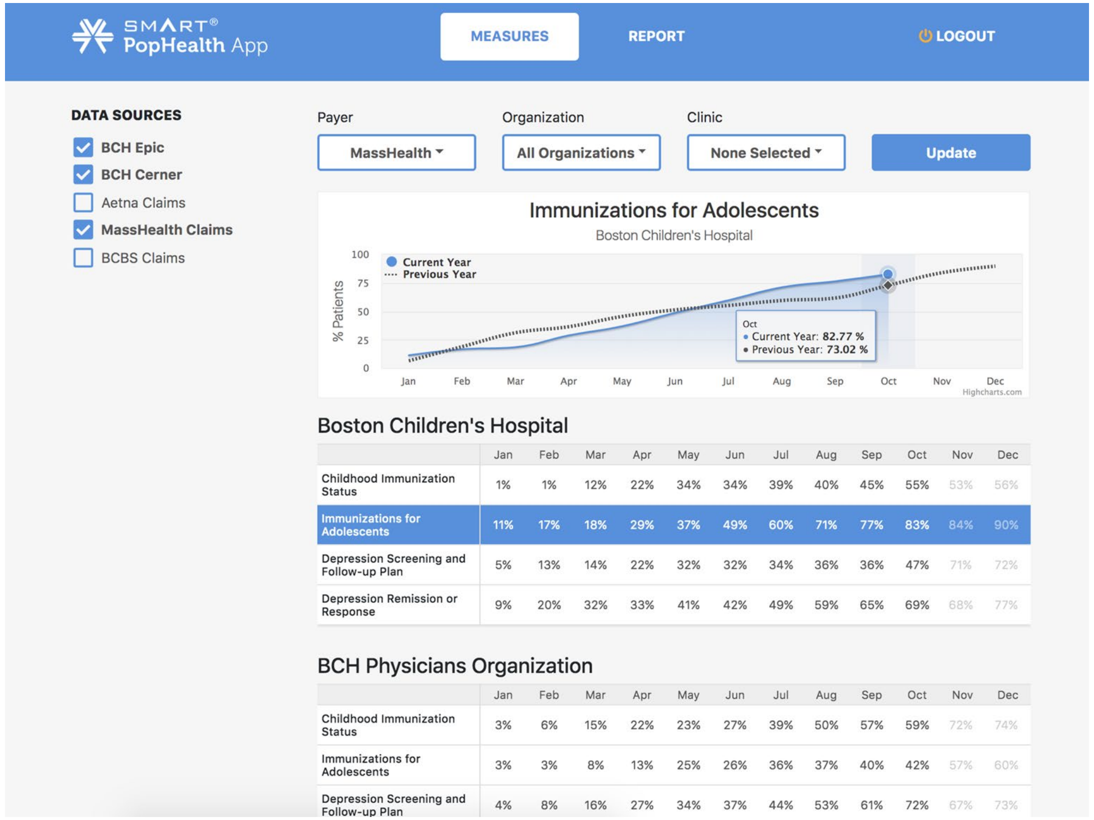


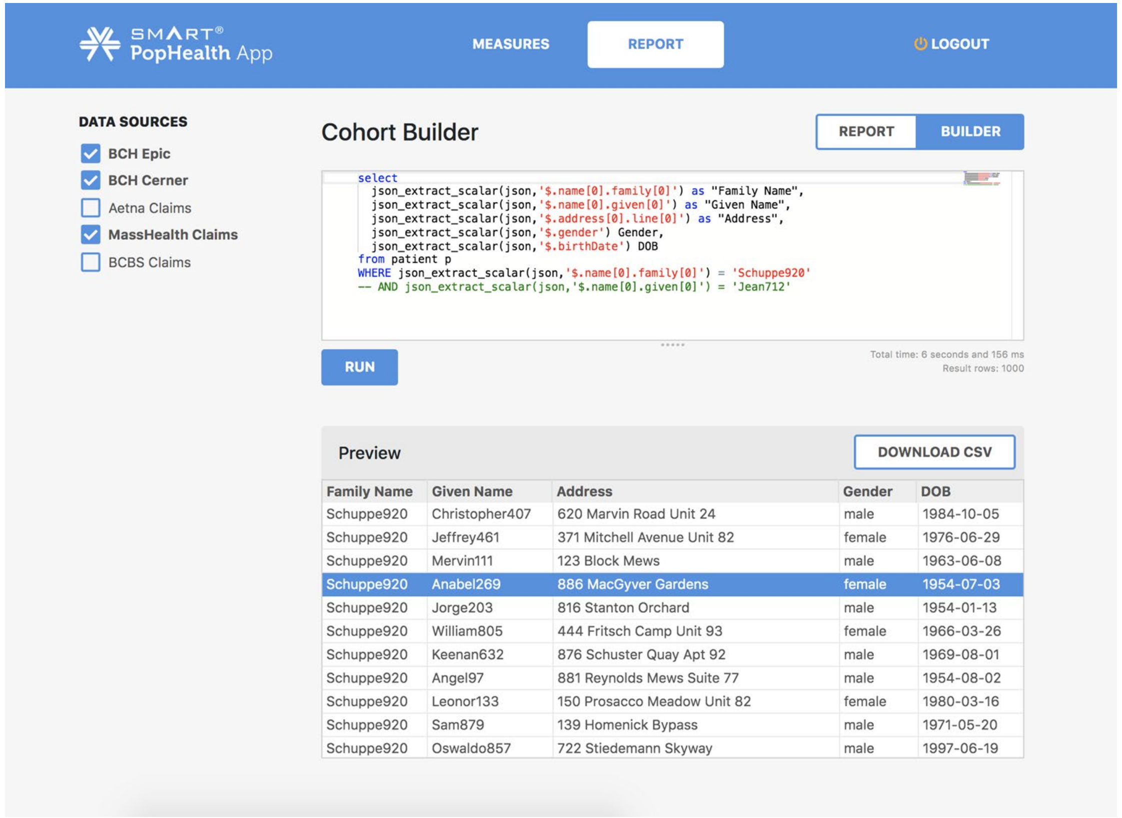
- More than 1.22M Patients
- Close to 200M Observations
- Close to 380M Resources
- About 49M Claims
- About 24GB data
- About 2.2GB data with gzip

REAL-WORLD DIAGRAM



POP-HEALTH APP

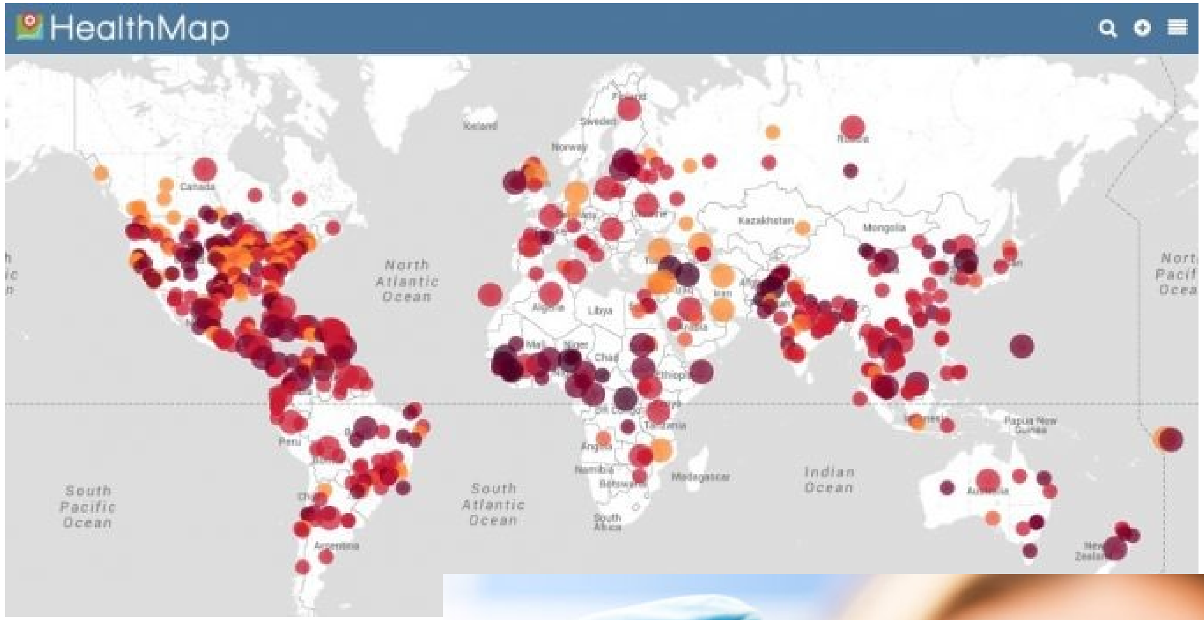




Federal Health Agencies Coming Aboard

Boston Children's Hospital

HARVARD MEDICAL SCHOOL



Establish your independent research program at Harvard and Boston Children's

Harvard Medical School Postdoc, Instructor, Assistant, or Associate Professor

Computational Health Informatics Program

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The Office of the National Coordinator for Health Information Technology

LEAP Focus Areas

2018

- Expand population-level data-focused APIs
- Advance clinical knowledge at point-of-care

2019

- Implement HL7® FHIR® Consent Resource
- Enhanced patient engagement technologies for care and research

2020

To Be Determined

- Consent for regulated vs. unregulated research?
- Security of data at rest and transit?

Significantly enhance the performance of health IT solutions for care and research

Discussion: LEAP Areas for 2020?

- Data anonymization
- Digital footprint
- Data security at rest and transit
- Unregulated vs. regulated research
- Patient education and misinformation
- Open source tools for health research apps

The Office of the National Coordinator for Health Information Technology

Contact ONC

ONC-LEAP@HHS.GOV

Phone: 202-690-7151

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