



Continuity of Care Standards, Interoperability, and Architecture

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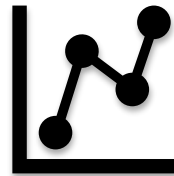
Data: the new currency

- The right data needs to be at the right place and right time for the right patient.
- Data is essential for analytics.
- Data is necessary for evaluation.
- Data must be of high quality: consistent, complete, and trustworthy.

DATA



For most patients, data is created at multiple places and must be brought together.



Big data, a valuable resource for clinical research and business analytics, results from the aggregation of data.



Interoperable exchange of data is therefore a necessity.

Standards are part of everyday life



Interoperability



The ability to exchange data without error.



The ability to interpret the data and to make effective use of the data so exchanged.



Most of the new initiatives in health and health care require the sharing of data.



Exchanges occur within an organization, enterprise, regional, national, and country levels.



**Semantic
Interoperability**

**Consumer
Interoperability**

**Communications,
networking
Interoperability**

**Functional
Interoperability**

**Business
Interoperability**

**International
Interoperability**

**Stakeholder
Interoperability**

**Security/Privacy
Interoperability**

**Legal, ethical, societal
Interoperability**





We all need to...

- Speak the same language.
- Avoid ambiguity
- understand word structures and relationships.
- have the right level of granularity

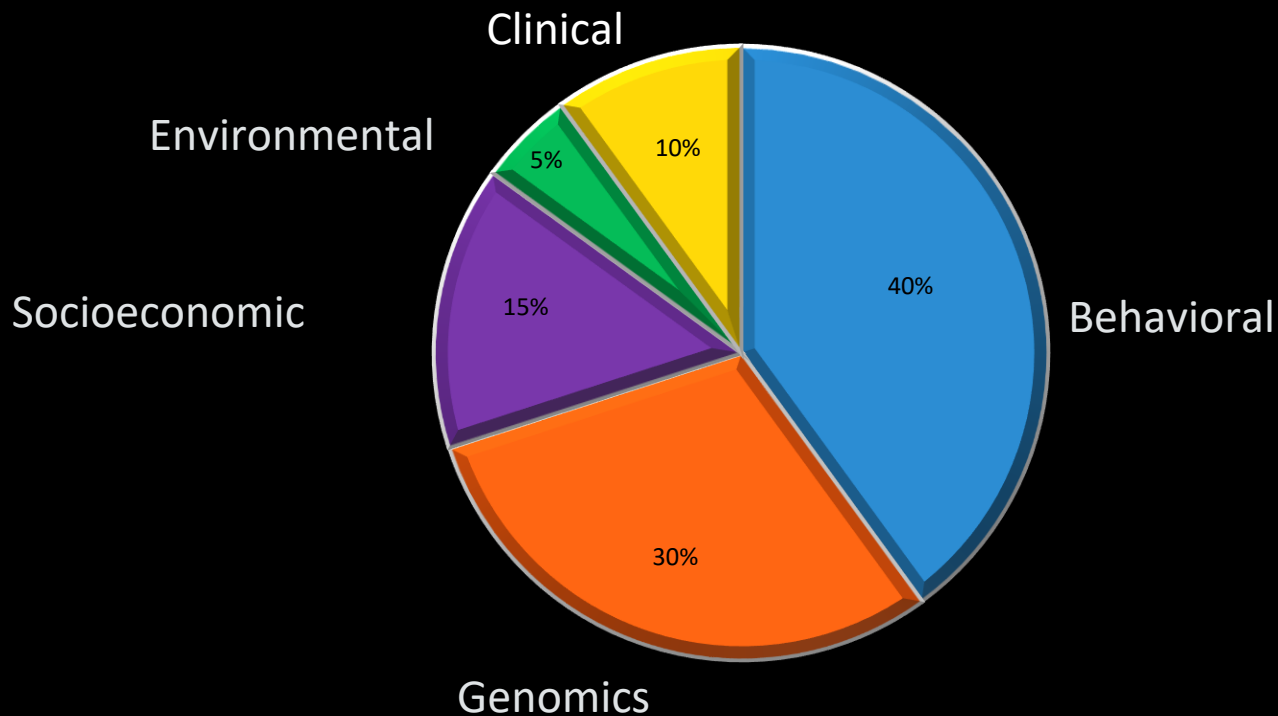
Data Representation

Data Representation

- Effective use of data requires
 - an unambiguous understanding of the meaning and intent of the data
 - trust in the quality and completeness of the data
- The problem is that there is **no global, national, regional, and even institution common set of data representation.**



New kinds of data



Source: McGinnis JM, Williams-Russo P, Knickman JR. The case for more active policy attention to health promotion. *Health Aff. (Millwood)* 2002;21: 78-93



Terminologies in general use

- SNOMED-CT – clinical data
- ICD 10 – diagnoses
- LOINC – laboratory tests
- RxNorm – medications
- MEDRA – adverse events
- MeSH – indexing literature



Why do we care?



Continuity of care requires all data about the patient aggregated into in an integrated set.



Registries permit focus on specific problems and issues.



Analytics permit identifying problems, issues, and costs and enables understanding for dealing with these concerns



Functional Interoperability

Patient
identity

Knowing
where to look
for data

How much,
what, when

With whom to
share

Knowing what
data does not
exist



What do we need to share data?



We need to extract the data we want from the EHR.



We need to “package” the data in a way the receiver can understand and use.



We need to use the data in an effective way that creates value.



We need to support models for exchange

Push: reports, documents, messages, bundles

Pull: queries



Enabling standards

- Fast Healthcare Interoperability Resources



- Substitutable Medical Apps, Reusable Technology



- CDS Hooks

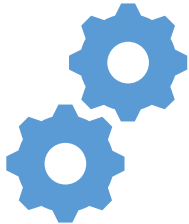


Business Case for HL7 FHIR

- Faster to learn, to develop, to implement
- Based upon modern internet technology
- Supports REST & Service Oriented Architecture
- *Human readable*
- Supported by large implementation libraries
- Developed and implemented around the world
- Readily integrates with existing standards
- FHIR is FREE!



SMART[®]



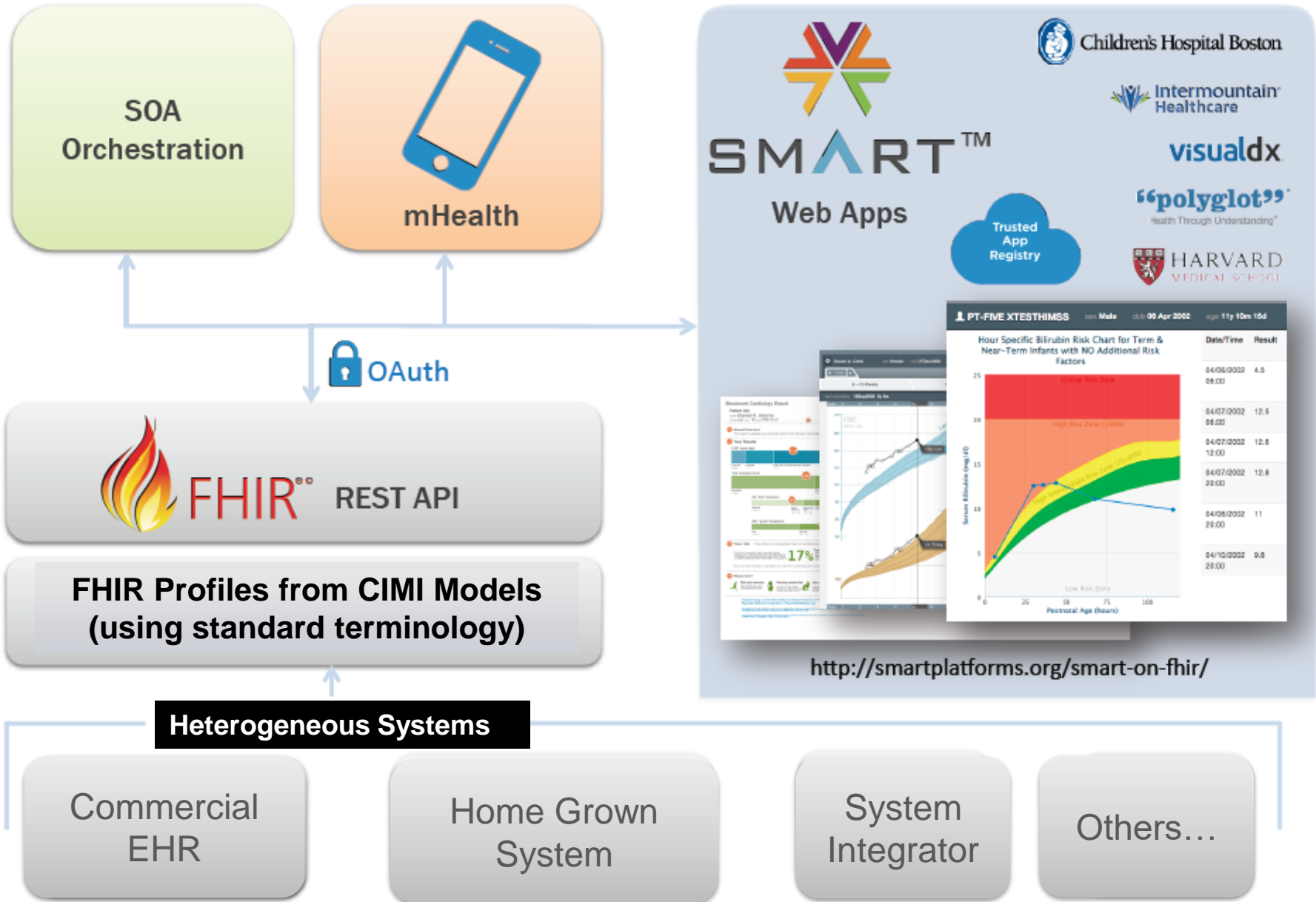
Enables vendors to create apps that seamlessly and securely run across healthcare systems

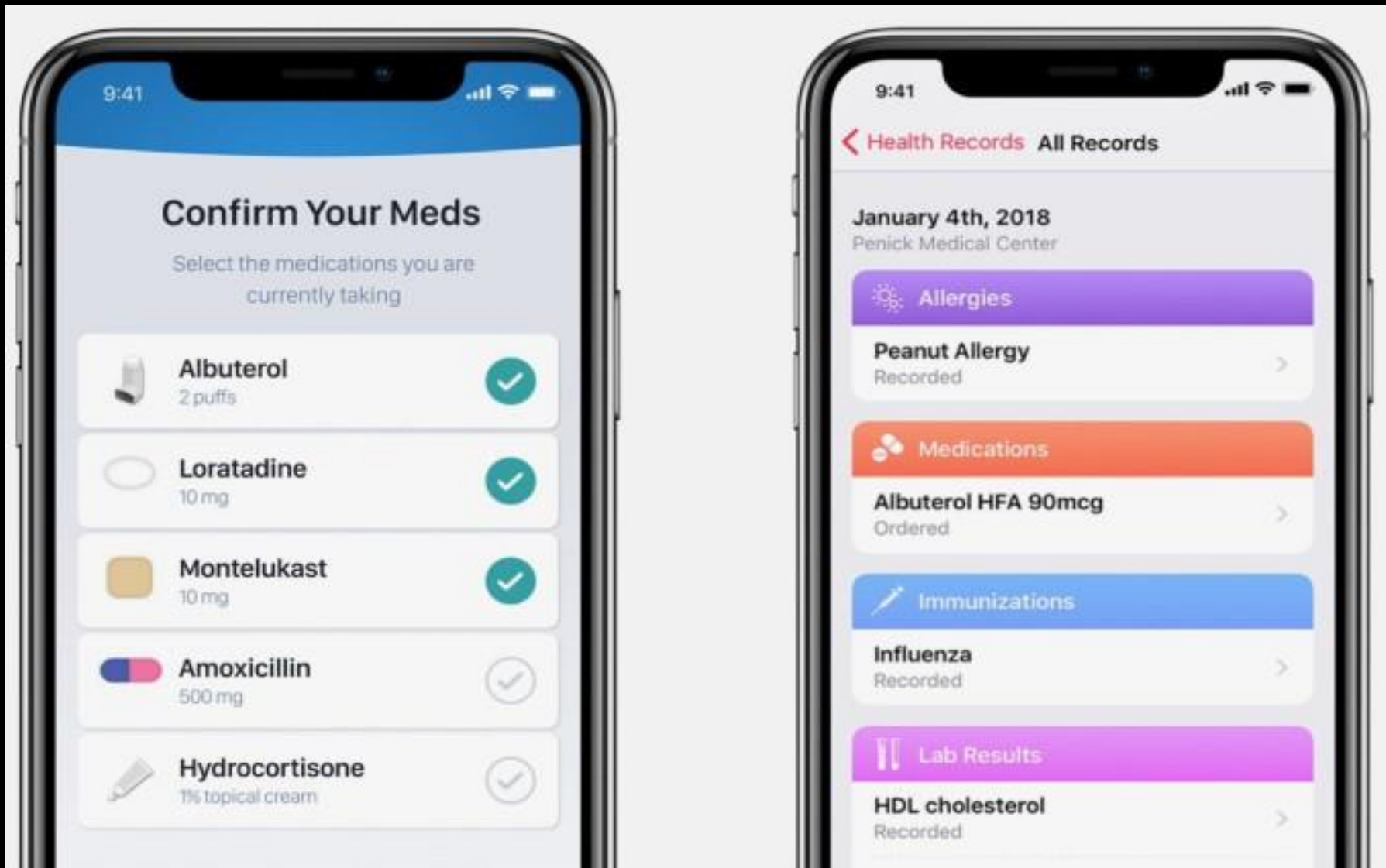


Patients, clinicians, others can draw on library of apps to improve clinical care , research, and public health



SMART on FHIR® – Open Platform Architecture





Apple Health Kit



Sustainability

- Government support
- Citizen support
- Community support
- Industry support
- Workforce development, capacity building
- Accommodating key issues such as privacy and security

Recommendations for LAC



The future is now. Embrace
the opportunity!

Thank you!
Questions?



RESOURCES



What is FHIR?

- Defines data to be exchanged in modular units called RESOURCES
- Resource content can be expanded through extensions
- Profiles specify resources to be used to accomplish specific tasks.
- Web-based architecture (ReST) used to connect systems



Resources

- Resources are:
 - Small logically discrete units of exchange
 - Defined behavior and meaning
 - Known identity and location
 - Resources refer to each other using URLs
 - Smallest unit of transaction

- Patient
- Provider
- Encounter
- Observation

Over 150
Resources
defined.



Extensions

- FHIR has a standard framework for extensions
- Every FHIR element can be extended
- Every extension has
 - Reference to a computable definition
 - Value - from a set of known types
- Supports local requirements
- Reusable



Profiles

- Resources are combined into “Profiles” to solve clinical and administrative problems in a practical way.
 - Parties exchanging data define the specific way they want to use resources and their relations using Profiles.
 - Profiles are the framework for defining services.
- Defines the collection of resources to accomplish a given task.



Examples of Profiles

- Referral of a patient to another facility.
- Populating registries.
- Supporting a Health Information Exchange (HIE).
- Adverse event reporting
- Ordering a medication.
- Providing data to a clinical decision support algorithm such as a risk assessment calculation



FHIR enables interoperability

- Exchange of data is based on a web-based approach called Representational State Transfer (**REST**) or RESTful Web services
- RESTful systems typically communicate over HTTP verbs (Create/Post, Read/Get, Update, Delete)
- FHIR permits transporting data at the lowest levels of granularity or at any level of packaged data.
- Provides interoperability between computer systems on the Internet.



SMART ®



- SMART = “Substitutional Medical Applications and Reusable Technology”
- A SMART App is a Web App
 - HTML5 + JavaScript
 - Typically embedded in EHR
 - EHR Data Access is via FHIR
- Supports smart-phone and patient-controlled apps



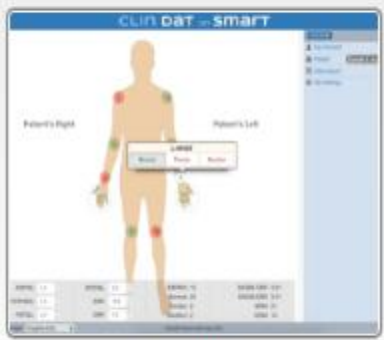
- Featured Apps
- Recently Updated
- Clinical Care
- Patient Education
- Genomics
- Open Source
- iPhone and iPad
- All Apps

Name A to Z

25 apps



Cardiac Risk



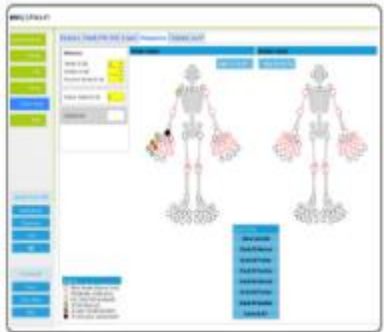
ClinDat



Crimson Care Management



Duke PillBox



EnrG | Rheum



ePRISM | Health Outcomes Sciences



CDS Hooks

- CDS Services
 - Provides a service that is invoked by the EHR via a hook
 - Evaluates its own logic using FHIR data
 - Returns decision support via cards

CDS HOOKS



Common Card Examples



Information Only

Textual information for the provider



Suggestions

Proposed actions encoded as FHIR resources



App Links

Proposed SMART app that should be used

Medication Information

ADRA2A (C/C): The genotype of this patient suggests a reduced response to certain ADHD medications.

Source: [RxCheck](#)

Medication Alert for lisinopril 5 mg tablet

This medication is not recommended for Black or African American patients.

82% of providers selected this recommendation.

[Switch to amloride 5 mg-hydrochlorothiazide 50 mg tablet](#)

Source: [RxCheck](#)

ASCVD Risk Alert

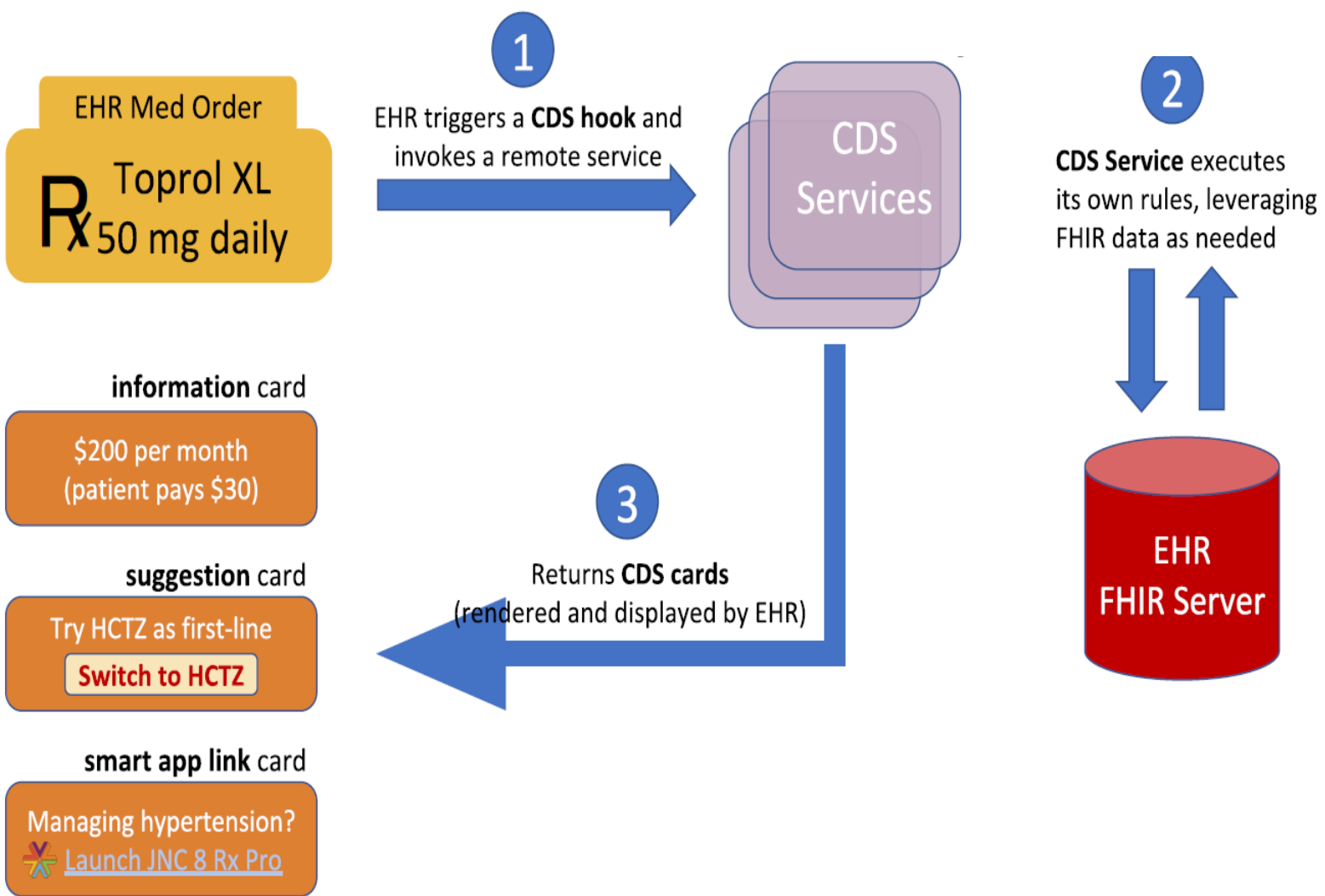
12% 10-year risk

69% lifetime risk

Source: [Demo CDS Service](#)

[ASCVD Risk Calculator](#)





Source: Jos Mandel

