An Introduction to SMART on FHIR

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Intro

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Substitutable Medical Apps, Reusable Technology

- User Management
- Workflow services
- Data persistence
- Regulatory compliance
- … app management

PERSPECTIVE

No Small Change for the Health Information Economy

Authors: Kenneth D. Mandl, M.D., M.P.H., and Isaac S. Kohane, M.D., Ph.D. Author Info & Affiliations

Published March 26, 2009 | N Engl J Med 2009;360:1278-1281
DOI: 10.1056/NEJMp0900411 | VOL. 360 NO. 13

Abstract

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

SMART Apps: Core Focus

Healthcare Apps

SMART
UX Integration
Authorization
Single Sign-On
FHIR APIs

Clinical Systems
(e.g., EHR, Patient Portal, Data Warehouse)

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

2010

$15M SHARP grant to the SMART Team

Draft SMART API released (RDF data models)

Cardiac Risk app becomes-first SMART app

2011

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

SMART Sandbox launched

2012

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

2013

Release of SMART on FHIR Genomics

SMART team joins FHIR development effort

2014

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

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

2016

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

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

2018

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

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

2020

SMART Markers Framework for Patient Generated Data

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.

2022

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

2023

Support for full export of Electronic Health Information

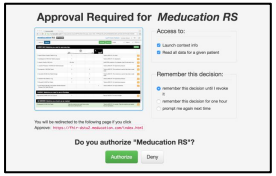
SMART®

Copyright © Boston Children's Hospital 2022

OAuth Based EHR App Launch

App

EHR



0. Launch request (server URL, launch id)

1. Authorization request (scopes, launch id)

1. Response (yes/no; scopes)

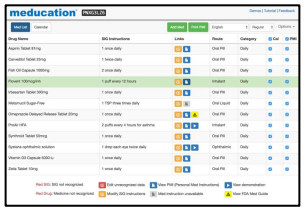
2. Token request

2. Response (access token, id token, context)

3. FHIR API request (with access token)

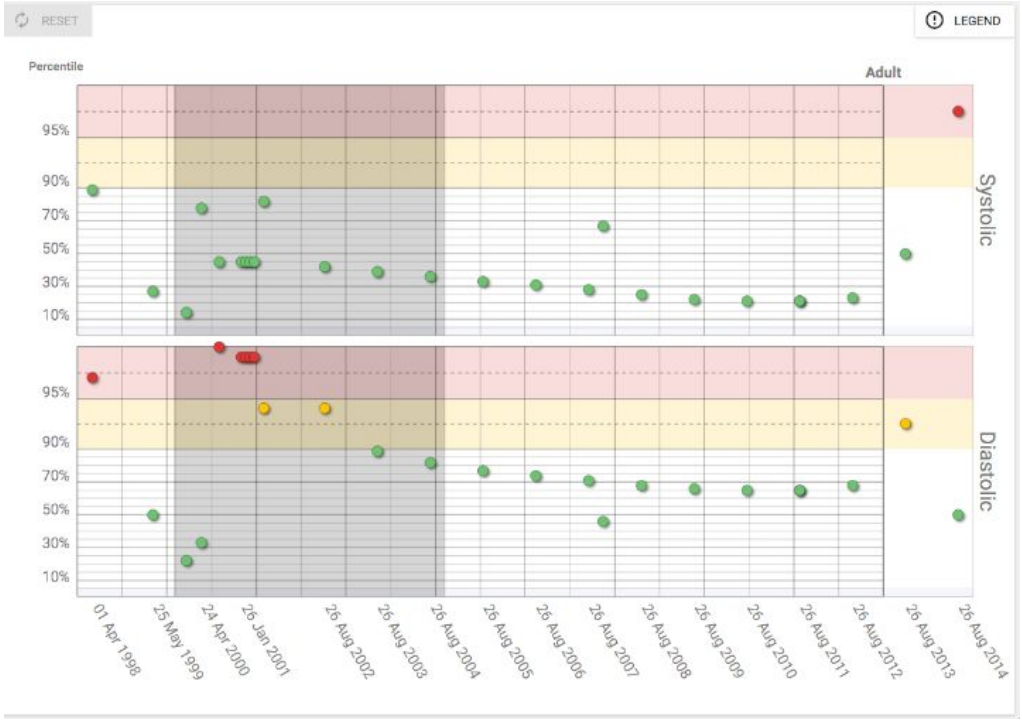
3. FHIR Resources

3. Display Data



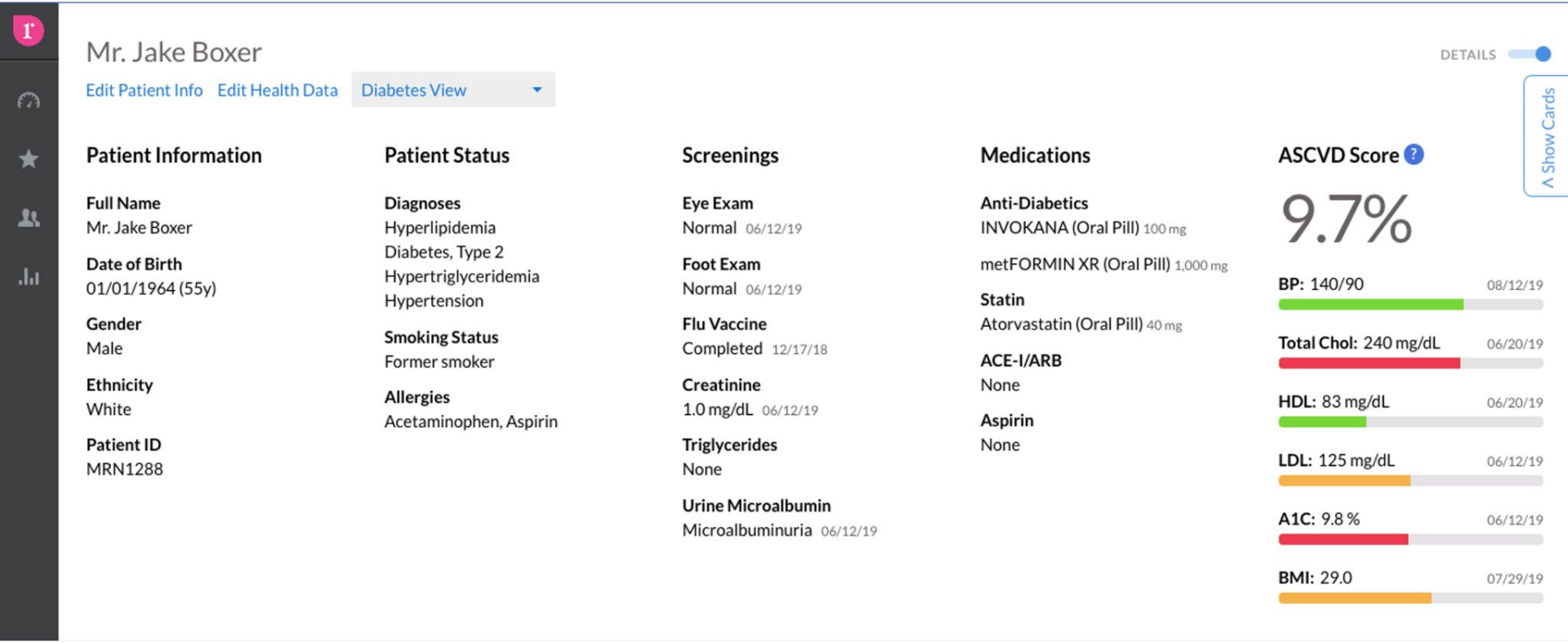
SMART Apps

https://gallery.smarthealthit.org/app/bp-centiles-v2



SMART Apps

https://gallery.smarthealthit.org/app/rimidi-diabetesme



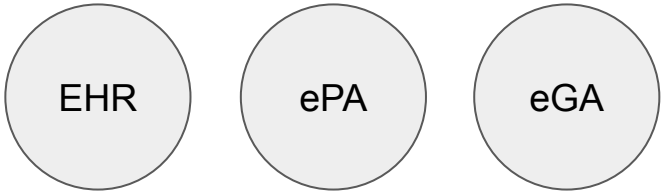
SMART on FHIR in MII

MUSS/Kann-Kriterium?	Anforderungs-nummer	Kategorie	Beschreibung
MUSS	3.1	Security	TLS 1.3 / 1.2 Support
KANN	3.2	Security	Autorisierung für die Abfrage von Terminologie-Ressourcen / Terminologie-Operationen kann per SMART on FHIR erfolgen
MUSS	3.3	Security	Rollen- und Rechtekonzept ist vorhanden, um eine Benutzergruppe für die Administration der Terminologie-Ressourcen zu definieren

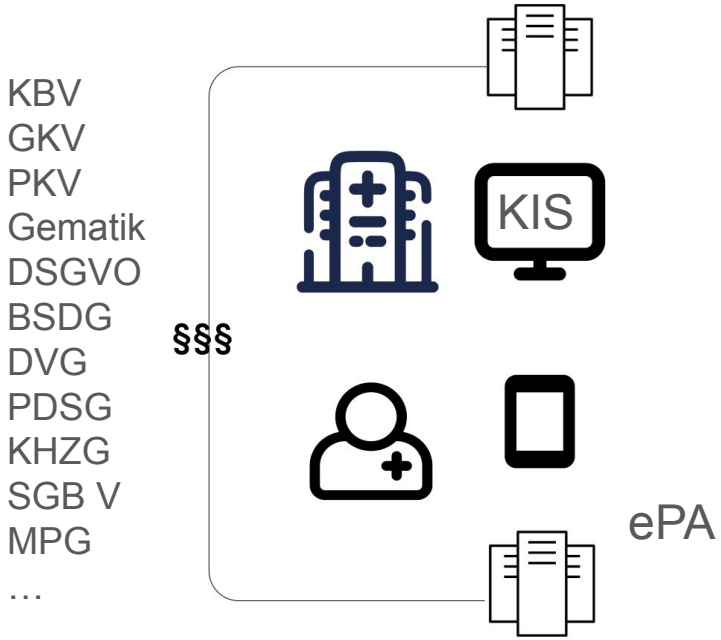
- Anforderungsermittlung für einen Terminologieserver in der Medizininformatik-Initiative 28.10.2021

- HiGHmed: Approach of placing FHIR and openEHR as complementary standards, with with SMART on FHIR being used in particular as a connector to the data stored in openEHR.

Terminology



- EHR means eGA
- EHR means ePA
- EHR means KIS
- EHR means FHIR Server



SMART Apps in Germany

- BIH: Integration Hub - Using Apple Watch to track ECG data
- MII Partners use SMART on FHIR: Mint Medical GmbH, Snke OS GmbH, also within the Radiological Cooperative Network (RACOON) project by NUM
- ISiK Connect (by Gematik) builds on SMART on FHIR

- No significant market of SMART Apps in Germany
  - Software manufacturers have no pressure to innovate

github.com/NUM-Forschungsdatenplattform/smart-on-fhir-keycloak

github.com/NUM-Forschungsdatenplattform/smart-on-fhir-app

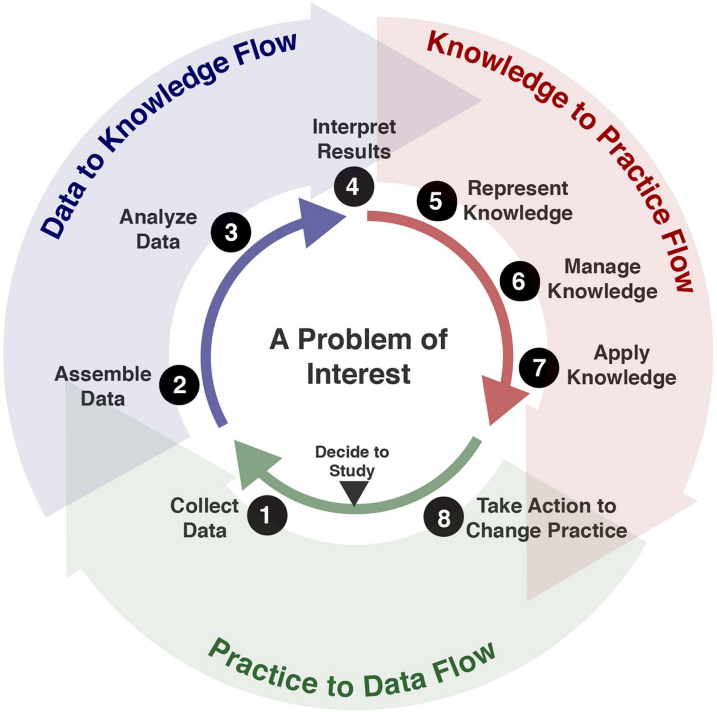
Simplifier.net, retrieved 20/10/24

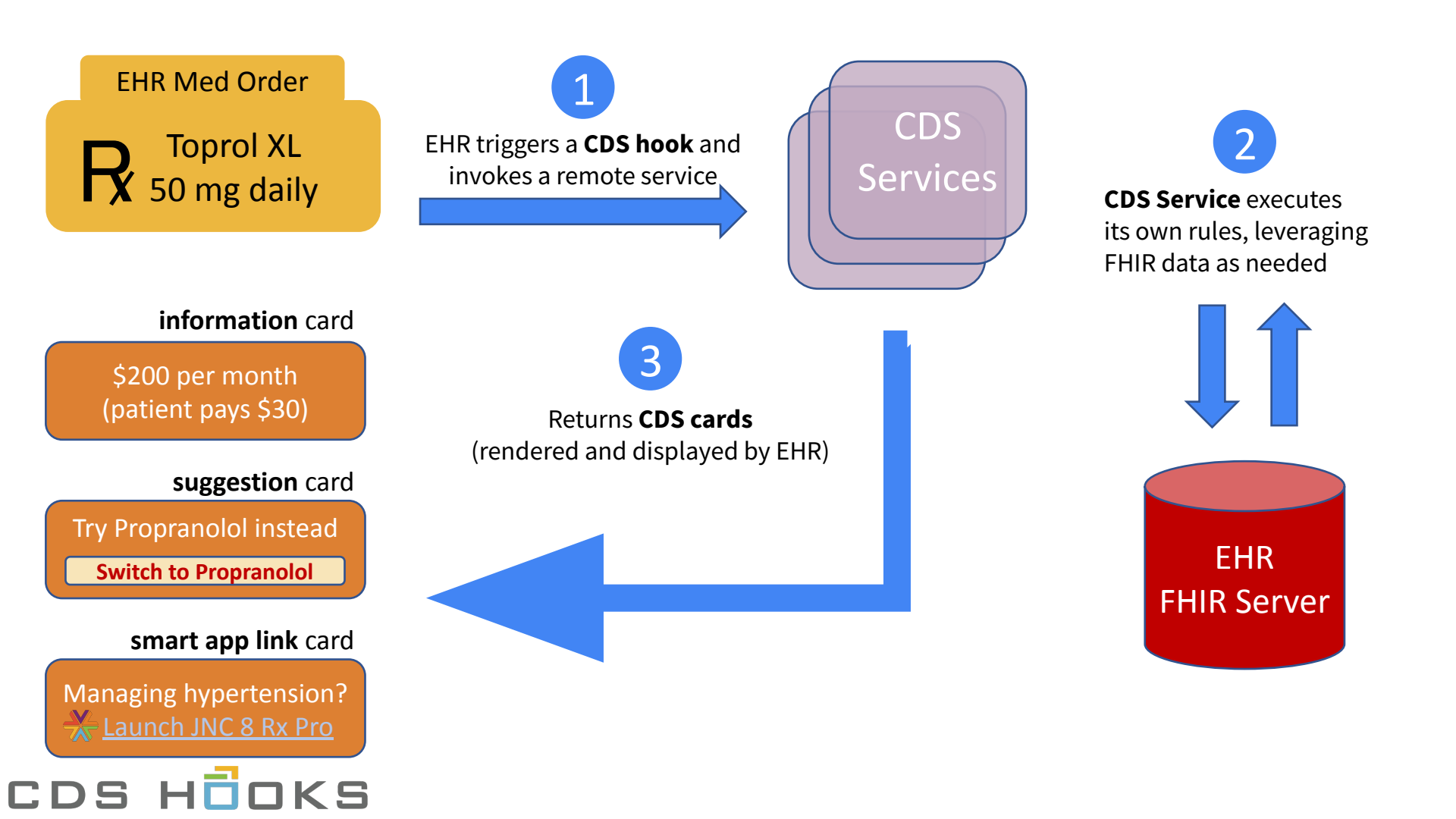
SMART Apps in Learning Health System

https://onlinelibrary.wiley.com/doi/10.1002/lrh2.10054

Given a "Learning Health System" model…

(2) Apps and Services for data assembly
(7-9) Apps deployed in clinical care
+ CDS Hooks for automated launch




EHR Med Order
Rx Toprol XL
50 mg daily
1
EHR triggers a **CDS hook** and invokes a remote service
CDS Services
2
CDS Service executes its own rules, leveraging FHIR data as needed
EHR FHIR Server
3
Returns **CDS cards** (rendered and displayed by EHR)
information card
$200 per month (patient pays $30)
suggestion card
Try Propranolol instead
Switch to Propranolol
smart app link card
Managing hypertension?
Launch JNC 8 Rx Pro
CDS HOOKS

https://docs.smarthealthit.org/

https://hl7.org/fhir/smart-app-launch

https://github.com/smart-on-fhir

http://sandbox.cds-hooks.org/