

# HIMSS19 CHAMPIONS OF HEALTH UNITE

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## FHIR Interoperability: Point of Care Healthcare Apps in the Real World

Session 306, February 15, 2019

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# Conflict of Interest

## Jon Billet

- Have no real or apparent conflicts of interest to report.

## Ryan Van Loan

- Have no real or apparent conflicts of interest to report.



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# Agenda

- Learning Objectives Overview
- Introductions
- Geisinger's Approach to Innovation
- FHIR and its Role in Interoperability
- Challenges in using FHIR Technology
- Geisinger Use Cases
- Approaches to using FHIR Successfully
- Future Recommendations



# Learning Objectives Overview

1. Describe FHIR and its role in interoperability
2. Identify the potential challenges presented in developing apps using FHIR
3. Explain several Geisinger use cases utilizing FHIR
4. Describe potential approaches for successful utilization of FHIR



# Introductions



## Jon Billet

- Director of Software Engineering for Steele Institute for Health Innovation, Geisinger Health System
- In his role, he is responsible for all custom software activities including team direction and strategy that support project and organizational initiatives. Jon serves as the internal and external key contact for development and advisory related activities the Steele Institute Software Engineering team performs.
- Prior, Jon worked as a federal government contractor before entering healthcare. Duties included architecting software for the Department of Defense, the State Department, the GSA, the IRS, and other government agencies. Jon brings over 15 years of experience in the software engineering arena.



# Introductions

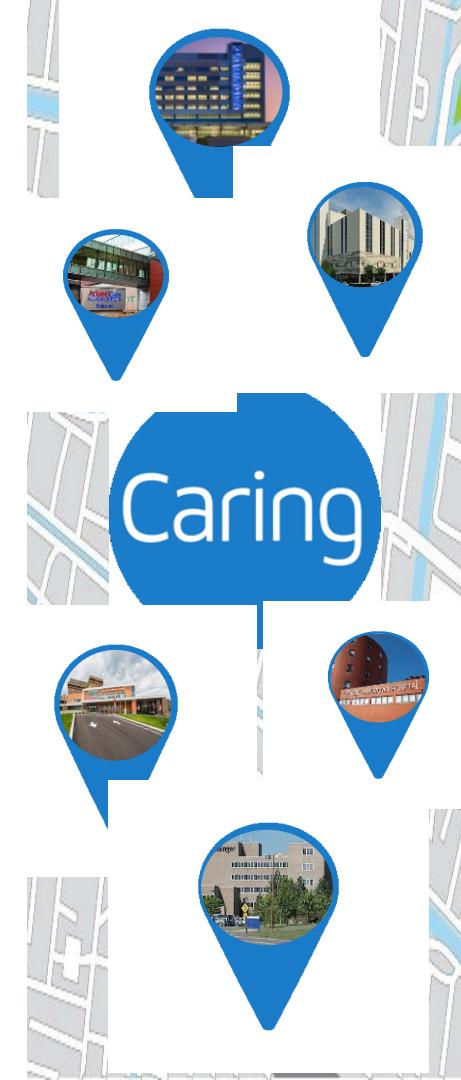


Ryan Van Loan

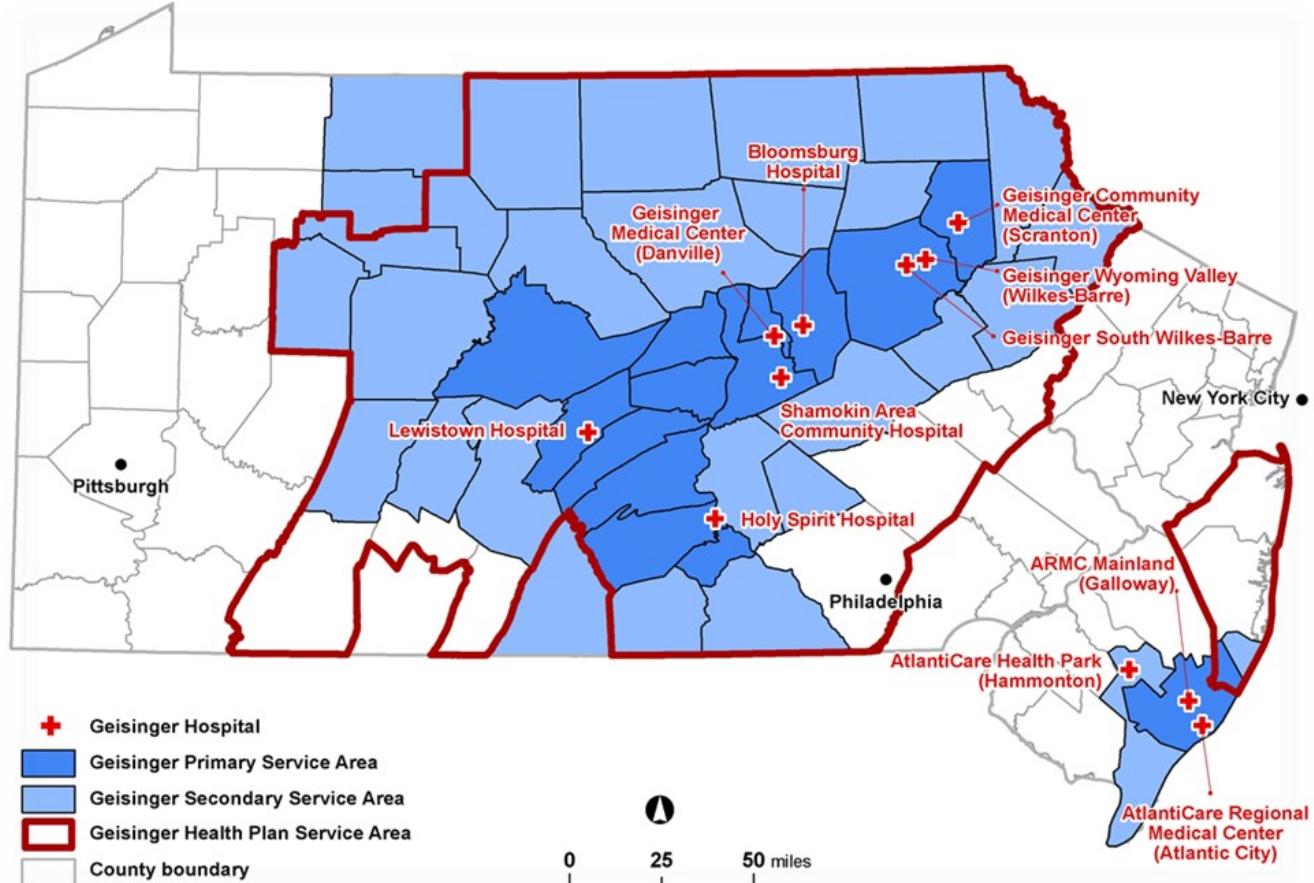
- Manager of Product Innovation for Steele Institute for Health Innovation, Geisinger Health System
- Ryan has nearly 9 years' experience implementing innovation and research throughout Geisinger, managing the administrative, operational, and technical facets of projects in the Steele Institute portfolio
  - Portfolios range from clinician-facing population health and point of care applications to patient-facing 365-days-a-year, mobile applications to Artificial Intelligence and Machine Learning
- Ryan has been a repeat guest lecturer at Pennsylvania State University's Master of Health Administration Graduate Program

# Geisinger: An Introduction

- A physician-led integrated health services organization
  - Serves more than 3 million residents in 45 counties
  - Clinical Enterprise, Health Insurance Company, Geisinger Foundation, and Geisinger-Commonwealth School of Medicine
- Technologically advanced
  - Using Epic EHR since 1998
  - Among “Most Wired Hospitals and Health Systems” 14 years
- Nationally recognized
  - Model for high-quality and high-value integrated service delivery
  - One of the largest rural health systems in the U.S.



# System Service Area



# Steele Institute for Health Innovation

Geisinger

## Purpose

Lead the nation in building transformative, scalable, measurable, and sustainable solutions that improve health, care delivery, patient experience, and lower cost

## Definition of innovation

A fundamentally different approach to solving a problem that has quantifiable outcomes

## Guiding principles

- Problem solving, value creating
- Advance values and strategic priorities
- Build upon data-backed strengths
- Inspired by both the broader healthcare community and other industries
- National replication potential
- Keep Geisinger family at the forefront



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# How we will develop our third generation of innovation

Leveraging Geisinger's assets...



- Clinical and genetic data
- Culture of innovation
- Integrated system
- Stable population

...and accessing new capabilities...

- AI / machine learning
- Data analytics
- Care models

...to solve the defining health problems of our time



# Geisinger Incubator

## Cross functional approach to Product Innovation

- The Product and Clinical Innovation Team is an advanced and predictive analytics, implementation, product management, and software development group that seeks to deliver greater health care through product and process development, clinical care model redesign, patient-family engagement, and research.



Help clinicians and researchers generate ideas



Support innovation best practices



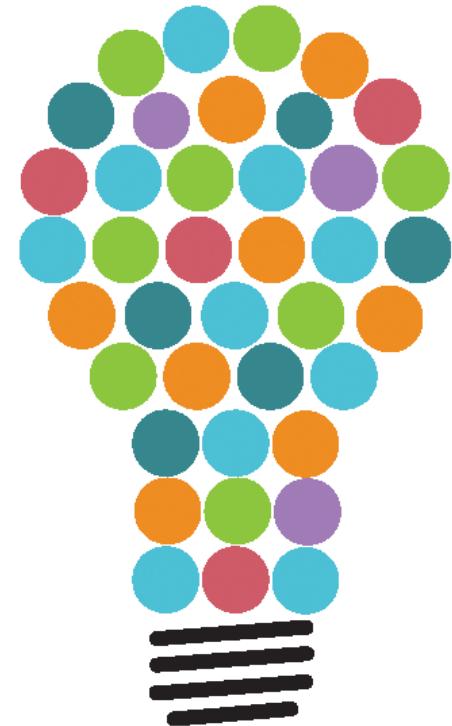
Develop skills and spread innovation across the enterprise



Provide core resources to develop, design, implement & evaluate new ideas



Foster and support partnerships with Research, IT and Operations

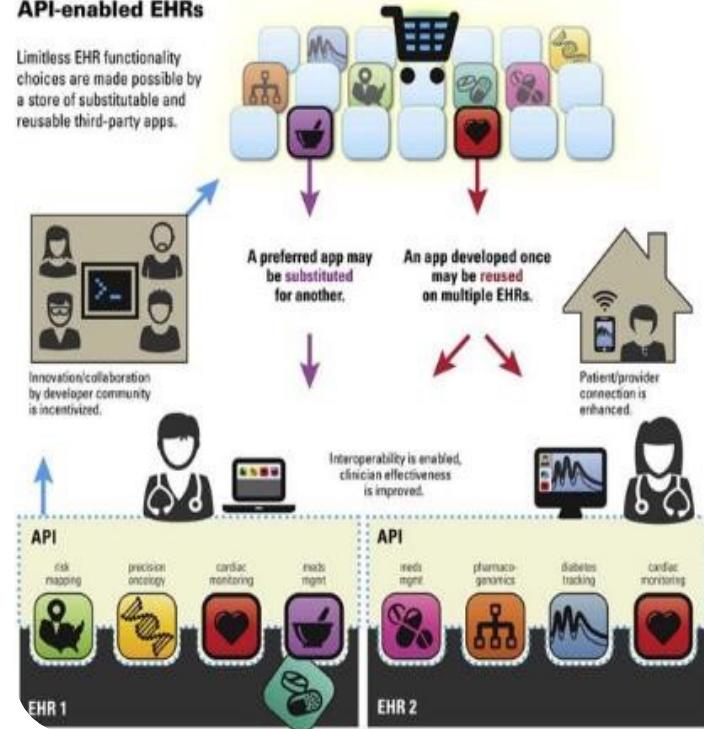


# Fast Healthcare Interoperability Resources: An Introduction to FHIR®

- An open, standards-based platform for medical apps designed to enable connecting apps to multiple EHRs
- FHIR (Fast Healthcare Interoperability Resource) FHIR provides “resources” or detailed sets of API’s, references, and “core” data models
- If an EHR supports FHIR resources, then an app using FHIR is essentially EMR-agnostic

## API-enabled EHRs

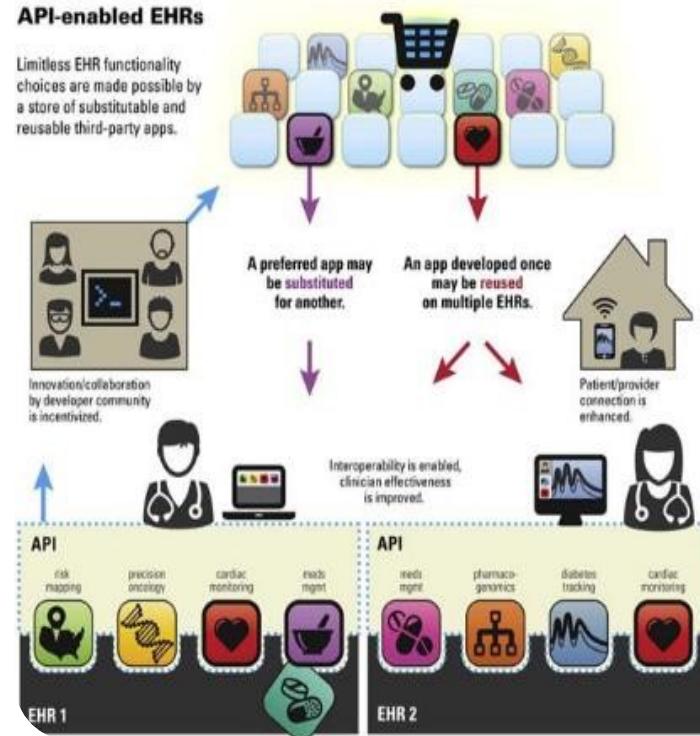
Limitless EHR functionality choices are made possible by a store of substitutable and reusable third-party apps.



## Learning Objective 1

# Fast Healthcare Interoperability Resources: What is FHIR® and its role in interoperability?

- An open, standards-based platform for medical apps designed to enable connecting apps to multiple EHRs
- FHIR (Fast Healthcare Interoperability Resource) FHIR provides “resources” or detailed sets of API’s, references, and “core” data models
- If an EHR supports FHIR resources, then an app using FHIR is essentially EMR-agnostic





# Fast Healthcare Interoperability Resources: What is FHIR® and its role in interoperability?



FHIR follows  
an 80-20  
principle

FHIR is often  
paired with  
authentication  
protocols to  
ensure security



Use of FHIR in  
EHR-integrated,  
point of care  
healthcare apps  
has been  
limited

# Challenges in using FHIR Technology

- Data accuracy and availability
  - Some EHR's and companies (e.g., SMART Boston) offer sandbox environments to develop FHIR apps
  - Often these environments lack the realistic and robust data found in EHRs. For example, accepting free text values for diagnoses.
  - FHIR resources may accept multiple standard codes such as ICD-10 or SNOMED and EHR vendors may accept either or both



# Challenges in using FHIR Technology

- **FHIR version compatibility**
  - FHIR now has multiple versions that are all slightly different. (e.g., Cerner supports DSTU2 while EPIC's latest release supports DSTU2 and STU3)
- **Software engineering capabilities**
  - Building clinical apps requires knowledge of both software development and EHR structures



# Geisinger Use Cases



**"Geisinger's ability to commercialize its EHR workflows via FHIR to a growing number of FHIR-enabled EHR platforms is pioneering and will usher in a new era of provider and patient-focused applications to more effectively deliver care."**

- Aneesh Chopra, former Chief Technology Officer, United States of America



# Geisinger Use Cases: PACER

- First FHIR-enabling exercise we attempted (Fall 2014-Spring 2015)

The screenshot displays the Geisinger HeartCompass PACER application interface. The top navigation bar includes the COMPASS logo, a patient icon, and tabs for 'Review' (selected), 'Snapshot', 'Trends', 'Diagnosis & Medications', and 'Rheumatic Labs & Test'. The main content area is divided into several sections:

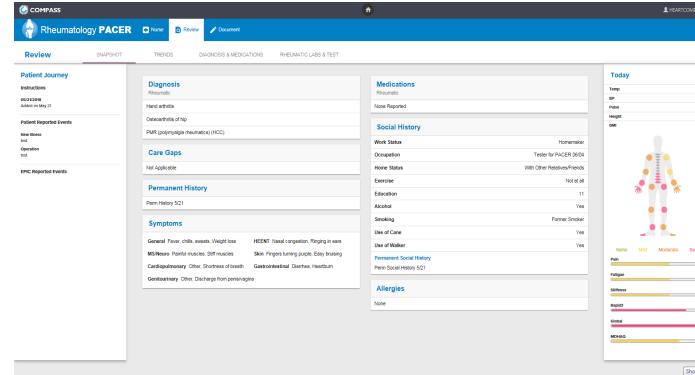
- Patient Journey:** Shows instructions and a note added on May 21.
- Diagnosis:** Lists Hand arthritis, Osteoarthritis of hip, and PMR (polymyalgia rheumatica) (HCC).
- Care Gaps:** Lists 'Not Applicable'.
- Permanent History:** Lists Perm History 5/21.
- Symptoms:** Lists General: Fever, chills, sweats, Weight loss; HEENT: Nasal congestion, Ringing in ears; MS/Neuro: Painful muscles, Stiff muscles; Skin: Fingers turning purple, Easy bruising; Cardiopulmonary: Other, Shortness of breath; Gastrointestinal: Diarrhea, Heartburn; Genitourinary: Other, Discharge from penis/vagina.
- Medications:** Lists Rheumatic and None Reported.
- Social History:** Lists Work Status (Homemaker), Occupation (Tester for PACER 09/04), Home Status (With Other Relatives/Friends), Exercise (Not at all), Education (11), Alcohol (Yes), Smoking (Former Smoker), Use of Cane (Yes), and Use of Walker (Yes).
- Permanent Social History:** Lists Perm Social History 5/21.
- Allergies:** Lists None.
- Today:** Displays vital signs: Temp 98 F, BP 120/90, Pulse 80, Height 5'9", and BMI 28.12. It also features a body map with colored dots indicating pain levels (None, Mild, Moderate, Severe) across various body parts and a series of horizontal sliders for Pain, Fatigue, Stiffness, Rapid3, Global, and MDHAQ scales.



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# Geisinger Use Cases: PACER

- Converted the apps API's from standard EHR web services to FHIR services
- Limited by FHIR Resources available at the time
  - App was able to consume data using FHIR ("pull") but could only return data using FHIR in Cerner EHR (at the time)
  - App was highly customized to our Rheumatology Department



# Geisinger Use Cases: Family Caregiver Application (FCA)

- FCA is designed to enable family caregivers to efficiently and effectively communicate with the care team and their dependent to coordinate care

The screenshot shows the FCA application interface. At the top, there's a navigation bar with links: Home, Interests & Information, Appointments, Care Partners, Healthcare Team, Medication Management, and Notes. On the right side of the header is a user profile icon and social media sharing icons.

The main content area is divided into several sections:

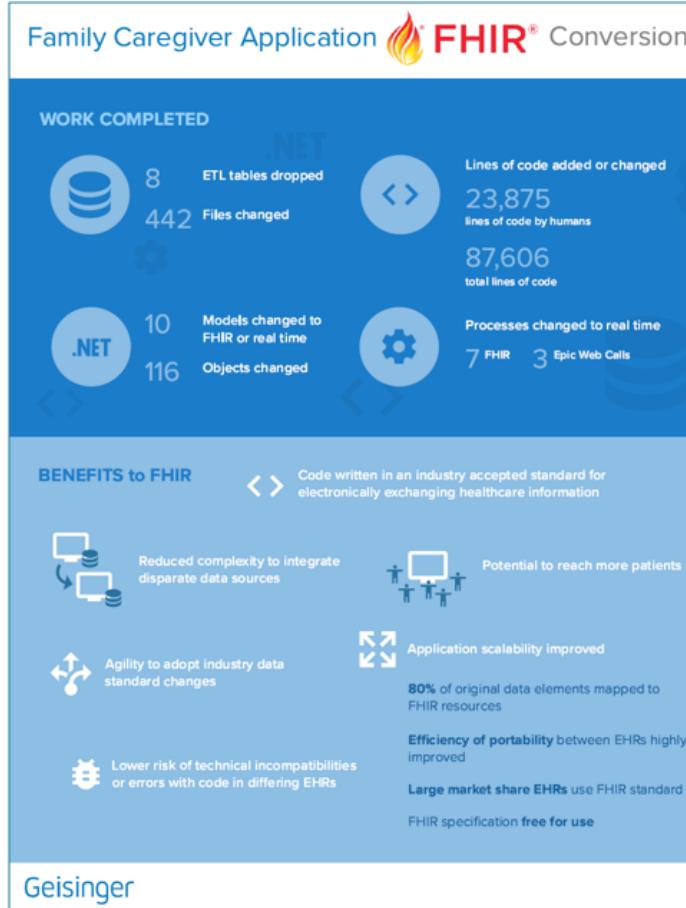
- Your Activities & Appointments:** This section features a calendar titled "Your Calendars | ADD APPOINTMENT". It shows three scheduled appointments:
  - 10/15/2018 12:00 AM - 10/15/2018 12:00 AM: Office Visit, Department: Pulmonary Medicine, Danville, Provider: [redacted]
  - 10/17/2018 12:00 AM - 10/17/2018 12:00 AM: Office Visit, Department: Family Practice, Tunkhannock, Provider: [redacted]
  - 10/18/2018 12:00 AM - 10/18/2018 12:00 AM: Office Visit, Department: Hematology Oncology Knapper Clinic, Danville, Provider: [redacted]
- Get Support From Your:** This section contains two boxes:
  - PRIMARY CARE PARTNER:** Joe Caregiver, jcaregiver23@gmail.com, Phone: 570-123-3344 (Mobile). It includes a small profile picture of a man.
  - PRIMARY HEALTHCARE TEAM CONTACT:** A placeholder for contact information, showing a green circle icon and the text MD, Phone: [redacted].
- Your Life & Interests:** This section includes three categories with input fields:
  - FAVORITE VACATION SPOT: Any place where there is lots of sun and water
  - MY HOBBIES: Baking, Drawing, Painting, Yoga, Baseball, Netball, Traveling, Disc Golf
  - MY PETS: Jacey (wheaten terrier), Wilfred (goldfish)



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# Learning Objective 3

## Geisinger Use Cases: Family Caregiver Application (FCA)



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# Geisinger Use Cases: Family Caregiver Application (FCA)

- Pivoted to EPIC's existing FHIR resources utilizing EHR test data
  - Began with DSTU2, but utilized STU3 version instead (more modern, more elements, etc.)
- Able to successfully FHIR-enable FCA while adhering to the 80-20 principle
- Approach
  - Evaluate existing data elements in the app to determine app vs. EHR vs. other data
  - Map EHR data elements to FHIR Resources
  - Convert data resources
  - Update coding to FHIR standards (e.g., SNOMED, RxNorm, LOINC, etc.) APIs, DB schema/structure, etc.
  - Test against EHR development environments



# Geisinger Use Cases: Family Caregiver Application (FCA)

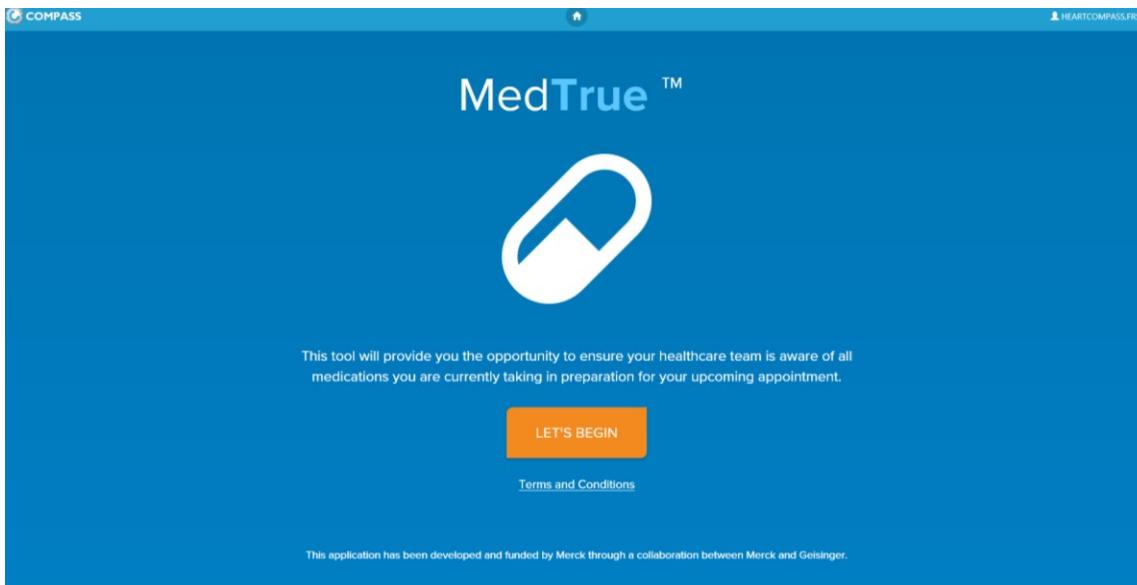
- **FHIR Resources Used**

- Patient, Related Person, Encounter, Practitioner, Care Plan, Care Team, Location, and Medication (including Statement and Order) Resources
- Over 45 FHIR data elements within identified FHIR Resources utilized throughout the application



# Geisinger Use Cases: MedTrue™

- MedTrue™ is an EHR-integrated workflow solution that aggregates multiple data sources to enhance the medication reconciliation process and uncover patient issues with medication adherence



# Geisinger Use Cases: MedTrue™

- We're currently moving through the process of FHIR-enabling MedTrue™
- Approach
  - Evaluate existing data elements in the app to determine app vs. EHR vs. other data
  - Map EHR data elements to FHIR Resources
- Challenges encountered
  - MedTrue™ utilizes many custom data sources in its current version that allow physicians to review patient-reported and nurse-verified med lists and push them into the EHR, updating the patient's medication list within their chart
  - FHIR has write-back Resources available...but EHRs do not support many of these services beyond documentation
  - Additionally, many EHRs do not support standard web services to write back
  - Currently exploring potential options to mitigate this



# Approaches for using FHIR successfully

- Any approach to FHIR requires access to existing EHR's as a source of truth when developing FHIR apps
  - Limited apps may be able to utilize sandbox environments, but any robust data services
- A systematic approach, similar to the one we used for FCA and MedTrue could be adopted by other software engineers and systems looking to develop FHIR-based apps



# Future Recommendations

- We all should look to what we've learned in standardizing EHR's and apply those learnings to FHIR
- EHR's interested in 3rd party app development should provide more robust, realistic, and well-supported sandbox environments
  - This would allow companies and software engineers outside of healthcare to develop apps ready for the real world
- EHR's need to expand their FHIR resources beyond merely 'read' and open up 'write back' resources
- Healthcare systems should come together to call for universal adoption of FHIR standards
  - Agreed upon release dates of new versions
  - FHIR implementations that are more closely related



# Questions



# Contact Information



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