Experiences With a FHIR Ecosystem Platform's Queryable APIs

Session #78, August 10, 2021, 4:00pm, Room Summit 211, Caesars

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HIMSS 21

INTEROPERABILITY INSTITUTE

HIMSS Michigan Chapter

University of Michigan

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Today's Speakers

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Michigan HIMSS Chapter and MIHIN

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Team Members

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Mary Kratz, Executive Vice President, Interoperability Institute

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Conflicts of Interest

Helen L. Hill, FHIMSS, is Board Director at Large for Michigan Health Information Network Shared Services (MIHIN).

The Interoperability Institute, a subsidiary of MIHIN, offers its own FHIR ecosystem sandbox (Interoperability Land™) and collaborates with the Interop.Community to offer a public, open source FHIR sandbox.

The speakers have no other real or apparent conflicts of interest to report.

Agenda for Today

- **Introduction to our Project and Partnership Program**

  - **Collaborative Partnership**
  - **Main Purpose of the Partnership**
  - **Things That Motivate Us**

- **Technical Work on Complex, Multi-target FHIR queries (Query Kits for FHIR)**

  - **Platforms Used**
  - **Examples of Query Kits for FHIR**
  - **Educational Programming**

- **Summary and Next Steps**

Specific Learning Objectives

- Explain what complex, multi-target FHIR® queries (**Query Kits**) are and do.

- Critique the potential for **Query Kits** to fill information gaps pertaining to telehealth, medication reconciliation, and social determinants of health

- Identify whether using **Query Kits** might provide a suitable solution for one or more health information needs of interest to YOU!

We Have Formed a Unique Partnership

**HIMSS
Michigan Chapter**

+

**Interoperability
Institute**

+

**University of
Michigan**

HIMSS Michigan Chapter

- **Breadth and Diversity**

  - 1,700 members
  - Extraordinary member talent and diversity

- **Collaboration, Education and Leadership**

  - Health IT & Health Info Exchange innovation, policy, workforce development
  - HIMSS Changemaker Chapter for advocacy
  - Partner on interoperability, care coordination, use of standards
  - Work on Michigan HIT Commission's Statewide 5-Year HIT Roadmap
  - Sponsor interns
  - Conduct career fairs

Interoperability Institute

IOI offers a neutral HIT space where …

- **Organizations can collectively demonstrate interoperable HIT solutions**
  - IOI Provides the Interoperability Land™ sandbox with synthetic FHIR data

- **People can learn to innovate with modern technologies & standards**
  - IOI Organizes Connectathons and Interoperathons

- **HIT workforce development can take place**
  - IOI Runs an Internship Program for 100+ student interns
  - Recognized by HIMSS Technology Informatics Guiding Education Reform (TIGER)

University of Michigan's Health IT Programs

- **Masters in Health Informatics**
  - @ School of Information
  - Residential
  - ≈ 40 students per year, some of whom are IOI Interns too!

- **Masters in Health Infrastructures and Learning Systems**
  - @ Medical School
  - Online and Residential
  - ≈ 20 students per year

- **PhD in Health Infrastructures and Learning Systems**
  - @ Medical School
  - Residential

We Value Tech "Sandboxes" for...

Photo by Marvin Meyer on Unsplash

Collaboration
Team up to solve complex problems.

Learning
Fail and learn quickly without dire consequences.

Innovation
Gain new skills, methods & solutions.

Validation
Test rigorously with shared tools, data & personas.

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Our Goal is Holistic Interoperability

high

Organizational Interoperability
Standardized Process

Semantic Interoperability
Standardized Meaning of Terms

Syntactic Interoperability
Standardized Data Exchange Formats

Technical Interoperability
Standardized Protocols

low

TODAY WE TRY TO INSERT SOMETHING NEW

Standardized Queries
e.g., Query Kits for FHIR

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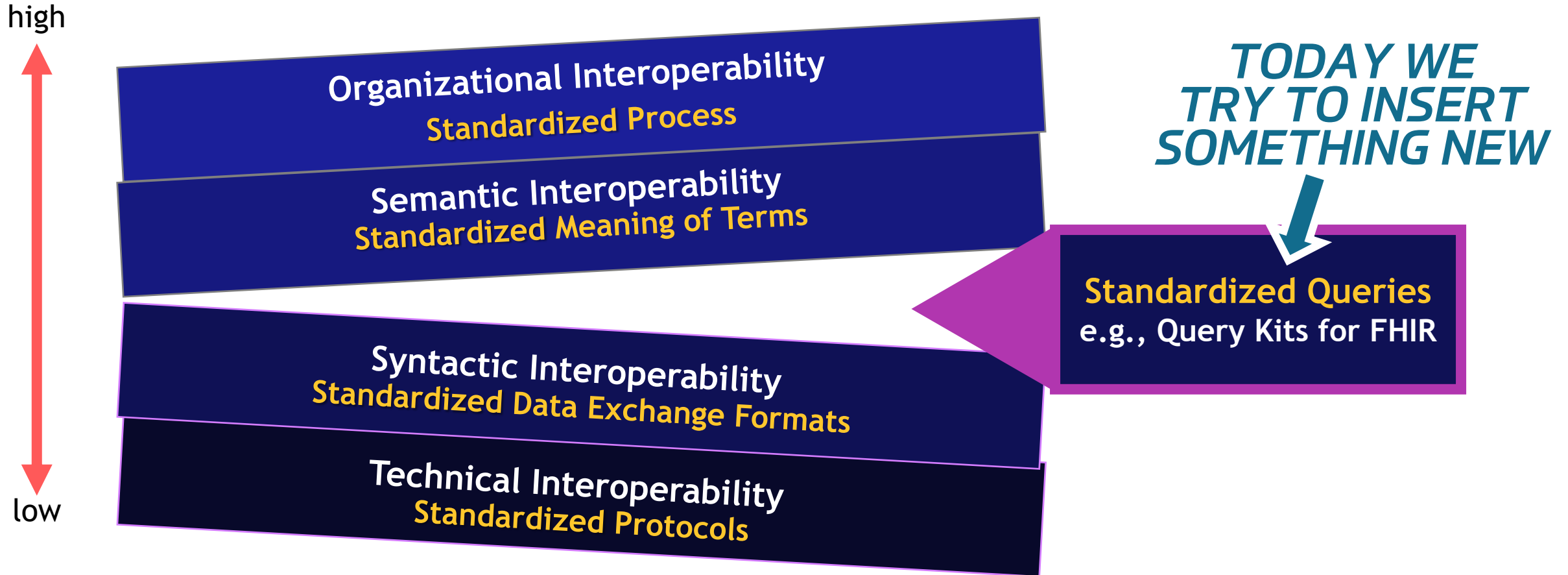
Some of the Things That Motivate Us

- Advancing standards and standards harmonization in specific areas

  Social Determinants of Health (Gravity, Siren, etc.)

  Reconciling Syntax/Semantic Variation in FHIR Resources for EHRs & Other Health IT

- Making improvements in

  Patient identification

  Industry-wide app testing platforms

  Uptake of patient reported outcomes data

  … and Shareable Queries

Audience Question #1

What interests you <u>MOST</u> about advancing Healthcare Interoperability?

- **Empowering people with better data sharing?**

- **Providing AI-driven apps?**

- **Accelerating a move to the cloud?**

- **Improving clinical care and research across the continuum?**

What are Query Kits?

(aka Complex Multi-target FHIR Queries)

The General Idea of a Query Kit

Health App

Icon by Ahmed Elzahra

Query Kit for FHIR

Clinic Hospital Insurance Company Pharmacy HIE

Ecosystem of Multiple FHIR Data Servers

A Shareable, Related Series of
FHIR Queries Needed to Do One Job
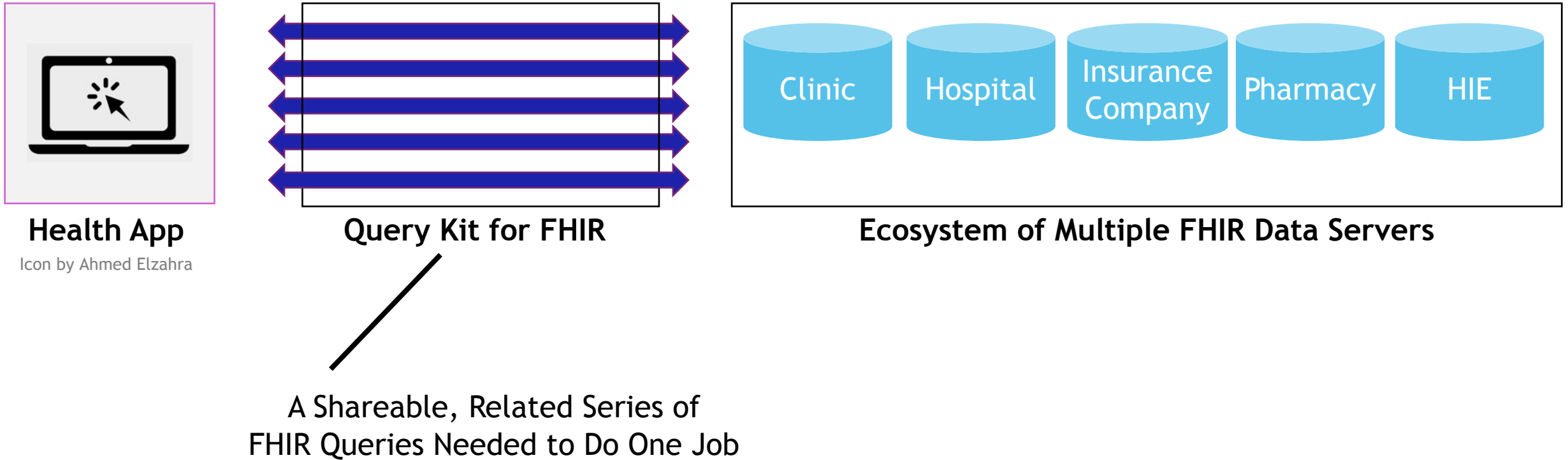
Job of a Query Kit for Medication Reconciliation

- Identify one or more FHIR server locations with a patient's medication resources

- GET multiple types of medication-related FHIR resources from those locations
  - **MedicationStatement**
  - **MedicationRequest**

- OPTIONAL: Limit the "lookback" time period to minimize information overload

- OPTIONAL: Have the FHIR servers order the information retrieved

Overview of Our Setup to Create Query Kits

1 → **2** → **3** → **4** → **5**

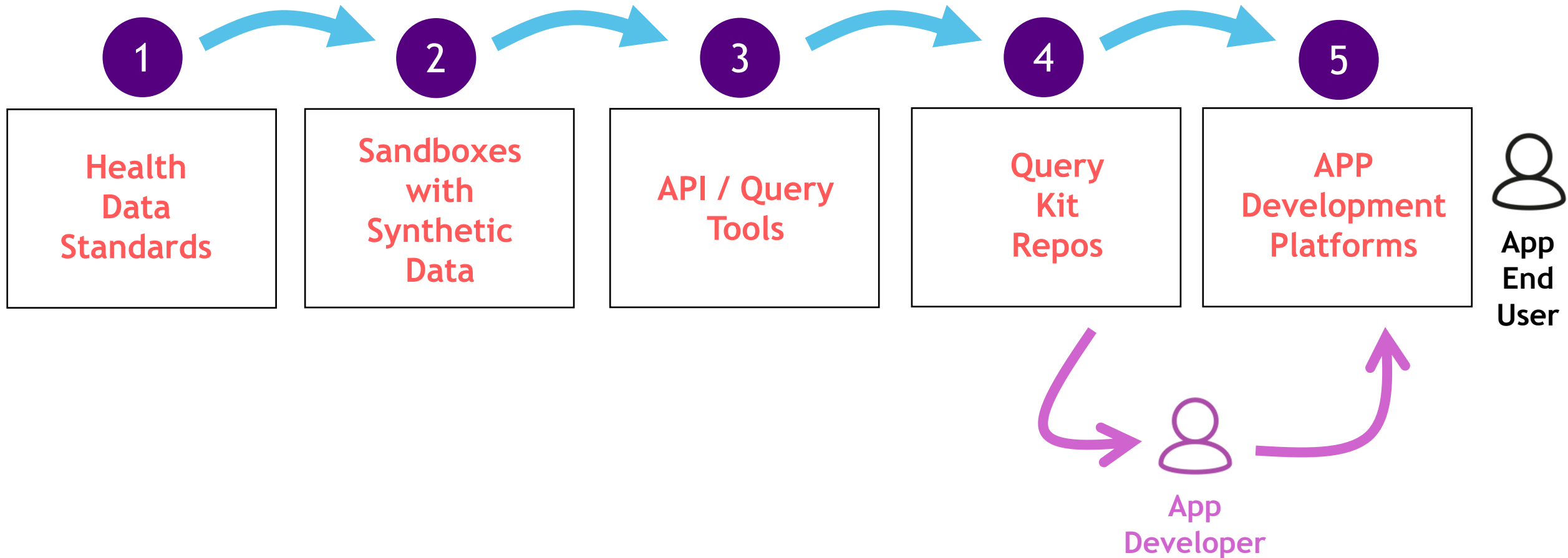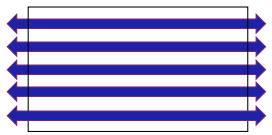| Health Data Standards	Synthetic FHIR Data Sandbox with 14 FHIR Servers	Develop and Test New Query Kits Using FHIR APIs	Store, Version, and Document Query Kits	Use Query Kits In Working App Wireframes
FHIR	**Interoperability Land**	**Postman**	**GitHub**	**Bubble.io**

App End User

App Developer

About our Data

HL7 FHIR resources

Observation

Questionnaire Response

Medication request

Patient

Medication Statement

Questionnaire

Coverage

About our Data Platform

2 FHIR Healthcare Ecosystem Sandbox

Five Lakes Health System

Oak Tree Pharmacy

TrueScript Pharmacy

Soldier Healthcare Alliance

USCare

Better Health Insurance

Independent Primary Network

State HIN

SilverCaid

Specialist Network Administration

Blaze Global Health System

New Hope Services

Open PIT

SilverCare

ID Service

+ CK:23b314...
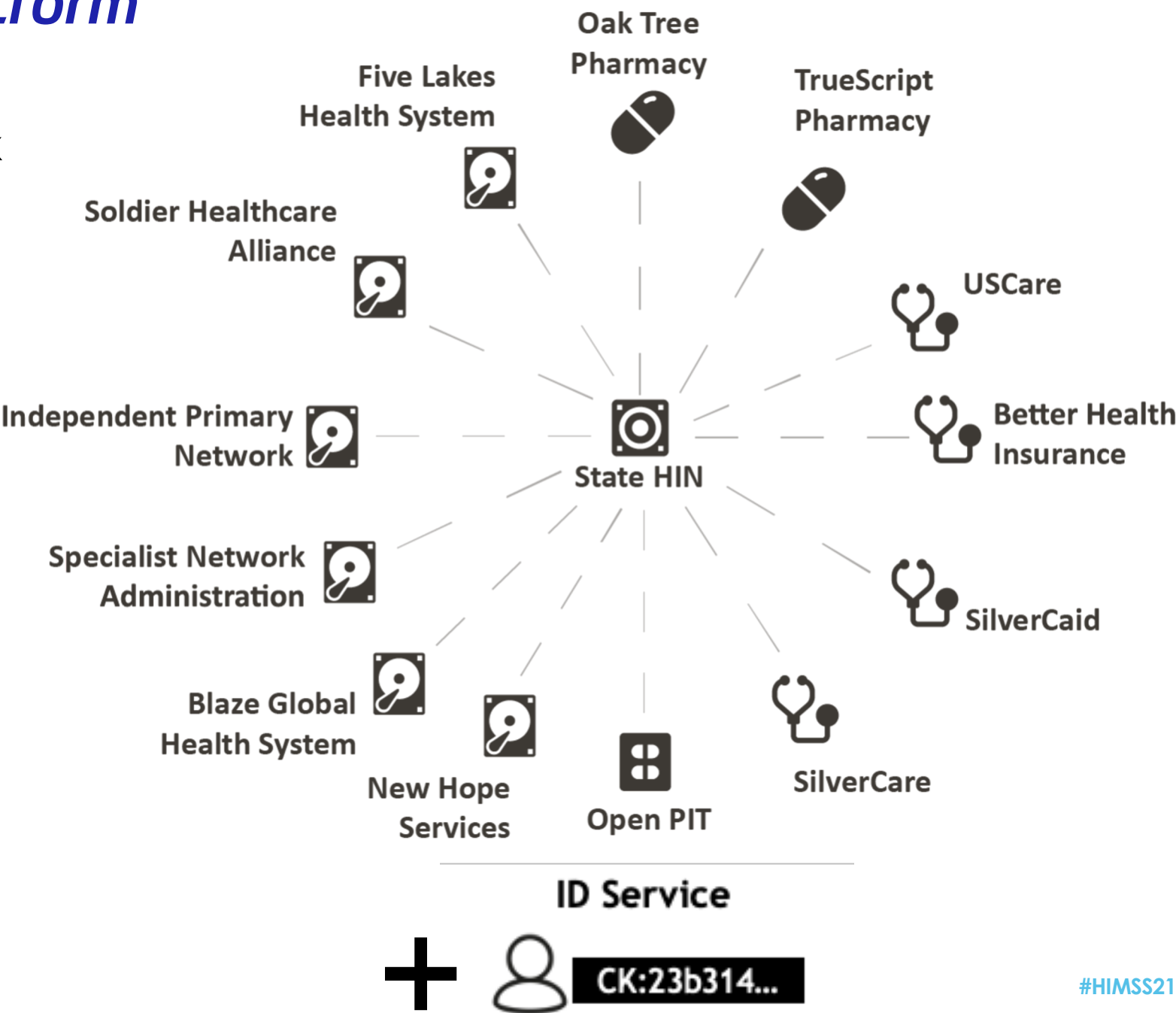
About Query Kit Development

3 **Create Queries Using REST APIs**

4 **Query Kit Repository** github.com/cmtfqs/queries

GET server/resource

db

Query Kit

GET https://PLATFORM/FHIR SERVER/fhir/
      Patient?name=[name]
      Patient?identifier=[CommonKey]
      MedicationDispense?subject=[]&_count=[]&_sort+date
      MedicationStatement?patient=[]&_count=[]&_sort+date
      ...
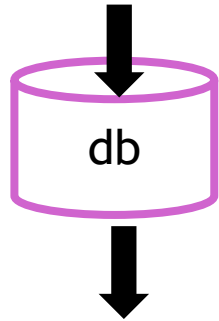
"resourceType": "Patient", "id": "4",
"meta": { "versionId": "1", "lastUpdated":
"2020-05-03T23:32:53.000+00:00",
"source": "#IiKi5LhKDRHzTAn7" }, ",{ "url":
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"coding": [{ "system":
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Identifier" }] }, "system":
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"code": "SB", "display": "Social Beneficiary
Identifier" }] }, "system":
"http://mihin.org/fhir/cks", "value":
"0640331fb20e4db788a488868ea4b5c3" }
],

FHIR Data

5 **Working App Wireframes**

APP Wireframe

Generalizing Our Setup

| 1	2	3	4	5
Health Data Standards	**Sandboxes with Synthetic Data**	**API / Query Tools**	**Query Kit Repos**	**APP Development Platforms**

App End User

App Developer

Query Kit for Medication Reconciliation

1 ⟷ Patient Last Name Query *returns* List of Patients With Same Last Name

End User *Selects One Patient*

2 ⟷ Patient Common Key Query *returns* Selected Patient's Common Key

3 ⇄⇄⇄⇄ Patient Data Inquiry Queries *return* Local Patient ID, when found

4 ⇄⇄ Medication Data Queries *return* Medication Request OR Medication Statement
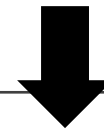
Patient Application Gains All Available Medication Information for One Patient

Icon by Ahmed Elzahra
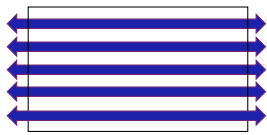
App Using Query Kit for Medication Reconciliation

Not a Real Person!
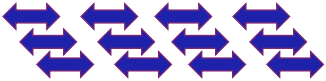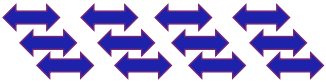
**Independent Primary Care Network**
Aspirin
Levothyroxine
Nabumetone

Five Lakes Health System
Levothyroxine
Lisinopril
Nabumetone

Blaze Global Health
Aspirin

True Script Pharmacy
Albuterol
Levothyroxine
Lisinopril
Nabumetone

Silvercaid
Levothyroxine

Silvercare
Albuterol

Better Health Insurance
Levothyroxine
Lisinopril
Nabumetone

MIHIN
Aspirin
Levothyroxine
Lisinopril
Nabumetone

View of Where One Patient's Data Was Found
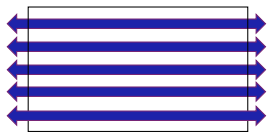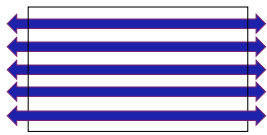
Query Kit for Social Determinants of Health

1 ⟷ Patient Last Name Query   *returns*   List of Patients With Same Last Name

Selects One Patient
End User

2 ⟷ Patient Common Key Query   *returns*   Selected Patient's Common Key

3 Questionnaire Queries   *returns*   Available Questionnaires at Organizations of Interest

4 Patient Questionnaire Response Queries   *returns*   Patient Responses to SDOH Questionnaire Items
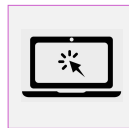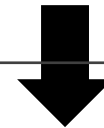
Patient Application Gains All Available Questionnaire Responses for One Patient

Icon by Ahmed Elzahra

Query Kit for Social Determinants of Health

Living Situation 🏠

Worried about a place to stay
> Never true

Do you worry about pests, molds or lead paint or pipes
> Sometimes true

Transportation 🚗

Worried about transportation
> Sometimes true

Unable to get stuff for daily living
> Often true

Food Security & Access ☕

Worried food would run out
> Often true

Food did not last
> Sometimes true

Employment 💼

Worried about employment
> Often true

Found employment
> Often true

App View of Most Recent Patient Answers to SDOH Questionnaires

Available GitHub Repository with Query Kits

- Go to https://github.com/cmtfqs/queries

- Sharing Query Kits as POSTMAN collections for these use cases
  - **Telemedicine**
  - **Medication reconciliation**
  - **Social determinants of health**

- Documentation in a README

- Easily convert queries to code in many programming languages, e.g. JavaScript

Audience Question #2

Which **data resources** and **queries** most interest you and your teams?

- SDOH data?

- Patient reported outcomes?

- Continuity of care data?

- Treatment outcomes data?

About our ongoing educational program

Education on FHIR & Interoperability – Initial Results

From:
FALL 2020
INTRODUCTION
TO
HEALTH
INFORMATICS,
University of
Michigan

How Much Did You Learn?
(n = 13)
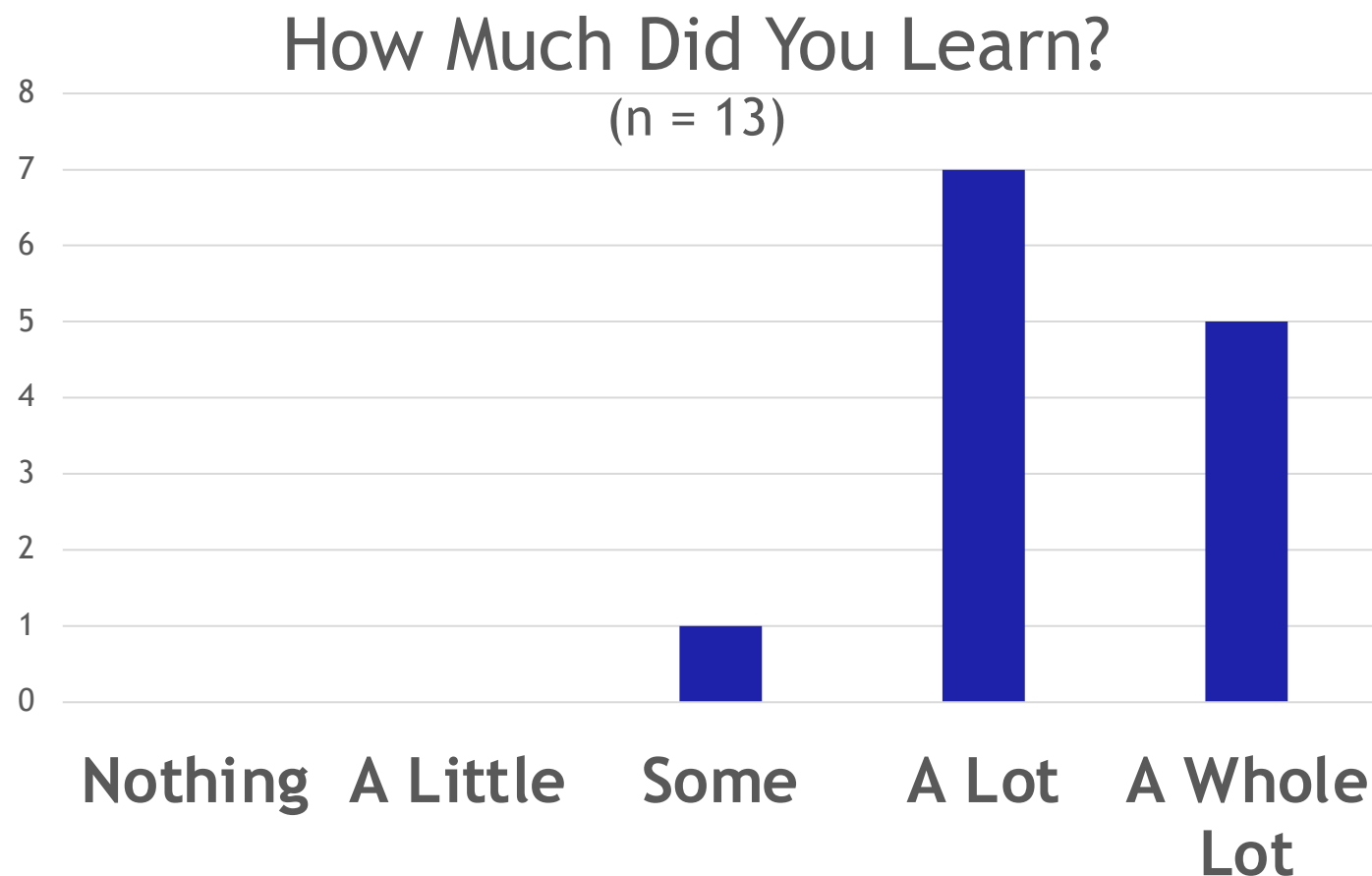
We Have a Growing Educational Program

How to join in

- Contact today's speakers or the Interoperability Institute for more information

interoperabilityinstitute.org/contact/

Benefits

- Instructional Materials
  - **Interoperability**
  - **FHIR Standards**
  - **Querying HAPI FHIR servers**

- FHIR App Ecosystem Sandboxes
  - **Public domain, open source https://interop.community/**

  - **Private, members only https://interoperabilityinstitute.org/interoperablityland/**

Summary Points

- Power of partnership
- Our work anticipates coordinated FHIR Data Ecosystems with common patient IDs
- Shareable standardized queries
- Providing opportunities for the next-generation health IT workforce

Next Steps

- Further curriculum development
- Build and demo SMART-on-FHIR apps that use standardized Query Kits for FHIR
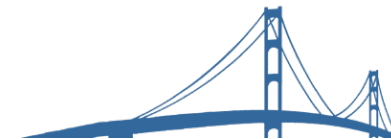- Provide feedback to improve app testing platforms

Any Questions About All This Stuff?

- **Query Kits** (Shareable Complex Multi-target FHIR Queries)

- **Platforms & Tools** (Interoperability Land, Postman, Github, Bubble.io)

- Goal of Accelerating Health App Development

- How Are Organizations Going to Expose Their Data APIs?

- Goal of Educating the HIT Workforce of the Future

- Expanding Partnerships to achieve Holistic Interoperability

Thank you!

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- Allen Flynn →   ajflynn@umich.edu