Accessing EMR data for Research, Quality Improvement or EMR functional extension

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What is the problem

- With increasing use of EMR and organisational data warehouses – information is stored which could be reused:
  - Clinical Data – for research, quality improvement or business use.
  - Data to pre-populate survey or data collection forms e.g. patient demographics e.g. prepopulate a Patient Reported Outcome Measure (PROM) Survey

- Enabling data extraction avoids the need for manual data extraction and copying from EMR to external data capture systems

Presentation overview

- What is REDCap
- Overview IHE's Retrieve Form for Data Capture
- REDCap – Dynamic Data Pull (DDP)
- REDCap - DDP on FHIR with EHR Launch

A data management tool kit for everyone who works for a not for profit

Data organisation needs:

- Understanding what other people are thinking, doing or want
- Collecting data of all sorts by end users – managers, clinicians, quality improvement, researchers
- Managing business and research processes

REDCap manages data - electronically

Common uses:

- Understanding what other people are thinking or doing or want

    = Survey – email, phone, face to face, patient self administered

- Collecting data of all sorts by end users – managers, clinicians, researchers

    = Data collection form

- Keeping track of things

    = Dashboard and lookup
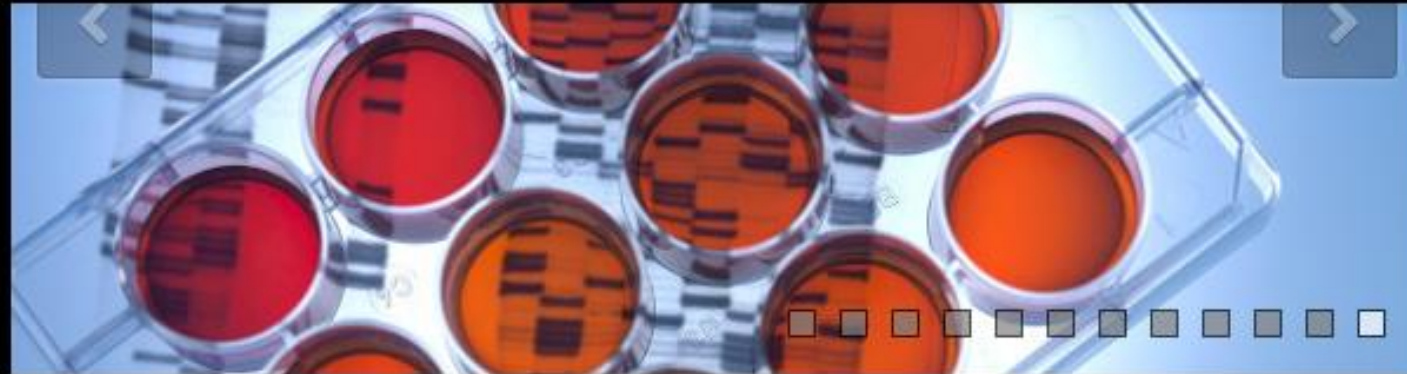
REDCap

Research Electronic Data Capture

ABOUT   PARTNERS   RESOURCES   SOFTWARE

REDCap is a secure web application for building and managing online surveys and databases. While REDCap can be used to collect virtually any type of data (including 21 CFR Part 11, FISMA, and HIPAA-compliant environments), it is specifically geared to support online or offline data capture for research studies and operations. The REDCap Consortium, a vast support network of collaborators, is composed of thousands of active institutional partners in over one hundred countries who utilize and support REDCap in various ways.

LEARN MORE

link

REDCap Community

https://projectredcap.org/wp-content/themes/rcap/map/map_fullscreen.php
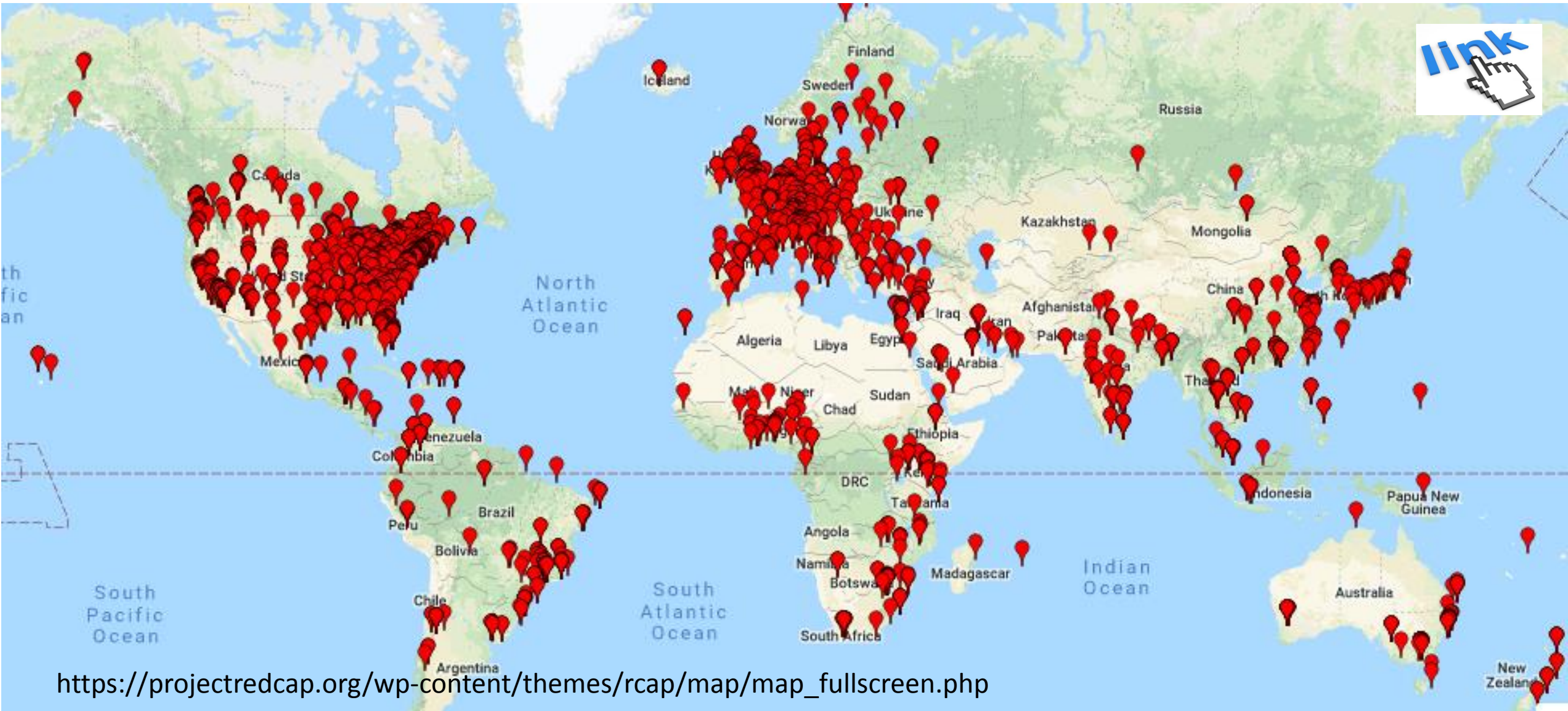
Using EHR data for research

- Unlocking data from EHR for research
  - Firstly importing demographics
  - Then clinical data e.g. medications, problems, investigation results

- Overcoming shortcoming of EHR for structured data capture
  - Customising EHRs is often not practical for structured data collection for clinical care, research, quality improvement
  - Why?
    - EHR is not designed with this in mind – legacy of paper and existing data collections
    - Change in EHR is often cost prohibitive (for small projects, specialty data needs)
    - Change in EHR is often not timely - "join the queue"
  - Getting data from EMR
    - Have to put it somewhere
    - May need to augment data

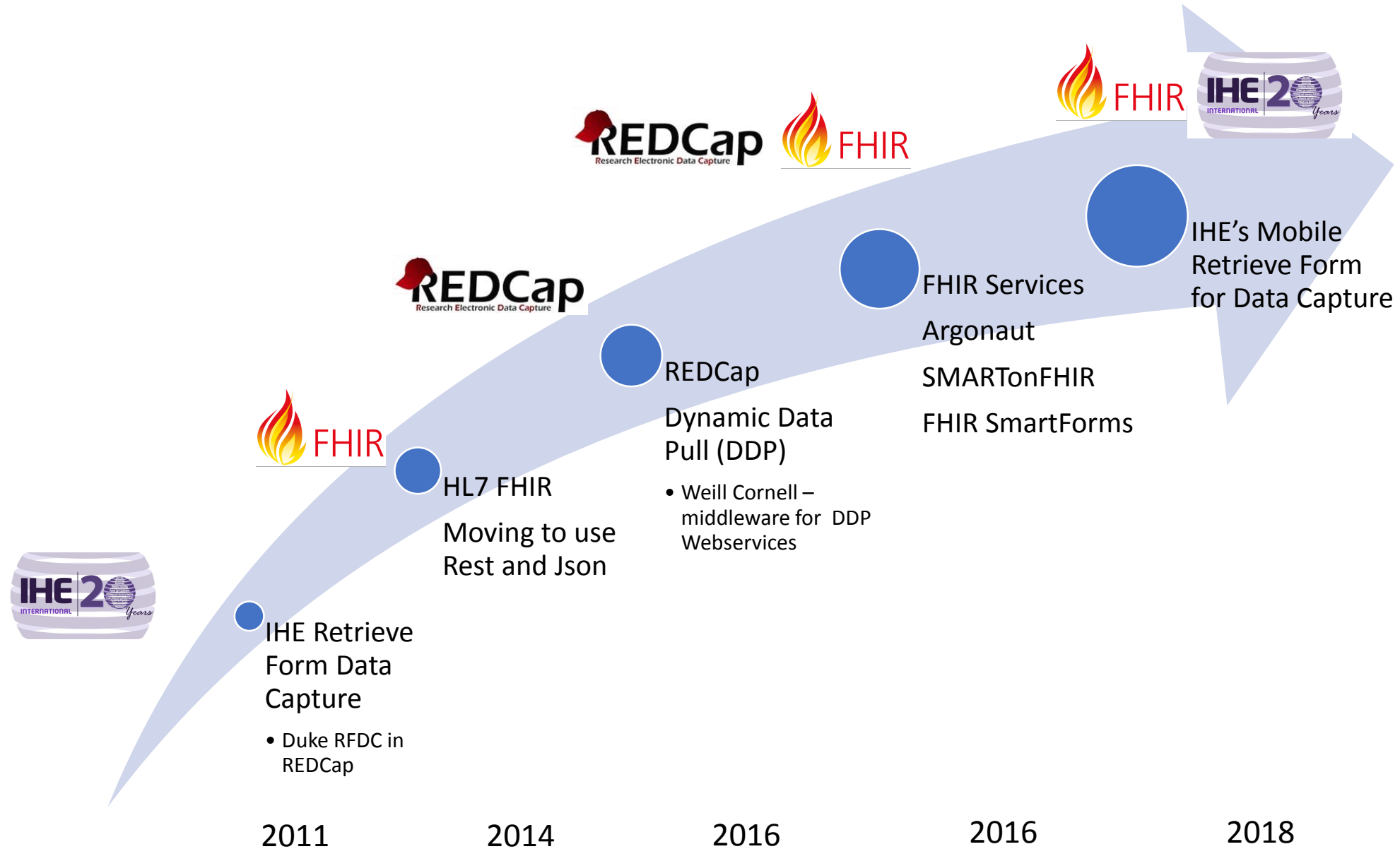# The EMR data extraction problem
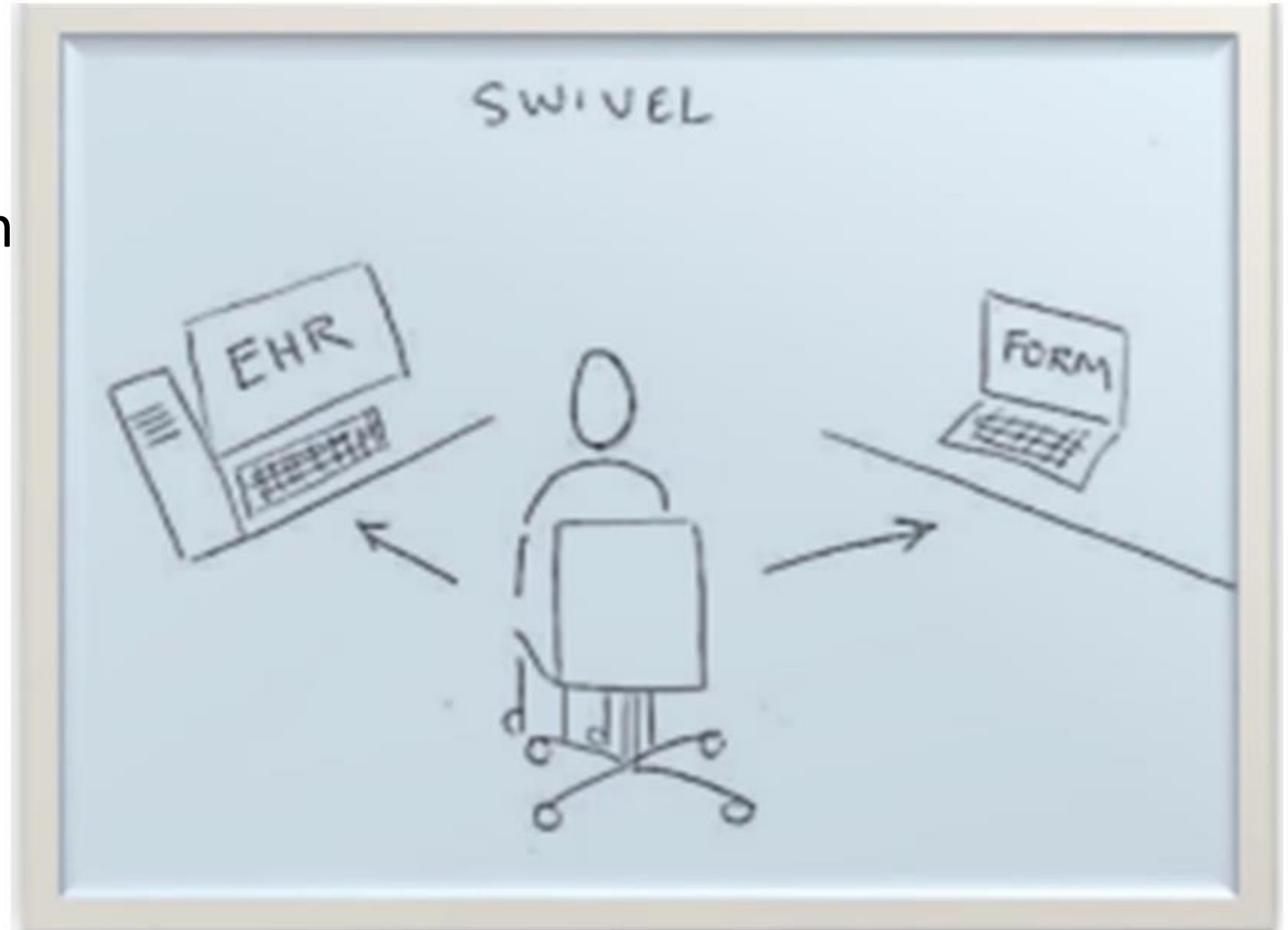
Nordo A. RADaptor: Duke University solution for improved clinical research efficiency.

The EMR data extraction solution
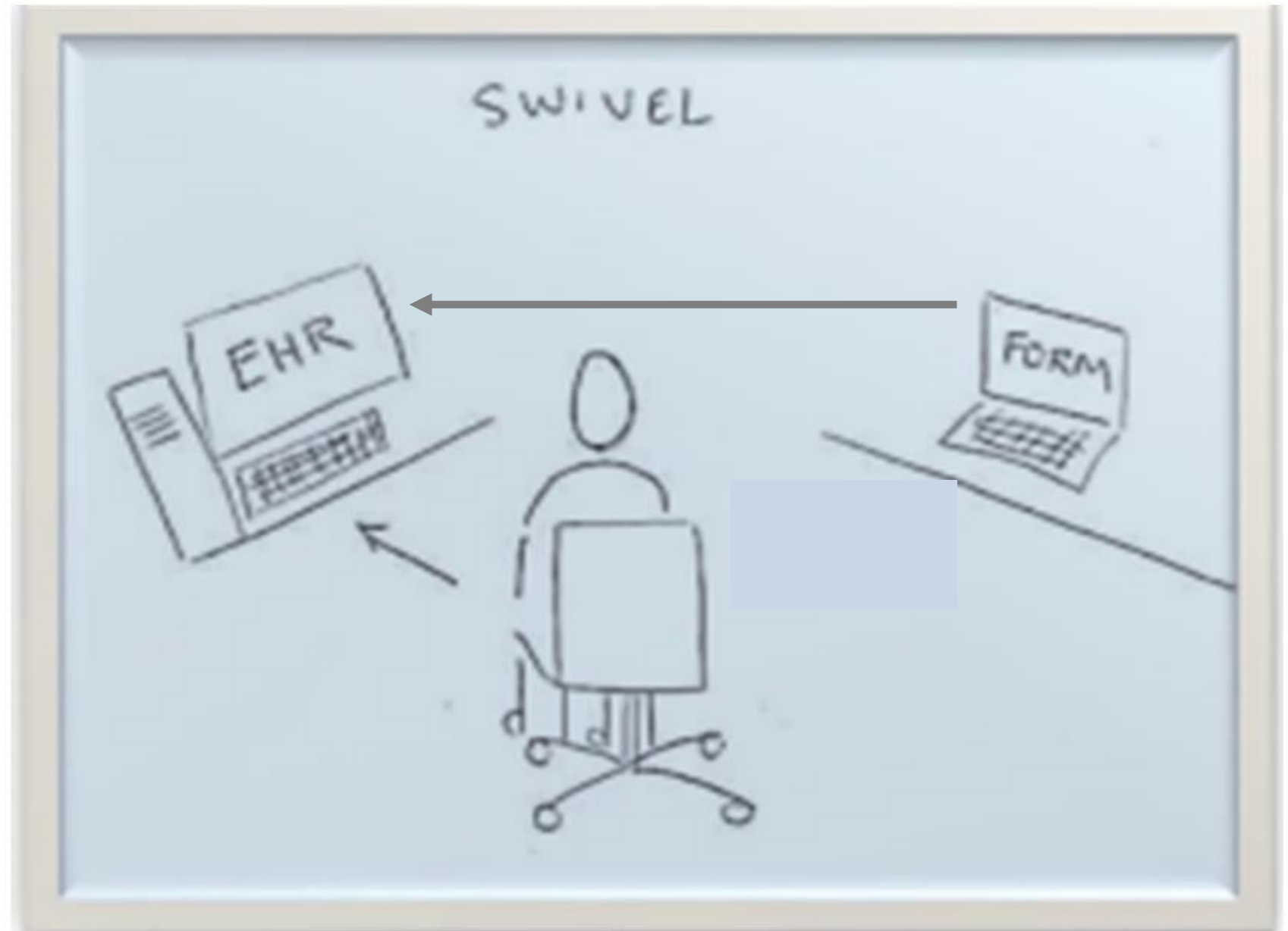
Nordo A. RADaptor: Duke University solution for improved clinical research efficiency.

Journey to standardized data extraction

IHE's Mobile
Retrieve Form
for Data Capture

FHIR Services

Argonaut

SMARTonFHIR

FHIR SmartForms

REDCap
Dynamic Data
Pull (DDP)

• Weill Cornell –
middleware for DDP
Webservices

HL7 FHIR

Moving to use
Rest and Json

IHE Retrieve
Form Data
Capture

• Duke RFDC in
REDCap

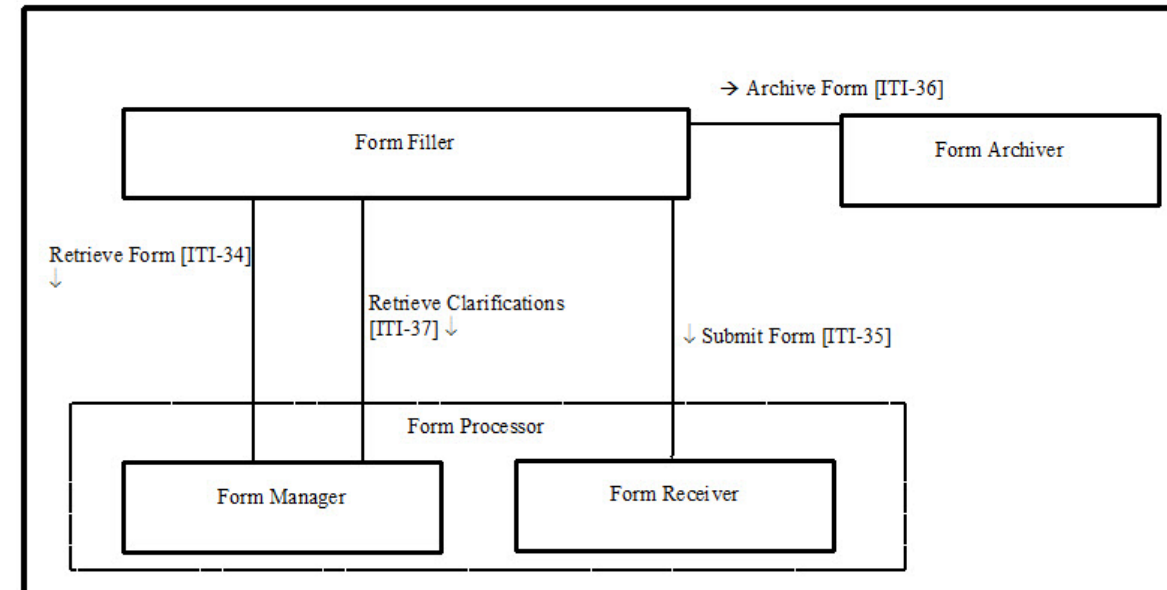2011   2014   2016   2016   2018

First steps:
Retrieve Form for Data Capture

Retrieve Form for Data Capture provides a method for gathering data within a user's current application to meet the requirements of an external system.

RFD supports the retrieval of data collection form from a form source, display and completion of a form, and return of instance data from the display application to the source application.

Developed by IHE and CDISC – circ 2006

Reference: RFDC – IHE WiKi

Initiate RFD

Call for Data Capture Form from within EMR Patient record

Reference: Nordo A, Gardner,M. Retrieve form for data capture – integrating Epic with REDCap @ Duke

Observational Comparative Effectiveness Study

Preliminary Findings

⬇ **37% Total time**

⬇ **1 FTE**

⬇ **65% Total keystrokes**

Secondary Objective- **Flexibility**

- EDC maintains all existing functionality
- Workflow alteration possible
- Potential for remote Study monitoring without direct EHR access

Secondary Objective- **Data Quality**

Non-eSource

9% data error

- On critical data elements:
- Patient's name
- Medical Record Number

eSource

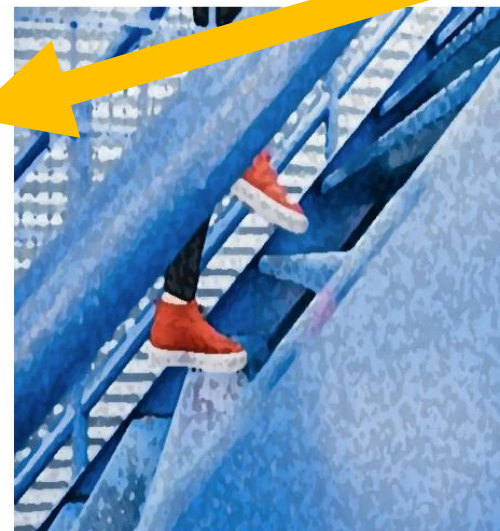**%** data error for RFD sourced variables

Next Steps

- EHR agnostic
- EDC agnostic
- Incorporate additional FHIR Resources
  - ResearchStudy
  - ResearchSubject
- Develop remote monitoring functionality
- Share our work
- Conduct multi-center study

Dynamic Data Pull (DPP)
Dealing with need to map to EHR data structure

Development of REDCap DDP webservice as middleware to support mapping of REDCap data model to that of the EHR/CDW –ref: Campion et al, Generalisable Middleware to support use of REDCap DDP for integrating clinical and research data: Weill Cornell Medical Centre.

- Field dictionary – lists data elements available to REDcap from EMR including SQL extraction statement, and temporal/timing metatdata
- Configuration files
- Webservices
    - Authorisation, data and metadata.
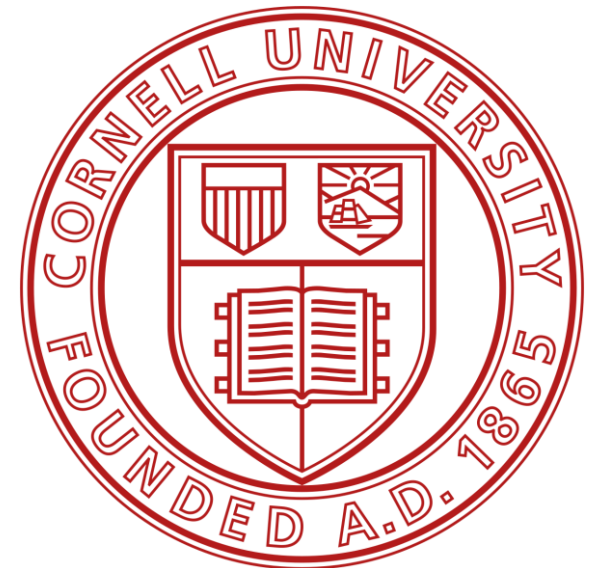
Mobile:
Retrieve Form for Data Capture

The Mobile Retrieve Form for Data Capture (mRFD) Profile provides a method for gathering data within a user's current application to meet the requirements of an external system. mRFD supports RESTful retrieval of forms from a form source, display and completion of a form, and return of instance data from the display application to the source application. The workflows defined in this profile are based on those defined by the Retrieve Form for Data Capture (RFD) profile.

IHE Quality, Research and Public Health
Technical Framework Supplement

Mobile Retrieve Form for Data Capture
(mRFD)

HL7® FHIR® STU 3
Using Resources at FMM Level 3
Rev. 1.1 – Trial Implementation

Date: August 18, 2017
Author: QRPH Technical Committee
Email: QRPH@ihe.net

Please verify you have the most recent version of this document. See here for Published versions and here for Public Comment versions.

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Reference: Mobile RFDC – IHE WiKi

Dynamic Data Pull (DDP) on FHIR with EHR Launch

- Launch a REDCap window while inside an EHR and to quickly and seamlessly import clinical data from the EHR into a REDCap project. As a built-in module in REDCap that can be enabled by an administrator, this feature can interface with any EHR system that has "SMART on FHIR" web services enabled.

TAYLOR, R.   REDCAP Con 2017

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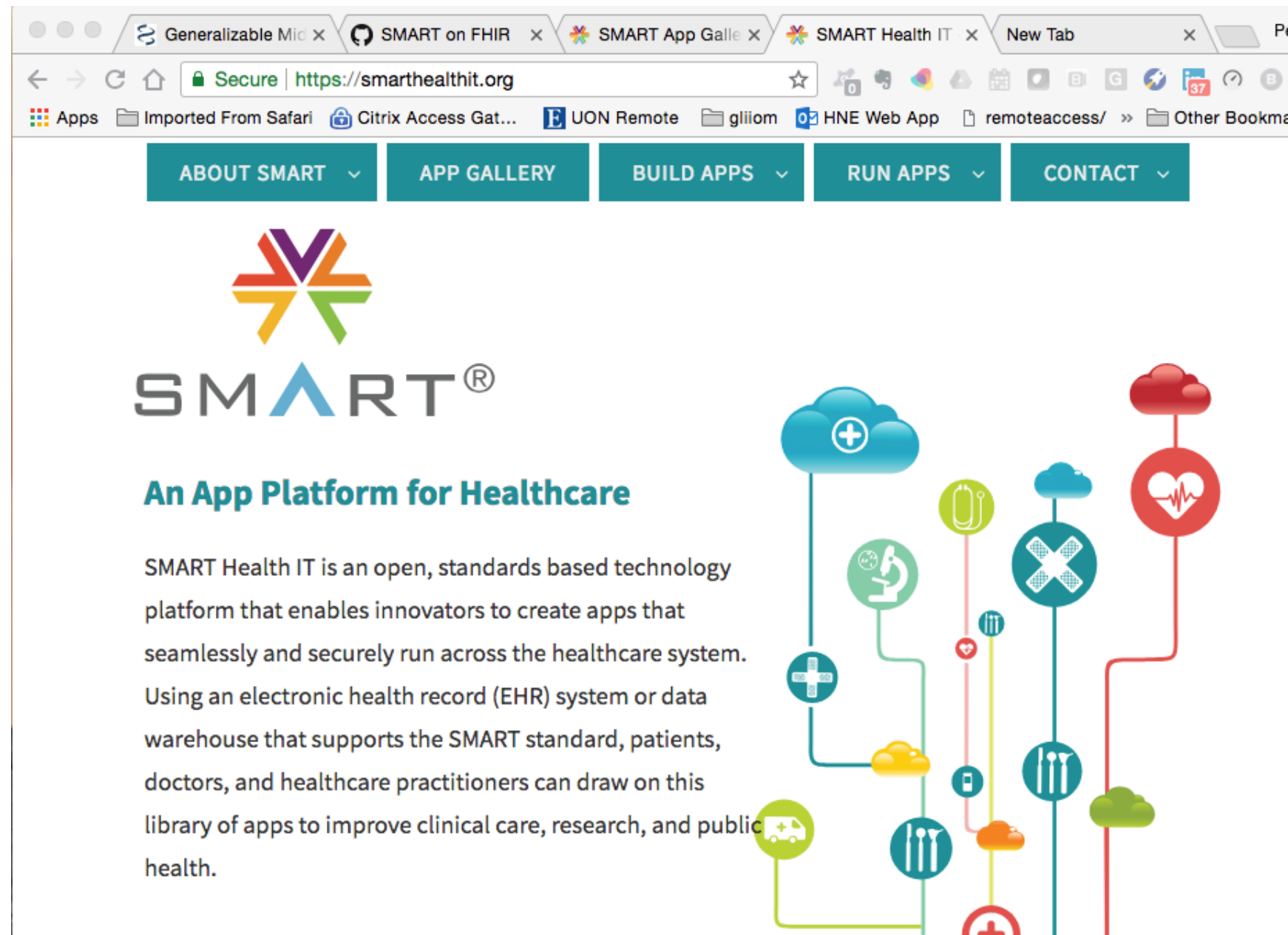**REDCap**™

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REDCap™

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SMART on FHIR – framework for launching applications

- http://docs.smarthealthit.org/
- https://smarthealthit.org/
- https://github.com/smart-on-fhir
- SMART on FHIR – Apps Store (Substitutable Medical Apps & Resuable Technology)

EHR Integration with REDcap

Setup process

- No custom programming is required

- Will work with any EHR system that supports SMART on FHIR
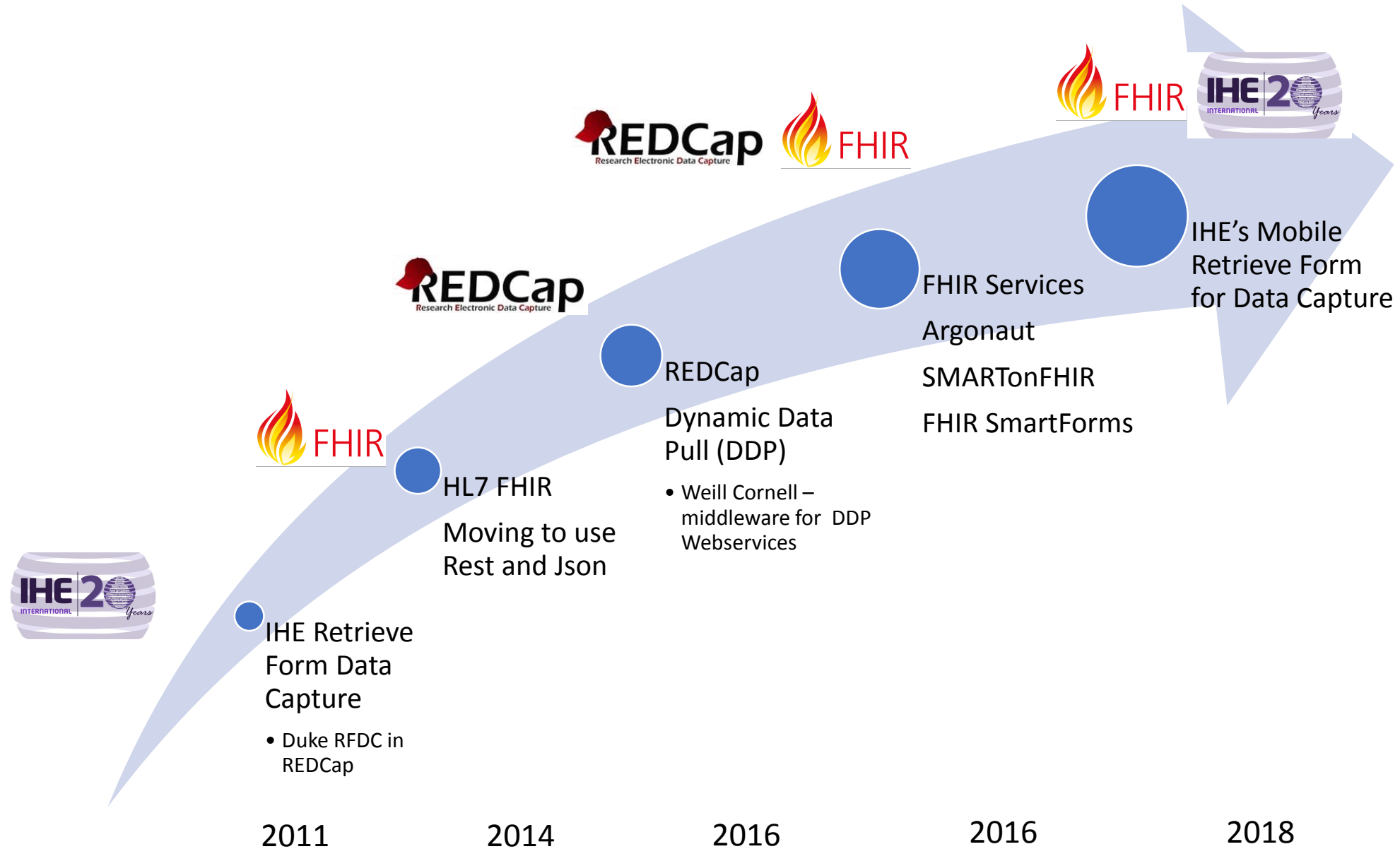
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Connecting REDCap to EMR

Why do RCH want to integrate EMR and REDCap?

- Streamline research data collection: quicker, more timely, better quality capture of research data.

- Increase scope for hospital patient data capture e.g. via online questionnaires (subject to appropriate governance arrangements).

- Self-service access to data for researchers will reduce the burden on the EMR report writing team.

- Shared connections between technological systems on campus is preferable to manually moving data between systems.

Journey to standardized data extraction

REDCap FHIR

REDCap

FHIR

FHIR

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| 2011 | 2014 | 2016 | 2016 | 2018 |

Other FHIR applications in REDCAP

- Terminology Services accessible using FHIR
  - Leroux, Hugo; REDCap under FHIR: Enhancing electronic data capture with FHIR capability, Australian E-Health Research Centre, Health and Biosecurity, CSIRO. HIC 2017