Substitutable Medical Apps, Reusable Technologies

- SMART provides a mechanism for individual medical records to be displayed in an “App”

- SMART defines an API and a data model in RDF to represent clinical data types such as Medications, Diagnoses, Allergies, Lab Results, Fulfillments, Immunizations, Vital Signs, etc.

- **SMART Apps** built against the SMART API can be embedded within any existing or future **SMART Container**

- A SMART Container can be an EMR system used by physicians, a PCHR used by patients, or a data-analytics platform such as i2b2
SMART Overview

Apps
- Got Statins?
- BP Centiles
- Cardiac Risk

API

Containers
- SMART-Enabled PCHR
- SMART-Enabled EMR
- SMART-Enabled i2b2
What is SMART?

SMART-Enabled PCHR

SMART-Enabled EMR

SMART-Enabled i2b2
Purpose of SMART + i2b2

- Enable i2b2 to support the SMART API, allowing current and future SMART apps to interact with data stored in i2b2

- Extend functionality in the i2b2 web client, to allow investigators to use these SMART apps for exciting use cases (e.g. clinical trials)
How to ‘SMART Enable’ i2b2

Three new components:
- SMART i2b2 cell
- Mapper i2b2 cell
- Patient-Centric View

SMART i2b2 Hive

SMART

Mapper

CRC

Ontology

Your SMART App
SMART i2b2 Cell

- Implements SMART API in i2b2 to produce
- SMART Cell registers Apps – no rogue apps
- Handles authorization – OAuth based

SMART RDF
- Allergies
- Clinical Notes
- Demographics
- Fulfillments
- Immunizations
- Lab Results
- Medications
- Notes
- Problems
- Vital Signs
Contains mapping table of local codes to SMART preferred coding systems

Provides assistance

- Starter table that maps 85% of most used terms
- I2b2 user tool for mapping everything else

1. Based on Partners HealthCare’s Research Patient Data Repository (RPDR) data warehouse data between 1986-2011
SMART Patient-Centric View App

- Allows user to create data views of specific areas of interest
- User selects installed apps from carousel and arranges into preferred views
- Multiple SMART apps run simultaneously
List Apps

- **Low Entry Barrier**
  - List apps do not do computable things on standardized codes
  - If mappings not available, list app will display local data

- **Developed SMART Apps**
  - Allergies List
  - Lab Results List
  - Immunization List
  - Medications List
  - Notes List
  - Problems List
Lessons Learned

- Achievement of substitutable apps is possible
- Straightforward SMART model facilitated implementation
- Having to learn RDF for app development was a barrier
- Full HTML5 compatibility a challenge in older browsers
- Want coding standard “escape” to display non-mapped data
Downloads

- VMWare Virtual Machine running CentOS with entire i2b2 stack + new SMART components

- Full source code available

- http://www.smarti2b2.org
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- **i2b2 Team**
  - Michael Mendis
  - Janice Donahoe
  - Lori Phillips

- **Web Resources**
  - SMART i2b2 Homepage: [www.smarti2b2.org](http://www.smarti2b2.org)
  - SMART Platforms Homepage: [www.smartplatforms.org](http://www.smartplatforms.org)
  - i2b2 Community Site: [community.i2b2.org](http://community.i2b2.org)
  - i2b2 Software: [www.i2b2.org/software](http://www.i2b2.org/software)
  - i2b2 Homepage: [www.i2b2.org](http://www.i2b2.org)