Future of Interoperability

Stan Huff, MD – Intermountain HealthCare
John Mattison, MD – Kaiser Permanente
Key Themes for Interoperability - KP

- The necessity of preserving both machine readability and human readability through interoperability
- The future of person-centric interoperability
- The role of interoperability in support of collaboration for research
- The role of interoperability in support of collaboration for care
Vision of Interoperability: Intermountain Healthcare

- Develop a new healthcare IT ecosystem
- Data modeling to ensure compatibility
- Platform-independent services such as FHIR profiles and resources
- A marketplace or “App Store” for the distribution of interoperable, shareable clinical applications.
- Data relevancy: integrating the right data at the right time
The Future Ecosystem

• Standards are defined that enable “truly” interoperable systems using standards based services

• Old and new EHR vendors:
  – Support standards based services (HL7 FHIR®)
  – Support SMART® applications

• Thousands of people develop software that runs on truly interoperable platforms
  – Open source, academics, and for profit developers
  – Apps, including clinical decision support algorithms, are for sale in a vendor neutral app store
  – Apps can be certified as HSPC compliant
  – Platform vendors certify apps as safe for use in their platform
The Future Ecosystem (2)

• People buy a patient data platform
  – Includes auditing, security, authorization, patient selection, etc.
  – May include some core apps: order entry, results review, notification, etc.

• People buy the apps they need

• There is also a marketplace for sharing knowledge, especially protocols, workflows, order sets, ontologies

• Patients receive better care at a lower cost because lower cost higher quality apps are available as driven by market forces
Site #1
Dry Weight: 70 kg

Site #2
Weight: 70 kg
- Dry
- Wet
- Ideal
Too Many Ways To Say The Same Thing...

• A single name/code and value
  – *Dry Weight* is *70 kg*

• Combination of two names/codes and values
  – *Weight* is *70 kg*
    • *Weight type* is *dry*
<table>
<thead>
<tr>
<th>Patient Identifier</th>
<th>Date and Time</th>
<th>Observation Type</th>
<th>Observation Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>12345678</td>
<td>7/4/2005</td>
<td>Dry Weight</td>
<td>70</td>
<td>kg</td>
</tr>
<tr>
<td>12345678</td>
<td>7/19/2005</td>
<td>Current Weight</td>
<td>73</td>
<td>kg</td>
</tr>
</tbody>
</table>

How would you calculate the desired weight loss during the hospital stay?
Evolution of Clinical Modeling & FHIR Profiling

• Clinical Element Models (CEM)
  – Curated by Stan Huff at Intermountain
  – 6500+ semantically-complete, explicitly constrained data entities
  – http://www.clinicalelement.com/

• HL7 CIMI – emerging international standard modeling effort
  – Led by Stan Huff and many others

• HSPC - Healthcare Services Platform Coalition
  – Intermountain + LSU Health + Veterans Administration + others
  – Truly interoperable clinical data services

• Argonauts
  – Vendor group to fund speed up SMART and FHIR
  – HL7 FHIR Core + Argonaut Profiles + OAuth2
<table>
<thead>
<tr>
<th>FHIR: Core Resources Span Key EMR Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>AdverseReaction</td>
</tr>
<tr>
<td>Group</td>
</tr>
<tr>
<td>OrderResponse</td>
</tr>
</tbody>
</table>
SMART Apps for Care Plan Integration

Population Health Service
(Healthe Intent)

Cerner
SMART App
Care Plan
SMART HTML
Local Data
FHIR

Allscripts
SMART App
Care Plan
SMART HTML
Local Data
FHIR

NextGen
SMART App
Care Plan
SMART HTML
Local Data
FHIR

Data Spine + Direct +/- HIE
SMART® on FHIR® – Open Platform Architecture – HIMSS 2015

Mobile Apps

Web Apps

OAuth

REST API

HL7® FHIR®

FHIR Data Profiles

ARGONAUT PROJECT

Epic

Supporting Health IT Systems

Cerner

athenahealth

Department of Veterans Affairs

HSPC Healthcare Services Platform Consortium

Duke Medicine

Your system here

http://smarthealthit.org

Booth# 2084-185 in Interop Showcase

HSPC

Healthcare Services Platform Consortium
**SMART on FHIR “App Gallery” – more than 25 apps (so far)**

<table>
<thead>
<tr>
<th>Diabetes Monograph</th>
<th>Disease Monograph</th>
<th>Duke PillBox</th>
<th>BMJ Content Discovery</th>
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</thead>
<tbody>
<tr>
<td>EnrG</td>
<td>Rheum</td>
<td>Growth Chart</td>
<td>Health Ally</td>
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<tr>
<td>Healthwise Patient Engagement Solution</td>
<td>MPR Monitor</td>
<td>Meducation RS</td>
<td>Cardiac Risk</td>
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<tr>
<td>Crimson Care Management</td>
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</tbody>
</table>
Intermountain: SMART Neonatal Bilirubin Alerts

Hour Specific Bilirubin Risk Chart for Term & Near-Term Infants with NO Additional Risk Factors

Date/Time   Result   Age (Hrs)   Value: Test   Risk Zone
11/21/2005  4.5       6.00      Bill Meter    High Intermediate Risk Zone (75-95%)
11/22/2005  12.5      30.00     Bill Meter    High Risk Zone (>95%)
11/22/2005  12.6      36.00     Bill Meter    High Risk Zone (>95%)
11/22/2005  12.8      44.00     Bill Meter    High Intermediate Risk Zone (75-95%)
11/23/2005  11        68.00     Bill Meter    Low Intermediate Risk Zone (40-74%)
11/25/2005  9.8       116.00    Bill Meter    Low Risk Zone (<40%)
The Road Ahead: Priorities for 2016 and Beyond

We continue to pursue learning and innovation to support advancements in HIE and interoperability on a broad scale.

2015-2016
- Identity Management capabilities piloted with Utah exchange partners
- Advancement of Patient Matching White Paper & minimal matching requirements

Testing New Standards and Capabilities

Concurrent Support of Multiple Standards (C32, C-CDA, FHIR, Direct email)

Continued Collaboration with HIE Associations and Regulatory Bodies

Expansion of capabilities in Production

Continued Improvements in Identity and Authorization Management