THE FUTURE OF INTEROPERABILITY AT UHN
Agenda

1. Introduction
   • University Health Network background

2. Current State
   • Interoperability at UHN and the EPR
   • Interoperability in the province of Ontario and the EHR

3. Building a better Learning Health System
University Health Network
Background

1. One of the largest Academic Medical Centers in Canada
2. Located in Toronto Ontario
3. Priority Program;
   - Arthritis
   - Medical Imaging
   - Neurosciences
   - Laboratory Medicine Program
   - Medical and Community Care
   - Multi-organ Transplant
   - Oncology
   - Cardiac
   - Surgery and Critical Care
   - Rehabilitation

Princess Margaret Hospital
Toronto Rehab Institute
The Toronto General Hospital
The Toronto Western Hospital
University Health Network
Background

CEO: Dr. Peter Pisters
HRO/Learning Health System

Executive VP Technology & Innovation
Dr. David Jaffray

Entrepreneurship & Research
CURRENT STATE OF INTEROPERABILITY AT UHN
1990+’s Silo Based Architecture

... 160+ systems

HIS/EMR

Legacy System

PC Applications or Access Databases

iPad or iPhone App

Data Copying
Copy (HL7 2.x)
2000-2020: Service Oriented Architecture

Enterprise Service Bus
(Business Logic and Common Services)

- Security
- Auditing
- Terminology

Interfaces (160+)
HL7

EPR
PHS
Labs
Rad

EDW
Quadramed Data Model + Finance Data

CDR
HL7 v3
RIM Model

 Patients and Provider Portals
HTML 5
Android/iPad apps

40+ web services
(JSON and FHIR)
UHN Integration Stack Highlights

ESB (Enterprise Service Bus)

1. UHN is currently in the process of migrating from legacy point-to-point interface to a SOA web services model
2. Create reusable services
3. The ESB makes the data available securely through web services
   - The ESB communicates with 92 systems within UHN and 35 different organizations around the province
   - Process about 600,000 HL7 transactions on any weekday
4. UHN has published a number of online tools that allows a department to be self sufficient
UHN Integration Stack Highlights

**CDR (Clinical Data Repository)**
- The CDR stores as much discrete data as possible to help build a complete patient record
- Discrete Data is stored in a standard healthcare nomenclature
- Data in CDR is sent real time from main systems (EPR, Pharmacy, Pathology, DI and OR) *
- Currently the CDR is live with over 7 years of historical clinical data

*Note: Many systems feed the EPR and in turn feed the CDR (e.g. Core Labs, Dietary etc.,)*
UHN Integration Stack Highlights

Portals and Mobile Apps

1. Common Client and Provider Registry for identifying patients, physicians and a single ID for system authentication
2. The Portal will aggregate data from multiple sources within the organization and external to the organization
UHN Integration Stack Highlights

Faster / Reusable / Cheaper

Development Time

First Module Built

Last Module Built

Nursing  Social Worker  Upgrade  Dietitian  Psych  Surgeon

Legend:
1. Framework
2. Screen Development
3. Common Fields
4. View Histories
5. Summary Report
6. Integration with EPR
7. Consult Notes
8. Integration with PHS
9. Auto-faxing
10. Unit-testing & UAT
Bariatric iPad Application
Infection Control Patient Tracking
Transcription Review and Sign-off

Date of Visit: 23 Jan 2013
This is a Resident dictating for a Staff for Consultation Note.
Dictated by: Dr. Ali Novin
Service of: George Smith, M.D.
Toronto Rehab
416-597-3422

DICTATED BUT NOT READ
356042 / 4561
Transcribed by: as
Connecting GTA will electronically link and integrate patient information from across the care continuum and make it available at the point-of-care to improve the patient and clinician experience.
North Eastern Ontario
4 LHINs – 2.76M population (21%)

- Approximately 682 HSPs including:
  - 4 Community Care Access Centres (CCACs)
  - 28 Community Health Centres (CHCs)
  - 67 Hospital Corporations
  - 196 Mental Health & Addiction Service Providers
  - 150 Long-Term Care Facilities
  - 237 Community Support Services

Greater Toronto Area
6 LHINS – 6.75M population (51%)

- Approximately 777 HSPs including:
  - Community Care Access Centres (CCACs)
  - Community Health Centres (CHCs)
  - Hospital Corporations
  - Mental Health & Addiction Service Providers
  - Long-Term Care Facilities
  - Community Support Services

South Western Ontario
4 LHINs – 3.6M population (28%)

- Approximately 626 HSPs including:
  - 4 Community Care Access Centres (CCACs)
  - 20 Community Health Centres (CHCs)
  - 42 Hospital Corporations
  - 119 Mental Health & Addiction Service Providers
  - 233 Long-Term Care Facilities
  - 207 Community Support Services
cGTA Clinical Portal
UHN 2015-2020: Cloud-based SAAS

**Development/TEST Sandbox**

- **MDM Solution**
  - Deploy Platform
  - Cloud-based – public, private, hybrid (very little coding)

- **ESB**
  - Raw Staging Data (Data)
  - Integration to vendor products being exposed as services
  - Vendor Integration Platform

- **Home Monitoring Data, Social Media**
  - Write back (FHIR)

- **External Knowledge Sources (e.g. Journals)**
  - Other External Data (e.g. CIHI)

**Safe/Secure Production Environment**

- **MDM Solution**
  - Deploy Platform
  - Cloud-based – public, private, hybrid (very little coding)

- **ESB**
  - Raw Staging Data (Data)
  - Integration to vendor products being exposed as services

- **Home Monitoring Data, Social Media**
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- **External Knowledge Sources (e.g. Journals)**
  - Other External Data (e.g. CIHI)

**Privacy and Security by Design**

- **Class II Medical Devices & Software**
  - (ISO 13485)

**Human Factors**

- **All UHN Raw Data**
  - Home Monitoring Data, Social Media
VISION FOR THE FUTURE OF DIGITAL HEALTH AT UHN
Clinicians will have so much data and so many applications to deal with:

How do we provide meaningful information about the patient; about their illness, about the best personalized treatment for that individual that supports decision making and quality outcomes.
The need to synthesize information and support decision making

"The Magical Number Seven (Plus or Minus two)" provides evidence for the capacity of short term memory to hold; up to 9 things at a time.

Psychologist George Miller’s (1956) paper On cognitive limitations on the number of things an adult can store and recall from short term memory.
From Health Systems to Learning Health Systems

Now

Science

Insights poorly managed

Evidence

Evidence poorly used

Care

Experience poorly captured

Missed Opportunities, Waste, and Harm

Best Care at Lower Cost

The Path to Continuously Learning Health Care in America

Mark D. Smith, MD, MBA, Study Chair
From Health Systems to Learning Health Systems

* Ability to learn rapidly and adopt rapidly to new learning/knowledge
From Health Systems to Learning Health Systems
Future State: UHN

Patients and Provider Portals

HTML5
- Android/iPad apps
- Android/iPhone apps

Enterprise Service Bus
- (Business Logic and Common Services)

PaaS (Front End Vendor)
- PaaS (Azure)
- PaaS (BlueMix)
- PaaS (GE Predix)

UHN Existing Web Apps

EPR  PH  Lab  Rad  B/C

CDR

3rd Party Cloud & IOT Services

Other Hospitals in Ontario
- EPR
- EPR
- EPR

100+ organizations

Provincial Services Connecting Ontario
- cGTA
- OLIS
- DI-r
- Drug

Other 3rd Party Cloud & IoT Services

Provincial Resources

Best Practices
- & Standardized

Orders/Care

Personal Health Record

Medical Journals

Other 3rd Party Knowledge Sources & Tools

EPR

UHN

Toronto General
Toronto Western
Princess Margaret
Toronto Rehab

COURAGE LIVES HERE
Building a Platform for Innovation

1. Liberate; but manage the data
2. Integrate new information sources
3. Implement new tools to organize, summarize, analyze, synthesize data
Platform for Innovation

1. The UHN platform allow teams to build new applications on the platform to meet their own particular business needs
2. The applications could be built on any technology or device such as:
   - Web applications, portlets, embedded within a hospital application, tablets or phones
3. The platform supports the Internet of Things (IoT). Any IoT device can be integrated into the solution such as:
   - Infusion pumps, Blood Pressure Monitors, Vitals etc.
4. UHN has created an App Store Model and published software development kits (SDK) including security protocols that need to be followed
5. UHN will certify new applications
6. UHN has created a number of initial applications and share them with participants
7. Apps and services that are developed can be shared and reused without having to rewrite them for each department or organization
Patient Finder App built via Bluemix
data returned from the ClinicalImpression resource is: Chronic Obstructive Pulmonary Disease (COPD) is a lung disease that includes chronic bronchitis and emphysema. In 80-90% of cases, it is caused by smoking. Other causes of COPD can include genetic reasons (alpha-1 antitrypsin deficiency), occupational dusts and chemicals, second hand smoke, frequent lung infections as a child, wood smoke and other biomass (animal dung, crop residues) fuel used for cooking. COPD develops over time. In most cases, COPD is diagnosed in people over 40 years of age. Someone with COPD may not realize that they are becoming more short of breath until it becomes very hard to do simple tasks like walking up stairs. When you have COPD, your lungs are obstructed or blocked, making it hard to breathe. In chronic bronchitis, your airways become swollen and can be filled with mucus, which can make it hard for you to breathe. In emphysema, the air sacs (alveoli) in your lungs are damaged which can make it hard for you to breathe.

The data about to be passed to the proxy function, via GET, should be:

Chronic Obstructive Pulmonary Disease (COPD) is a lung disease that includes chronic bronchitis and emphysema. In 80-90% of cases, it is caused by smoking. Other causes of COPD can include genetic reasons (alpha-1 antitrypsin deficiency), occupational dusts and chemicals, second hand smoke, frequent lung infections as a child, wood smoke and other biomass (animal dung, crop residues) fuel used for cooking. COPD develops over time. In most cases, COPD is diagnosed in people over 40 years of age. Someone with COPD may not realize that they are becoming more short of breath until it becomes very hard to do simple tasks like walking up stairs. When you have COPD, your lungs are obstructed or blocked, making it hard to breathe. In chronic bronchitis, your airways become swollen and can be filled with mucus, which can make it hard for you to breathe. In emphysema, the air sacs (alveoli) in your lungs are damaged which can make it hard for you to breathe.

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Thank You