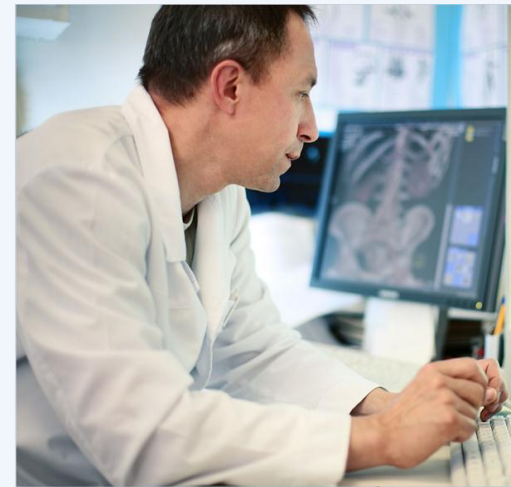


Diagnostic Imaging and the Electronic Health Record



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www.mohawkssi.com

Strengthening Cooperative Solutions

Speaker Bio

- Diane Larwood is the General Manager of Mohawk Shared Services (MSS) DI-r Division. Diane and her team currently provide DI-r change management, adoption and training support to healthcare providers in the Hamilton Niagara Haldimand Brant and the Waterloo Wellington (HNHB & WW) LHINs. In addition, Diane works to develop and manage new healthcare projects that will improve the healthcare experience for all patients in the region.



Description:

- Diagnostic Imaging has a very important place in support of patient care. Imaging produced during a patient's lifetime consists of many different types of studies; X-ray, CT, Ultrasound, MRI, etc. resulting in very large image files which can be acquired at many different facilities across the province and even the country.
- This presentation will cover the progress made to date in Ontario and Canada in support of ensuring Imaging has its place in the electronic health record and will address what's coming in the future. We will also discuss the technical standards required to support interoperability of systems used to acquire, store and exchange imaging data at a local, regional and provincial level.

Objectives:

- Describe the Diagnostic Imaging architecture across Ontario and federally
- Explain the role of eHealth Ontario and Canada Health Infoway as architects and funders of the electronic health record projects (high level)
- Describe the Pan Canadian and International Standards used in support of the electronic health record and current system limitations and workflow challenges
- Describe how caregivers access the information in the Diagnostic Imaging Repositories, regionally and provincially
- Describe next steps towards the future of interoperability; DI Common Services, Foreign Exam Management, the Provincial EHR

What Role did this gentleman play?



Historical Roentgen 1895

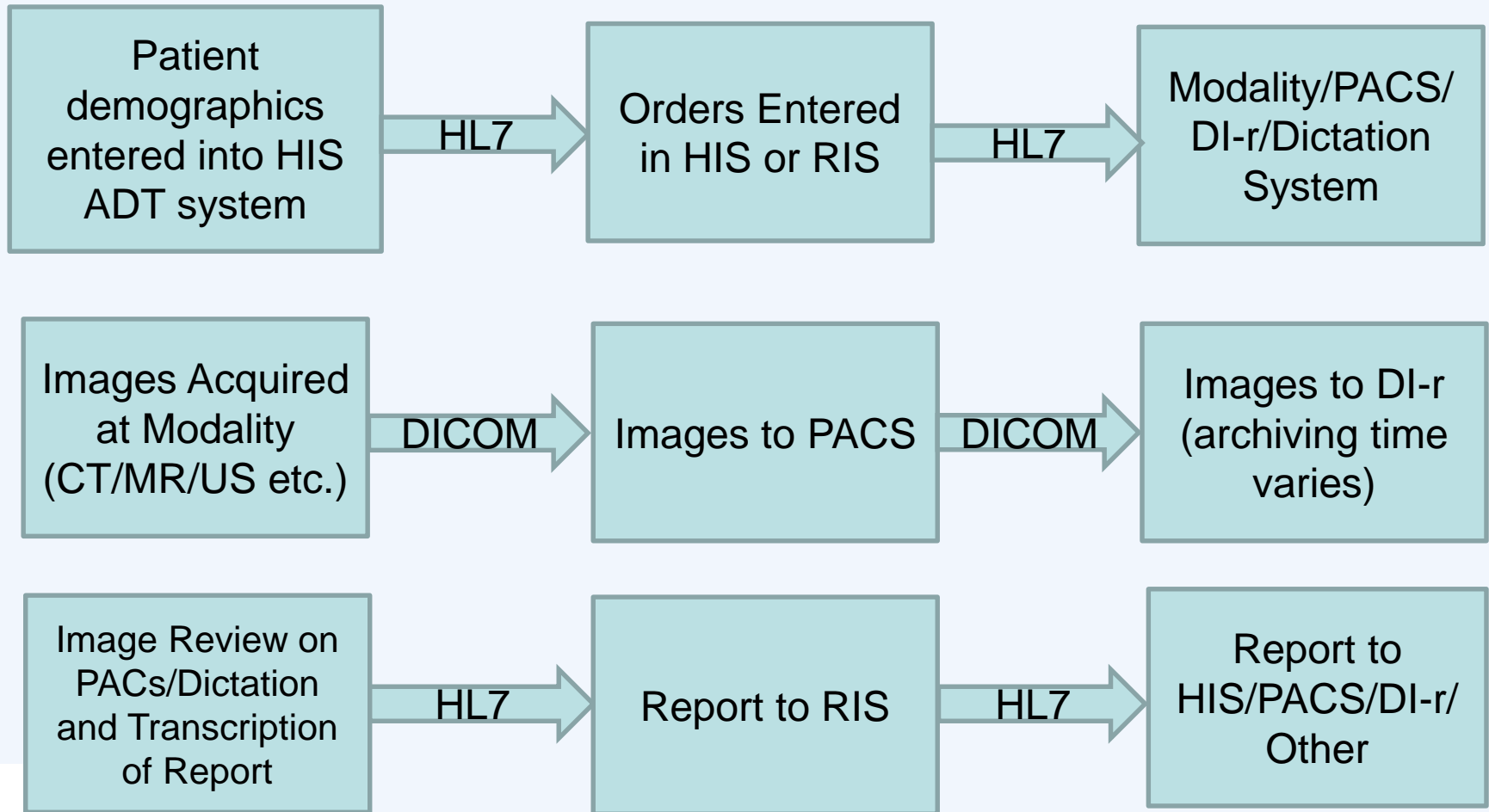
Roentgen with a historic image of his wife's hand and wedding band.

www.imagingdomain.com/

The e-transition

- Through the 80's we still used manual paper processes for patient demographics, billing, reporting and of course film for imaging
- 90's led to implementation of Radiology Information Systems (and HIS) to support patient registration, orders, billing, reporting etc. + use of fax for report distribution
- 2000's was the boom in implementation of PACS. Last hospital site filmless in this region in 2010
- Mid 2000's advent of voice recognition software for dictation/transcription
- Mid to late 2000's start of Infoway/eHO funded DI-r projects
- Late 2013 98% of Ontario hospitals connected to DI-r

Imaging Messaging Flow



What is a DI-r?

- What are some of the things we need to have in place to support sharing of images and reports?
 1. A regional DI repository/archive
 2. Network Connectivity
 3. EMPI or patient matching solution
 4. Electronic access (viewer)
 5. Privacy and security
 6. Authentication and user access management (secure log-in)
 7. Interoperability Standards
 8. Provider registry
 9. User adoption

- **Patient Benefits of DI-r**

- Elimination of unnecessary travel
- Reduced wait times and lengths of stay thanks to faster exam reports and clinical decisions by physicians and specialists
- Reduced duplicate and unnecessary exams
- Elimination of the need to physically transfer images or CDs to the specialist
- Elimination of unnecessary exposure to radiation

- **Clinician Benefits of DI-r**

- Faster and easier access to images and reports 24/7
- Remote access to images for off-hours coverage
- Enhanced remote reporting capabilities
- Real-time clinical collaboration, increasing access to a broader range of specialists

<http://www.ehealthontario.on.ca/en/initiatives/view/diagnostic-imaging-program>

Financial Benefits

Since 2009 hospital investments in local Long Term Archives have been reduced and in many cases eliminated.

- Assumptions:
 - Sites will maintain short term storage on site but over time will decommission the site Long Term Archive (LTA)
 - Sites will archive to the DI-r and not their LTA from Go-Live
 - Sites may utilize Data Migration services from the DI-r to enable migration of historical images from the site LTA
- This leads to savings for Ontario hospitals
- The DI-r is also a solution for DI disaster recovery and business continuity for local hospitals.

Infoway- What they do:

- Jointly investing with the provinces and territories to implement the health information systems needed to manage Canadians' health and health care information in every region.
- Fostering and supporting adoption and use of health information technologies by clinicians
- Providing the technology Blueprint to guide the development of electronic health records in Canada.
- Supporting and sustaining communications and technology standards that enable health information systems to share patient health information accurately and securely
- Providing tools and services for technology vendors

<https://infoway-inforoute.ca/index.php/about-infoway/what-we-do>

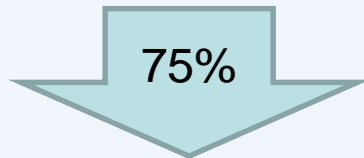


- *Infoway* works as a strategic investor of funds provided by the Federal Government, in collaboration with the provinces and territories.

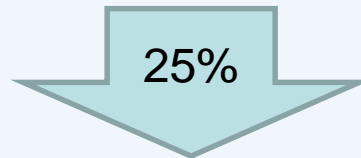
The Government of Canada



Canada Health Infoway



The Provincial and Territorial Governments

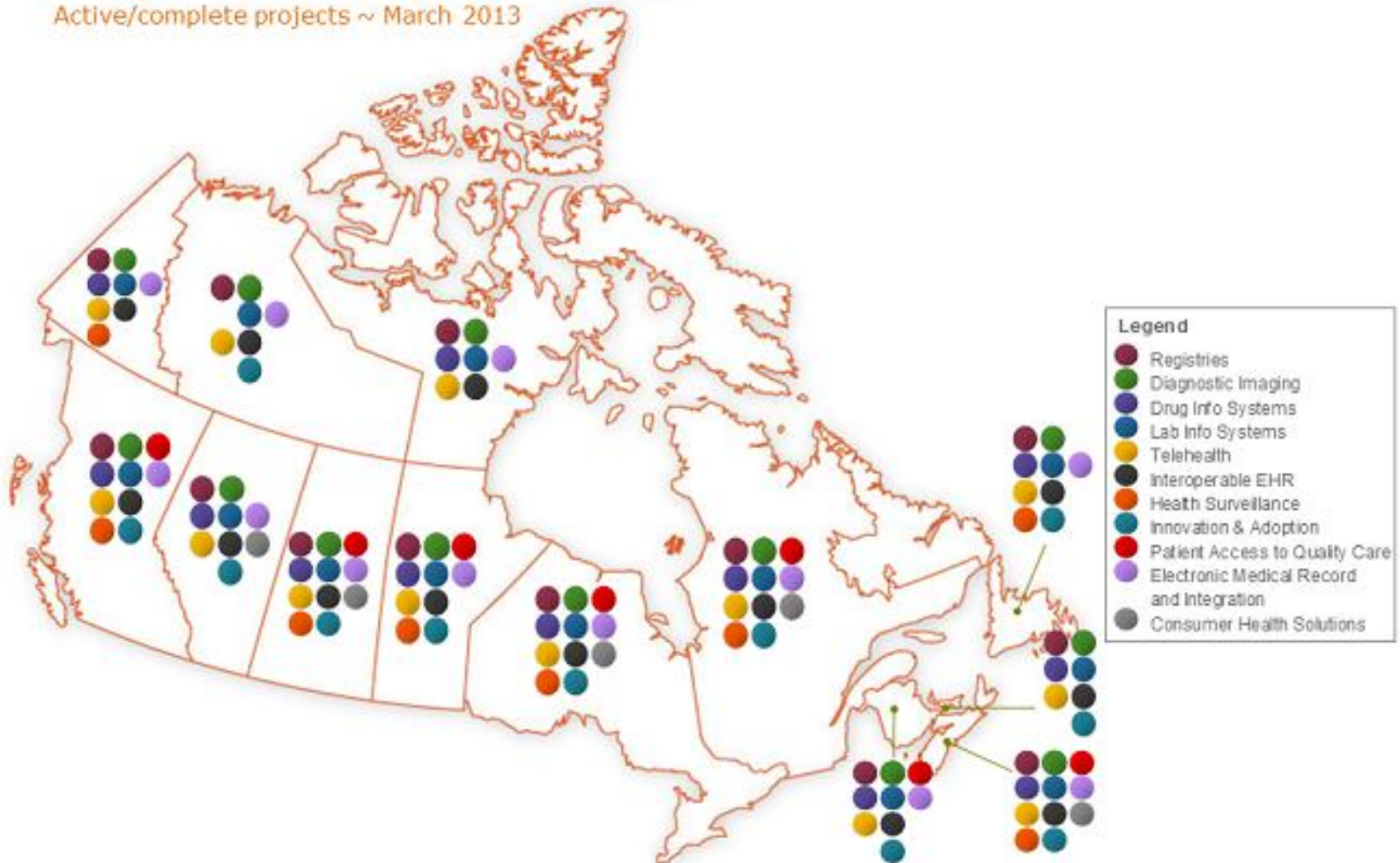


Local Projects

Infoway Programs

Program activity summary

Active/complete projects ~ March 2013



<https://www.infoway-inforoute.ca/index.php/programs-services>

From <http://www.ehealthontario.on.ca/en/>

- eHealth Ontario actively engages new information technology (IT) to improve both quality and access to health care for the people of Ontario. We are enabling doctors and clinicians to talk to one another and share patient information electronically.

eHealth DI Program

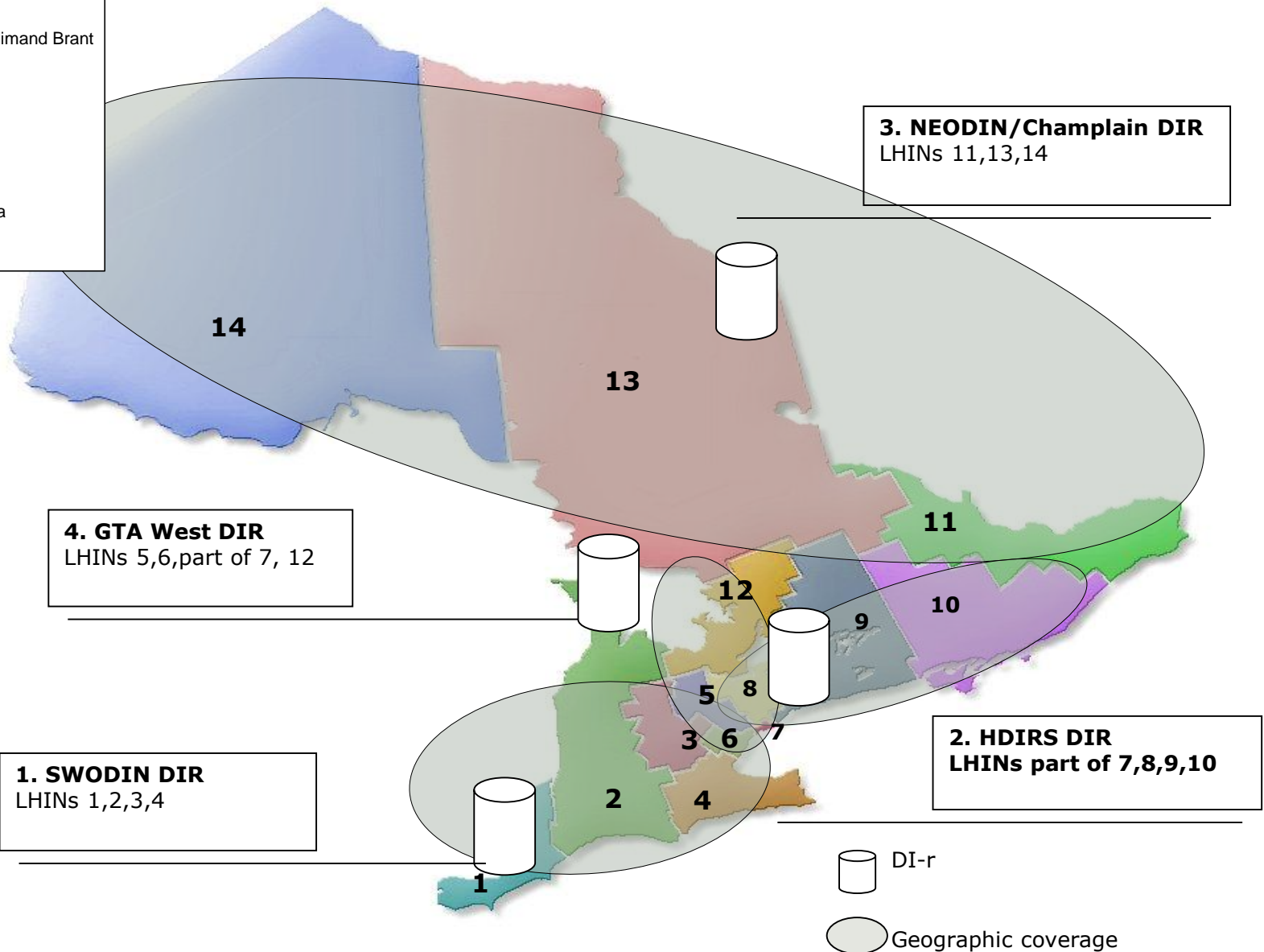
- The diagnostic imaging (DI) program supports DI initiatives and systems such as the picture archiving and communications system (PACS) and regional DI repositories (DI-r).
- Picture archiving and communications systems (PACS) and DI repositories are secure computer systems that contain patient radiology reports and images such as hospital-based CT scans, ultrasounds, MRIs, mammograms and x-rays. The implementation of these systems has eliminated the need for film and paper diagnostic images.
- eHealth Ontario coordinates the four DI-r projects covering all hospitals in Ontario and provides funding support and the ONE® Network that gives providers access to the system.

<http://www.ehealthontario.on.ca/en/initiatives/view/diagnostic-imaging-program>

The Ontario D.I. Landscape

LHINs

1. Erie St. Clair
2. South West
3. Waterloo Wellington
4. Hamilton Niagara Haldimand Brant
5. Central West
6. Mississauga Halton
7. Toronto Central
8. Central
9. Central East
10. South East
11. Champlain
12. North Simcoe Muskoka
13. North-East
14. North-West



SWODIN (Southwest Ontario DI Network)



<http://www.swodin.ca/>

HL7 Architecture

- In the SWO DI-r there are several different HIS, RIS and PACS systems. Each of these HIS/RIS systems is currently sending HL7 transactional information to their local PACS systems.
- These systems also send a copy of the HL7 message to the Information Exchange layer in the DI-r to notify the DI-r of all relevant Radiology patient and order information.
- The Information Exchange layer collects and indexes the patient information and is responsible for resolving patient identification through the patient normalization solution.

Challenges to Interoperability

- Patient identification
- Privacy and Security
 - User/Physician authentication
 - Access management/Lock box
 - Data Sharing Agreements
- Lack of Standardization
 - Technical Standards
 - Terminology
 - Implementation of new technical standards such as IOCM

Infoway Standards Collaborative

- **A key resource for health information standards in Canada**
- The Standards Collaborative is your Canadian source for key standards that help ensure health information is available and understandable when needed.
- Gain an overview of [key health information standards](#) to support the adoption of pan Canadian standards based solutions
- Learn more about [Infoway's role](#) in advancing these standards and how to [get involved](#)
- [Become a Standards Collaborative member](#) to access standards and much more!
- Learn about [resources and tools](#) to help with implementing standards
- Learn about [conferences](#) and [education offerings](#) to help guide standards implementation and adoption

<https://www.infoway-inforoute.ca/index.php/programs-services/standards-collaborative>



- IHE promotes the coordinated use of established standards such as DICOM and HL7 to address specific clinical needs in support of optimal patient care. Systems developed in accordance with IHE communicate with one another better, are easier to implement, and enable care providers to use information more effectively.
- IHE has defined a number of profiles to support Radiology processes. Three recent additions to the Technical Framework are Patient Identifier Cross Reference (PIX), Cross Document Sharing (XDS), Image Object Change Management (IOCM)
 - PIX is used to link multiple patient identifiers together in a common linkage set based on a set of common attributes.
 - The XDS profile is a general framework that supports document sharing between diverse systems and organizations.
 - IOCM is designed to handle (and fix) changes to image sets, including additions (e.g., 3D images generated), deletions (a patient moved during a series and it needed to be re-performed), and even PID changes (patient scanned under wrong id).

Access to images in the eHR

- Local hospital PACS
- DI-r web viewer (GE OneView, AGFA web viewer, etc.)
- Access via integration to the local hospital information system (Meditech, Cerner etc.)
- Regional Portals- e.g. ClinicalConnect
- Provincial eHR viewer
- Physician eMR (office system)
- Etc.

Next Steps

- DI Common Services
 - On DI Terminology Project
- Connecting Projects
- Foreign Exam Management
- Integrated Healthcare Facilities (IHF's)
- Ongoing Standardization (XDS/XDSi, IOCM....)

Ontario DI COMMON SERVICE

- eHealth Ontario project established to allow for interoperability across DI-rs to support the sharing of diagnostic reports and images across Ontario
- DI Common Service allows for message-based sharing of reports and images across regional repositories supporting portal-based viewers and EMR integration
- Core initiative to supporting EMR integration and overall EHR vision, as articulated by MOHLTC and eHealth Ontario

On DI Terminology Project

- The Ontario DI Terminology Project was launched to provide the terminology products for the Ontario Diagnostic Imaging Common Service
- Diagnostic Imaging is one component of the Electronic Health Record (EHR), where RIS and PACS exam information will be accessible to clinicians across the province
- ON DI Terminology Set will be deployed through the use of ON Terminology Services by the Provincial Common Integration Services (HIAL), supporting the Ontario DI Common Service User Access Channels.
- The Project looks to leverage, expand, or develop standard terminology for the following:
 - **DI Procedures**
 - Modalities
 - Body Part

SNOMED CT® Frequently Asked Questions

What is SNOMED CT®?

- Systematized Nomenclature of Medicine - Clinical Terms (SNOMED CT®) is an international accepted terminology coding standard that enables sharing of all relevant clinical information (e.g. diagnoses, medications, results, orders etc) across the continuum of care and geographical boundaries. SNOMED CT can be used to represent clinically relevant information consistently, reliably and comprehensively in electronic records. SNOMED CT Improves patient health through improved representation of clinical information.
- SNOMED CT is considered to be the most comprehensive, multilingual health care terminology in the world. It can represent clinically relevant information consistently, comprehensively and reliably. The clinical data can be communicated in a standard way between health care systems and individuals.

https://sl.infoway-inforoute.ca/content/dispPage.asp?cw_page=snomedct_e

Why did Canada Health Infoway adopt SNOMED CT for use in the electronic health record?

- Canada Health Infoway (Infoway) has approved and adopted SNOMED CT® as a clinical standard to support the electronic health record (EHR) and facilitate the building of a pan-Canadian EHR network. SNOMED CT® supports the interoperability of EHRs (i.e. the iEHR) by reducing the variability in how data is captured, encoded, and used for patient care.

Benefits of SNOMED CT®

- Captures clinical information at the level of detail needed by clinicians for the provision of care in all health care disciplines and most health care settings
- Is the terminology "standard of choice" for semantic interoperability of EHRs
- As a terminology, has the desirable features that make it a good clinical vocabulary. For example, it has non-semantic concept identifiers, is concept oriented, recognizes redundancy, has multiple granularities and consistent views, characterized by graceful evolution.

Connecting Ontario

- The cSWO Project is in the process of integrating healthcare systems across the Erie St. Clair, Hamilton Niagara Haldimand Brant, South West and Waterloo Wellington LHINs.
- Building on the success and investments made in local, regional and provincial initiatives, cSWO is working closely with stakeholders to address specific local and regional needs to allow electronic patient health information to be seamlessly and securely shared.
- When it's complete, the project will be comprised of robust, scalable and re-usable building blocks capable of exchanging clinical data for better, timelier and more coordinated care, accelerating the delivery of electronic health records to the populace.

<http://www.southwestlhin.on.ca/Page.aspx?id=3528>

- Similar projects are underway across the province
 - cGTA <http://www.centrollhin.on.ca/page.aspx?id=16812>
 - cNEO http://www.nelhin.on.ca/page_ehealth.aspx?id=13068

What is Foreign Exam Management?

- The ability for a hospital PACS system to ingest and display images from the DI-r that are “not known” to the local system within the patient record (jacket, folder)
- The ability for the PACS system to hang these exams within the local viewing application for comparison to a locally acquired exam
- FEM Issues to be overcome:
 - Local PACS systems use different patient identifiers
 - Local PACS systems use different procedure descriptions
 - Most PACS systems require an order to match images to in order to profile the exam in the patient jacket
 - DI-r Privacy and Security agreements require all activity related to foreign exams to be auditable

- Independent Health Facilities (IHF) are privately owned, publicly funded imaging clinics in Ontario.
- Generate 40% of diagnostic images in the province of Ontario
- 617 sites FY2009-10
- 274 Licensees (owners) FY2009-10

IHF's con't

- eHO is funding projects with all 4 DI-rs to integrate the provincial IHFs over the next few years
- Clinic technical readiness is causing delays
 - Not all IHFs have RIS or PACS
 - Technical expertise is with the vendor not “in-house”
 - Don't typically have interface engines so more “out of the box” thinking will be required

IHF- RIS/PACS Systems

- Of the 445 facilities (out of 617) which responded to the eHO IHF DI Equipment Survey (2010), the following breakdown:

Facilities RIS/PACS	Number of Facilities
No PACS	182
Full PACS	193
Partial PACS	70
No RIS	117
Full RIS	284
Partial RIS	44

- * Partial PACS facilities are those which utilize a PACS, but not all equipment modalities in the site are connected to the PACS.

ClinicalConnect™ to DI-r Integration Project

- ClinicalConnect™ is a secure portal that provides physicians and clinicians with real-time access to their patients' electronic health records. Integration with the DI-r will allow physicians the ability to access patient DI information from locations outside of hospital networks

Future Clinical Use of DI-r

- IHFs
- DI Common Services & XDS/XDSi
- Cardiology
- Pathology
- Ophthalmology
- Other “ologies”

Possible Future Non-Clinical Uses of the DI-r

- Data analytics/Business intelligence
- Research (TBD)
- Radiation Dose Monitoring
- Peer Review



Thank You

Strengthening Cooperative Solutions