eHealth Ontario

eReferral Provincial Reference Model

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0.3 DRAFT		Third draft – based on feedback received from LHINS, Provincial Standards Sustainability Office, & Centre for Addiction and Mental Health	eHealth Ontario Architecture, Standards and Planning Division
0.2 DRAFT		Second Draft – based on preliminary internal review	eHealth Ontario Architecture, Standards and Planning Division

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TRADEMARKS

EXECUTIVE SUMMARY

Over the past number of years there have been many referral initiatives within Ontario to streamline and automate referral interactions, providing significant progress and support for transitions in care. New eReferral solutions are focused on planning eReferral implementations to align with the provincial EHR direction and to avoid creating eReferral 'silos'. A 'dialogue' regarding common approaches to eReferral implementations would be beneficial to all provincial eReferral stakeholders.

This document seeks to foster this dialogue. Referred to as the eReferral Provincial Reference Model (PRM), this document is a resource for provincial eReferral solution planning and development activities. It also provides information for decision-makers of existing and future Ontario-based eReferral initiatives that will assist in maximizing their short-term and long-term investments in health information technology by:

- Aligning to the eHealth Blueprint and Ontario's EHR Connectivity Strategy.
- Leveraging Ontario's provincial electronic health record (EHR) assets and products.
- Implementing common, extendable solutions and approaches.

The PRM consists of Business, Technology Solution, Privacy & Security, and Information Frameworks, as well as an overview of the provincial eReferral Interoperability Standard. Each framework contributes concepts to explain how referrals can be automated. These concepts are further elaborated upon by recommendations and/or requirements to guide the development or procurement of an eReferral solution.

The eReferral PRM is currently in draft and is expected to be updated as it is reviewed with the broader healthcare community. eHealth Ontario's Architecture, Standards and Planning division is responsible for maintaining the PRM, based on ongoing engagement with the Ministry of Health and Long Term Care and the broader healthcare community in Ontario. The authors seek to continually add to the value of this document so that it contributes to realizing the province's EHR vision.

Subsequent to version 1 release of the eReferral PRM (Q4 FY14-15), the eHealth Ontario Architecture Program Office (APO) will release maintained versions of the document on an annual basis. At any time, input and feedback can be sent to architecture@ehealthontario.on.ca.

1.0 BACKGROUND

Within the Ontario health care system there are many unique healthcare client journeys, as a healthcare client will have many different care providers involved in their care. Ideally, care is always coordinated under the auspices of a single provider. In the primary care setting, the primary care provider (PCP) is responsible for the overall coordination of the health care client's care, whereas, in acute care, the care team, under the most responsible physician, is accountable. Great strides have been made in maintaining and improving the quality and safety of multi-disciplinary care within a care setting[1] [2].

Transitions in care are critical to the patient experience, overall care, and system efficiency. The provider entering the health care client's care team needs timely, relevant, accurate, and up-to-date information to quickly and effectively deliver his/her care services. This information is typically provided within a referral.

For the purpose of this document, a referral is defined as the practice of requesting a service, care, support, and/or advice for a health care client from a health care provider[3]. Examples of referrals from across the healthcare system include:

- A parent requesting school-based speech language therapy services for his/her child;

[1] Ontario Medical Association. (2011). *OMA Principles and Recommendations: Models and Processes of Delivery of Specialty Care*. Retrieved from: **https://www.oma.org/Resources/Documents/ModelsandProcessesofDeliveryforSpecialtyCare.pdf**

[2] The College of Family Physicians of Canada and Royal College of Physicians and Surgeons of Canada. (2009). *Guide to Enhancing Referrals and Consultations between Physicians*. Retrieved from: **http://www.royalcollege.ca/portal/page/portal/rc/common/documents/advocacy/referrals_consultation_guide_e.pdf**

[3] eHealth Ontario. (2012). *eReferral Standard Implementation Guide*. eHealth Ontario.

- A family member requesting meal delivery and friendly visits for an elderly person living in the community;
- A PCP seeking advice or an in-person assessment from a specialist;
- An Emergency Medical Services (EMS) Responder request for Community Care Access Centre-coordinated services for patients repeatedly contacting EMS;
- A hospital-based discharge planner assisting the transition of a patient to a complex care or long-term-care facility;
- A PCP seeking palliative care services for an end-of-life health care client.

For the purpose of this document we define patients and health care clients interchangeably, based on the health care setting.

1.1 AUTOMATING REFERRALS

As with other areas of healthcare, care providers are at various stages of introducing technology to mediate referrals. Potential patient care benefits that can be realized through utilizing technology include secured delivery of referrals, improved efficiency, access to care, quality of care, continuity of care, better quality of documentation and communication, as well as reduced cost[4]. For the purposes of this document, the term eReferrals will refer to the automation of one or more activities involved in initiating, negotiating and closing the referral process.

[4] Gu Y, Warren J, Orr M. (2014). The potentials and challenges of electronic referrals in transforming healthcare. *New Zealand Medical Journal.* 127(1398):111-8.

The Evolution of eReferrals in Ontario

Since 2003, the Ontario Continuing Care sector has been pursuing an e-Health strategy, aligned with the overall Ontario e-Health strategy and Canada Health Infoway, to provide seamlessly integrated community-based care in Ontario between the four Continuing Care sectors: Community Care Access Centres (CCAC), Community Mental Health & Addictions (CMH&A), Long-Term Care Homes (LTCH) and Community Support Services (CSS). The Ontario Continuing Care e-Health strategy was formulated by the Continuing Care e-Health Council, in consultation with the entire Continuing Care sector. It consisted of several projects and initiatives, known collectively as the Continuing Care e-Health (CCeH) Program. One of these projects, the e-Referrals & Access Tracking Project, was established to develop an electronic referral messaging model. The objective was to automate, streamline and standardize referrals using an electronic system and gather feedback from end-users, which was positioned to be incorporated into the province-wide e-Referrals & Access Tracking solution. The requirements gathered from this initiative were incorporated into the Ontario eReferral Standard specification in the 2010 publication, as part of the Ontario Care Request Data Standard (OCRDS).

In 2009, Cancer Care Ontario (CCO), in partnership with eHealth Ontario, led an Alternate Level of Care Resource Matching and Referral Project (ALC RM&R). Its goals were to establish the Provincial Reference Model (PRM) for resource matching and referral solutions and provide funding to Local Health Integration Networks (LHIN) to implement LHIN-based solutions in keeping with provincial guidelines and standards. The scope of the ALC RM&R project was limited to a subset of referral pathways that had been identified as having the greatest potential impact on ALC in the acute setting. The PRM focused on providing guidelines to assist LHINs and Health Service Providers (HSP) when implementing Resource Matching and Referral (RM&R) solutions, via four care pathways, using three standardized forms:

1. *Acute to CCAC Pathway* – Referral data sent by acute in-patient (medical/surgical) units to a CCAC to trigger a patient assessment for CCAC services;
2. *Acute to CCAC to LTCH Pathway* – Referral data in the application cover sheet sent by all CCAC to LTC Homes to help the LTC Homes in making acceptance decisions. All other attachments are standardized through either the Ministry or the CCAC sector;
3. *Acute to Rehab Pathway* - Referral data sent by acute in-patient (medical/surgical) units to Rehab and Complex Continuing Care (CCC) facilities to help the Rehab and CCC facilities in making program/service acceptance decisions;
4. *Acute to CCC Pathways* – Referral data sent by acute in-patient (medical/surgical) units to Rehab and CCC facilities to help the Rehab and CCC facilities in making program/service acceptance decisions.

In 2009-10, eHealth Ontario's eHealth Standards Program was commissioned to create an Ontario eReferral messaging standard which would leverage requirements from CCO's ALC RM&R project and incorporate the CCeH business/technical requirements. This was developed to align and enhance the pan-Canadian eReferral messaging standard developed by the Canada Health Infoway Standards Collaborative. The Ontario eReferral standard

supported additional pathways beyond the 2010 PRM, such as physician-to-specialist, community support services and mental health and addictions referrals.

In 2011, the Toronto Central LHIN (TC LHIN) was appointed Project Sponsor for ALC RM&R and proceeded to develop and implement the required governance structure and work with all LHINs to develop Ontario Referral Standards for the four care pathways as identified above.

When ALC RM&R was initiated in 2009, the Ministry's objective was to accelerate the LHIN's collective state of readiness for a provincial Resource Matching and Referral (RM&R) automated solution. With the standardization of terminology, forms, and referral processes as a pre-requisite for successful implementation of an automated provincial RM&R solution, the Ministry funded ALC RM&R was designed to complete all pre-automation activities within the LHINs in a provincially coordinated manner.

Since 2013, the focus of ALC RM&R has been on ensuring that the benefits of standardization will be realized through the implementation of the Ontario Referral Standards (ORS) in existing referral environments across the Province. With the development and implementation of Ontario Referral Standards, ALC RM&R has contributed to the creation of a more streamlined referral landscape for the four aforementioned referral pathways. The mandate of the ALC RM&R Business Transformation Initiative (BTI) was to establish standardized referral terminology, referral standards and forms for the four referral pathways.

In April 2014, the Chief Executive Officers (CEOs) of the fourteen Local Health Integration Networks (LHINs) formally approved the final Ontario Referral Standards for implementation across the province. Currently, all LHINs are working with their HSPs to implement these standards across all HSP sites; this was completed on March 31, 2015. Implementation of the ORS will take place in the referral environment(s) which exist within individual LHINs. Some implementations are paper-based while others are utilizing new or existing eReferral Solutions (such as the Ontario Community Care Access Centres (OACCAC) CHRIS system for CCAC and LTC referrals or STRATA solution for CCAC, LTC, Rehab, and CCC referrals).

The RM&R Provincial Standards Sustainability Office (PSSO) was established in 2014 for a one year term, within the Toronto Central (TC) LHIN, to ensure that, as a province, we: (1) continue to build upon the work completed as part of ALC RM&R BTI; (2) continue to monitor and evaluate ongoing implementation and use of developed ORSs; and, (3) finalize a sustainability model for beyond 2014/15 and decisions related to possible future planning endeavors. As part of this mandate, the PSSO played a liaison role to ensure the ORS are aligned to eHealth Ontario Agency's EHR interoperability standards, and that emerging requirements from the LHIN's are shared with the Agency's Architecture, Standards, and Planning Division to ensure regional delivery partners have consistent standards to follow.

Current eReferral Solutions in Ontario:

There have been many successful eReferral implementations in Ontario supporting different points of care transition within the patient journey. The descriptions below are intended to provide a sample of the scope, approaches and successes of the progress to eReferrals in Ontario. Future releases of this document will include additional project profiles.

Toronto Central LHIN, Central LHIN, and North West LHIN

The Strata Pathways Resource Matching and Referral (RM&R) system is a web-based information and referral system that matches patient/clients to the earliest available services that best meet their individual needs.

The TC LHIN RM&R Program is a multi- sectorial eHealth initiative and involves integration by TC LHIN hospitals, LTCHs, community support services, and the TC CCAC. The program continues to grow and, most recently, the Strata Pathways RM&R system was expanded to include referrals to palliative care services in the TC LHIN. To date, the RM&R system has been implemented between 86 health service provider organizations.

In the North West LHIN, Strata Pathways is positioned as the central referral manager for all types of referrals (including PCPs to Specialists). It is used to match clients to available services, as well as, provide automated bed level matching based on bed eligibility criteria - this ensures that bed matches (e.g. for Long-Term Care, Rehab, CCC) are made in the most transparent and equitable manner. In the North West, the system is continually expanding to encompass additional pathways and health service providers, as it is viewed as a foundational tool to improve many areas, including patient flow between health service providers and access to care wait times. Due to its use by three LHINs across the province, provincially coordinated and regularly scheduled joint-LHIN planning sessions take place (involving the LHINs that use Strata Pathways) to identify and prioritize common enhancements that can be pursued together, resulting in cost savings and efficiencies, regionally and provincially. The Strata Pathways computer system is fully compliant with the established Ontario Referral Standards, and while many LHINs in the province are implementing these standards using paper-based forms, the North West LHIN has chosen to implement the standards using the electronic forms that are part of this comprehensive computer system.

Ontario Association of Community Care Access Centres (OACCAC) Client Health Related Information System (CHRIS)

The Client Health Related Information System (CHRIS) is a web-based patient management system for Ontario's CCACs that plays an integral role in enabling CCACs to provide quality care to patients. CHRIS gives CCAC staff access to patient information and care plan details from wherever they are working. This information is vital for ensuring safety and consistency in care delivery, and also enables quick responses to patient and provider queries.

CHRIS is integrated with a number of supporting applications, providing CCAC staff with seamless access to the following:

- Patient assessments – completed and accessed, as needed, online through a link from the CHRIS patient record; shared through eReferral functionality.
- Patient Document Library – documents triaged for filing and accessed through a link from the CHRIS patient record; shared through eReferral functionality.
- Bed Board Management (BBM) – vacant bed inventory management for long-term care as well as complex care and rehab placement, with support to match patients waiting for service; reservation management for long-term care, short stay or respite.
- Health Partner Gateway (HPG) – secure, timely exchange of patient information with contracted service providers, community support service agencies, long-term care homes, complex care and rehab hospitals, medical equipment and supply vendors.

Together, these tools allow CCAC intake staff to assess the needs of new patients, refer patients to community services, and initiate CCAC care plans for them in a timely manner, consistent with the urgency of their needs.

At the same time, CCAC community teams, organized by patient population, coordinate the ongoing care plans of the patients admitted for service. Service providers electronically submit patient status reports on a regular basis to update the CCAC Care Coordinator on the patients' progress towards their goal. Care Coordinators then re-assess patients to confirm that their care plan is effective in supporting the patient towards their goals, and to plan for the discharge of CCAC services, as appropriate.

CHRIS has incorporated the ORS forms into their application.

The administrative functions in CHRIS support the CCAC management of contracts for each of their contracted providers and vendors, the billing of services, and medical supplies and equipment rentals, as provided to patients as part of their care plan[5].

The Hospital for Sick Children Ambulatory Referral Management (ARMS)

The Ambulatory Referral Management (ARMs) system, a local eReferral system developed in 2006 by the Hospital for Sick Children in Toronto, was integrated in 2012 into the Electronic Child Health Network (eCHN), a paediatric patient information portal. By completing an online referral form, which is not interfaced to an EMR, PCPs are able to electronically refer to 54 different specialty clinics at Sick Kids. The referral is electronically routed for review, triage and booking. It provides automated faxed responses to the referring provider as the patient progresses to advise when the referral has been received, to whom it was directed and when the patient has been booked for an appointment.

SickKids has transitioned to a preference of receiving all referrals electronically (vs. fax submission) and now approximately 80% of all referrals (approx. 55,000 referrals annually) are submitted electronically. The result has been a more timely and efficient management of referrals from physicians' offices to outpatient clinics and from one clinic to another within SickKids[6].

[5] Ontario Association of Community Care Access Centres. (2015). *CHRIS – CCACs' Client Health & Related Information System*. Retrieved from: http://oaccac.com/innovation/Pages/chris-ccacs-client-health-related-information-system.aspx

[6] Ontario Hospital Association. (2015*). Implementing an Online Ambulatory Referral Management System*. Retreived from: http://www.oha.com/Education/EventCalendar/Pages/EventDetail.aspx?eventid=E5%20509%2015#sthash.krF8tbpF.dpuf

Champlain LHIN Building Access to Specialists through E-consultation (BASE)

The Champlain BASE (Building Access to Specialists through E-consultation) project is a collaborative pilot project between a University of Ottawa academic research team and the Champlain LHIN; it is designed to enable primary care physicians to submit a question to a specialist, through a secure web-based service, along with supplementary laboratory results, digital images, and/or health history. The consultation request is assigned to an appropriate specialist who is expected to respond within one week. A prospective study of 406 e-consultations over a 15 month period (April 2011 – July 2012), which included between 59 PCPs and 16 specialty services, found that the service mitigated a traditional referral in 43% of the submitted cases[7].

Ontario Telemedicine Network (OTN)

OTN launched a pilot Store and Forward service in 2011, specific to dermatology and ophthalmology, that allows the requesting physician to send a description of the problem along with digital images to the consultant specialist. The consultant is able to offer advice to provide an opinion or request that the patient be referred for an in-person initial consultation.

Specific to this service is Otn.teledermSF®, which allows GPs/FPs to securely send photographs of a patient's skin condition and other relevant health information to an Ontario-based dermatologist. The dermatologist will review the file and provide a diagnosis and treatment plan. All communication is done through OTN's secure information technology platform.

[7] Keely E, Liddy C, Afkam A. Utilization, Benefits, and Impact of e-Consultation Services Across Diverse Specialties and Primary Care Providers. *Telemedicine and e-Health*, 19:10 – 733 – 738.

With this service, on average, wait times are less than 5 days and result in freeing up physician time for necessary face-to-face appointments. This is in contrast to existing wait times that can vary from 3-4 months for patients who are 45 minutes from a major urban centre, to 8-12 months for those residing in Northern Ontario[8].

Emergency Medical Service to CCAC

Toronto Central CCAC and EMS created a community based referral project, called Community Referrals by EMS (CREMS), to optimize the use of resources already existing in the system by providing paramedics with a new option to engage other health providers in serving at-risk people in the community. Traditionally, EMS response has been limited to administering medical treatment and either leaving the individual at home or transporting them to the hospital; however, the CREMS model provides a third option. Through a 24/7 information line, staffed by the Toronto Central CCAC, a paramedic can make a community referral. Once this referral is made the CCAC, via CHRIS, will coordinate a needs assessment and link the referral to community health and support services. This low cost, innovative solution resulted in more appropriate use of EMS services and hospital emergency department resources - giving people the right care, in the right place, at the right time.

Mississauga Halton Central Intake Program for Diabetes Education and Foot Care Services

The Mississauga Halton Central Intake Program, funded by MH LHIN and hosted by Halton Healthcare, was implemented in 2013 to manage referrals to community diabetes education programs in the region. It receives referrals from primary care providers and specialists, triages referrals for diabetes education services based on care needs, and provides referral status updates to referral sources. Due to its success, the program was expanded to incorporate foot care and addiction and mental health services for the region, and since April 2013 it has

[8] OntatioMD. (2014). *OntarioMD eConsult Business Plan.* OntarioMD.

received over 8,000 referrals from 775 sources, with 98% of them triaged within 48 hours of receipt. In order to meet the increased volume and maintain its efficiency in referral processing, the program procured and implemented an eReferral solution in 2014. Phase one implementation consisted of adoption of the portal between Central Intake and the diabetes education and foot care program. Work is currently underway for physician adoption of the system in September 2015. Starting Fall 2016, the eReferral solution will enable primary care physicians to submit and track referrals for diabetes education, addiction and mental health services in the Mississauga Halton region.

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1.2 BLUEPRINT, ONTARIO'S EHR CONNECTIVITY STRATEGY, AND PROVINCIAL REFERENCE MODELS

The Architecture, Standards, and Planning Division at eHealth Ontario plays a critical systems integrator role – namely: (1) the development of the architectural strategy for EHR; (2) the development and maintenance of system architectures; and (3) the creation of interoperability standards that supports enterprise integration. Enterprise integration, in turn, aims to optimize the access to, and availability of, Ontario's investments in systems that provide clinical data for the benefit of all Ontario patients. Architecture defines how Ontario's EHR is built, what standards need to be employed to allow secure information exchange, and who, throughout the health care sector, is responsible for which aspects of the system.

To connect with our stakeholders and share Ontario's EHR's vision the Architecture, Standards, and Planning Division has developed the Blueprint, Ontario's EHR Connectivity Strategy, and, now, the eReferral Provincial Reference Model.

1.2.1 ONTARIO'S EHEALTH BLUEPRINT

Ontario's Ehealth Blueprint is an architectural foundation that informs electronic health record planning and delivery for the province, providing a comprehensive description of the business, information, and system components necessary for the implementation of an interoperable EHR, and explaining how they work together. It provides a standardized taxonomy and common semantics model for describing the ehealth architecture, and describes the architectural principles and patterns that will be employed to deliver it. The blueprint is built on key foundational principles including privacy and security compliance, collaborative governance, regulation and policy, standards, and federation. Information on standards, a key component of an interoperable EHR, is woven throughout the document. In short, the Blueprint describes what components are required to realize an EHR and ensures all stakeholders have the same vision for the EHR, thereby enabling the federated delivery model utilized in Ontario.

1.2.2 ONTARIO'S EHR CONNECTIVITY STRATEGY

To enable ehealth system integration the Architecture, Standards, and Planning Division at eHealth Ontario developed the Ontario's EHR Connectivity Strategy, which describes how EHR assets in Ontario will be connected to form a shared, comprehensive, provincial Electronic Health Record. The strategy assists decision makers by leveraging investments made to date and providing a transition plan for future state EHR connectivity, thereby ensuring all stakeholders understand and agree with the path forward and assisting stakeholders in making decisions today. The scope of the Ontario's EHR Connectivity Strategy includes acute, primary, and community care. In addition to care settings, treatment is also given to clinical domains (lab, drug, and diagnostic imaging), as well as provincially integrated eHealth service from Cancer Care Ontario, Ontario Telemedicine Network, and Ontario Association of Community Care Access Centres.

1.2.3 EREFERRAL PROVINCIAL REFERENCE MODEL

This PRM, which is a complete revision of the 2010 RM&R PRM, focuses on presenting the development and implementation framework of an eReferral solution from an eHealth Blueprint and Connectivity perspective, including identification of and details on necessary components and patterns. These patterns are articulated through a business, information, solution, privacy and security point of view. The PRM follows these core principles:

- Promoting a common understanding and approach;
- Providing re-usable patterns;
- Offering a framework to guide building or procurements;
- Leveraging provincial EHR assets;
- Building systems today that can be integrated in the future; and,
- Supporting standards that are aligned with the eHealth industry direction.

1.2.4 DRIVERS TO UPDATE THE EREFERRAL PRM AND STANDARD

The MOHLTC eHealth Liaison Branch asked eHealth Ontario to review and update the PRM and eReferral Standard. Five drivers have catalyzed the need to update the 2010 PRM frameworks and eReferral standard:

1) *MOHLTC noting that individual eReferral solutions should conform to provincial standards, and they will be removing funding for a single provincial eReferral solution.* As such, regional delivery partners may choose different approaches to implement eReferral solution and an updated PRM will guide delivery partners on how to align to the provincial assets and enable the ability to interoperate.

2) *The scope of eReferral solutions has broadened beyond the original four care pathways.* As described above, automated referral solutions are already in place between physicians and specialists, EMS and CCACs, and CCACs and community-based providers. Additional pathways between various providers, and even health care client self-referrals, are in various stages of planning and implementation. These initiatives will benefit from guidance on how to interoperate with one another.

3) *The creation and availability of EHR assets.* Since 2010, several provincial EHR assets have become available, e.g. Client and Provider Registries. Additional services, such as the provincial Consent and Privacy Audit services, are also progressing towards production. The new PRM will inform regional delivery partners in how these assets will be leveraged.

4) *Alignment to eHealth Ontario documents.* In 2014, eHealth Ontario released the Blueprint, and in 2015 we released the Ontario's EHR Connectivity Strategy. The Ontario eReferral PRM should be informed by and aligned with these guiding documents.

5) The need to establish clear linkages between the PRM and the provincial eReferral standard.

1.3 OVERARCHING CONCEPTS

There are four key concepts that highlight the differences between 2015 and the 2010 PRM. The eReferral business and technical requirements specified in this document are rooted in existing and planned Ontario-based eReferral solution initiatives, and these four concepts set the stage for how eReferrals 'fit' within the broader EHR strategy. These key concepts are:

1) Patterns and pathways.

2) Standalone and interoperable systems.

3) Workflow integration and health information exchange.

4) Messages and documents.

1.3.1 REFERRAL PATTERNS VERSUS PATHWAYS

As described above, the 2010 PRM focused on four referrals pathways from acute to post-acute facilities. The evolution from "pathways" to "patterns" emerged from the growth of 'referral based' solutions throughout the province and the need to provide a model which would sustain multiple types of referrals regardless of the health care domain/setting. Based on extensive review of the provincial referral landscape, referral forms were collected

to come up with the classification of "referral patterns" as an outcome of applying the content from the various referral pathways to confirm that, regardless of the content on the forms, all referrals fell into one of three classifications. The three patterns are briefly described below, and fully detailed in the Business Framework (Section 3):

1) Patient Self-Referral

Many health service providers will consider a health care client's request for care, service or support without requiring another health service provider's participation in the request. Examples include PCPs, such as family physicians, nurse practitioners, dentists, and chiropractors, and many allied health professions. In some cases, a provider will accept a self-referred health care client without requiring clinical information. For example, Ontario's Shouldice Hospital offers a walk-in clinic for hernia examination that does not require a PCP referral[9]. In most cases, however, the provider will require the health care client to provide contextual information to assess whether to accept him/her into the practice.

2) Non-Transfer of Care

Referrals are used to obtain specialist or specific treatment or service from another health care provider (person or organization), yet responsibility and accountability for the health care client ultimately remains with the health care provider (person or organization) that is referring the health care client. An example of this would be a PCP request for a one-time dermatology consult. The PCP is enhancing his/her ability to provide excellent care to the patient but the patient remains attached to the PCP and receives results back from the PCP. Typically, a consult report is used as a feedback mechanism to the referring provider after the health care client has been treated by the referred-to provider. Two features of this pattern, that are related to the accountability continuing to reside with the (initial) requestor, are: (1) there may be a series of cascading referrals from one provider to another in

[9] Shouldice Hospice. "Frequently Asked Questions." Shouldice Hospice. Retrieved 29 Dec 2014, from http://www.shouldice.com/faq.aspx

order to fully meet the initial referral request, and (2) all communications related to these cascading referrals are expected to be shared with each of the 'upstream' referral requestors. These concepts are further developed in Section 3.3.

3) Transfer of Care

Referral activity is focused on moving responsibility and accountability for a health care client from one health care provider (person or organization) to another. An example is a patient discharged from a hospital into a long term care facility. Some characteristics of these types of referrals that may distinguish them from the non-transfer of care pathways include:

- The referral recipient becomes the most responsible provider for the care of the health care client with regards to the condition being treated[10].
- When the care is transferred, additional information may be supplied to the referred-to provider (e.g. new lab results, new medications, etc.).
- The referred-to provider typically does not provide a consult report back to the referring provider[11].

[10] For an example, see the College of Midwives of Ontario's *Consultation and Transfer of Care Policy (January 1, 2015).* Retrieved from: http://www.cmo.on.ca/?page_id=1026

[11] eHealth Ontario. (2010). *eReferral Standard implementation guide*. Retrieved from:http://www.ehealthontario.on.ca/en/standards/view/ereferral

- The purpose of this classification is to provide a simple means of categorizing and discussing transitions in care across the health system and patient journey. This can assist eReferral initiatives with demonstrating to stakeholders that there are many common process activities between patterns. This may present the opportunity to design an eReferral solution that is broader than initially conceived.

1.3.2 STANDALONE AND INTEROPERABLE SYSTEMS

Standalone applications are 'all in one' systems, where all eReferral activities and services for referral generation, tracking, and management occur. The advantage of this approach is that it enables 'out of the box' referral management, especially for providers that do not have referral functionality in their local systems. Two disadvantages are that providers must 'leave' their local systems in order to generate and act upon referrals (phases one and two) and they need to re-enter and/or manually export data that from the standalone application into their local system. Many of the operational eReferral programs in Ontario are integrated applications.

An alternative approach is to create interfaces between systems so that they can interoperate. Two advantages of this approach are that it can enable referral generation and management within a local system and it enables systems with different capabilities, functions and data to work together in supporting clinical workflow. The disadvantage of this approach is that establishing and maintaining interfaces between systems, especially when they exist within different organizations, is a technical and resource challenge.

1.3.3 WORKFLOW INTEGRATION AND HEALTH INFORMATION EXCHANGE

eReferral solutions span a range of capabilities that can be categorized in three broad phases. **The first phase is the generation and communication of an eReferral.** This can include semi or fully-automated resource matching, 'smart' eReferral templates that ensure complete referral content, and initial communication of the eReferral to the Referral Destination. **The second phase consists of referral management activities.** These can include referral triage and/or assessment, status tracking, requests for additional information, and brokering between multiple potential referral destinations. This phase concludes once a referring destination accepts a referral and/or once the patient transfers into the care of the referral destination. **The final phase is closure of the referral** through the communication and delivery of any collateral reports to relevant members of the care team (e.g. a consult report).

The first two phases are common across referral patterns, while the final phase is specific to the non-transfer of care pattern. The focus of many eReferral implementations is to streamline the first and second phases of referral activities through workflow integration. Establishing clear processes that are technology enabled for transitions in care between providers can reduce the delays associated with slower, paper-based modes of referral transmission (such as mail, courier and fax). They can also speed up decision-making processes because the referral information required can be requested up-front through customized templates so that it is consistent and complete for all patients. Finally, the status of a referral can be tracked and actioned more quickly than paper-based referrals. For

the purposes of this document, these implementations are referred to as 'workflow integration' implementations. Integrated systems and interoperability are both approaches used to achieve workflow integration.

The third phase, covering referral closure, is important for the purpose of maintaining a complete and up-to-date EHR for the patient. The information contained within a consult report or progress note created by the referral destination informs the referral source, as well as other members of the care team, of the patient's health status. It can also be an important input to any subsequent episodes of care. Workflow integration implementations may also include this third phase, or it can be implemented as part of a broader strategy for 'unleashing' all relevant clinical data from disparate provider systems into a centralized repository that is accessible to all health care providers. This latter type of system implementation is termed as a health information exchange (HIE). By its nature, an HIE involves creating interoperability between systems to share it with other systems that are more broadly accessible.

For both eReferral workflow integration and HIE initiatives, scoping boundaries need to be established for the purposes of achieving stakeholder objectives and managing cost, timelines, and quality. Boundaries are drawn around the patient and provider locations and provider types involved. These boundaries may also be introduced to reflect the technology capabilities required to participate. In this PRM, this collection of socio-technical actors – providers, patients and systems – involved within a bounded referral system is referred to as an eReferral ecosystem.

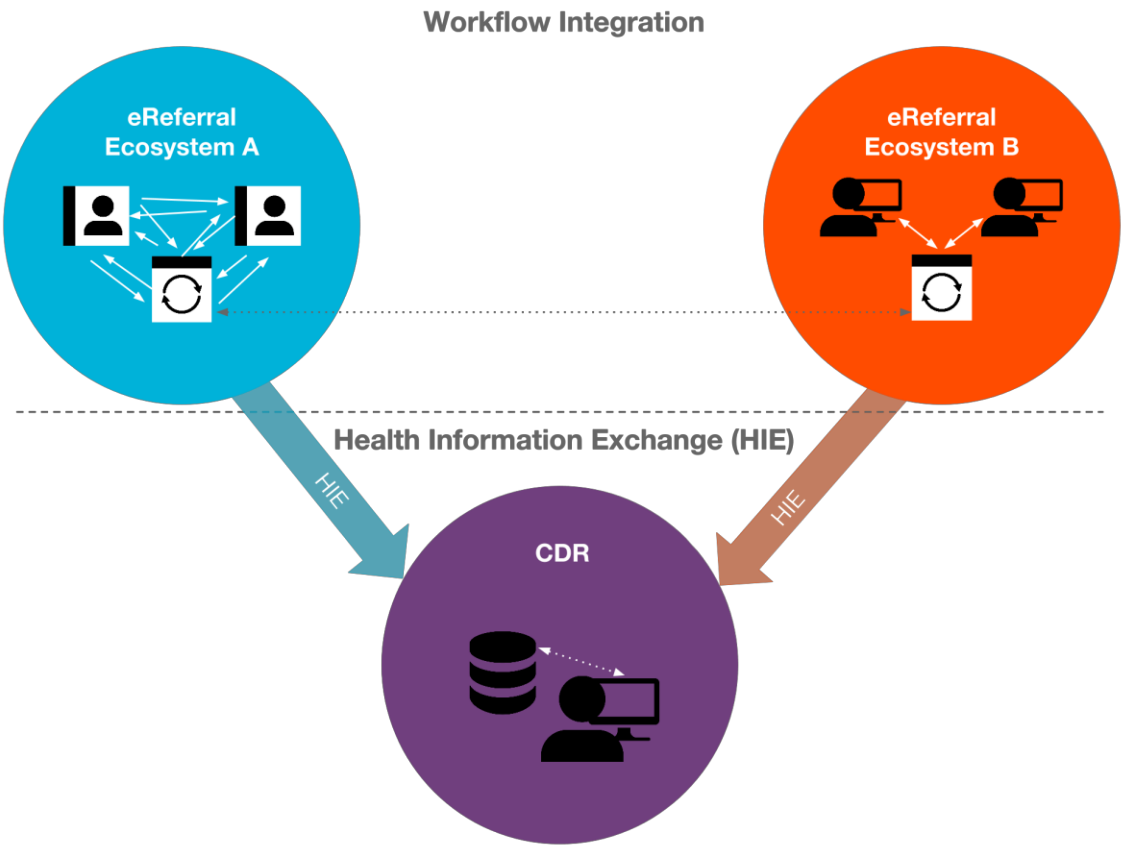


Figure 1 - Permeating eReferral Ecosystem Boundaries to Enable Broader Workflow Integration and Health Information Exchange

As illustrated in Figure 1, above, a broader plan is required to weave together current and future eReferral ecosystems so that referrals can permeate these boundaries. This will enable cross-boundary interoperability for all three phases. As well, health information exchange will need to be enabled to make the patient's EHR accessible to providers outside of an ecosystem. And, finally, as the number of ecosystems grow, providers will likely need a simplified means for accessing them without having to remember multiple usernames, passwords, and how to navigate each system. As a result, each ecosystem needs to be planned and implemented in a future-looking manner that can support interoperability with other ecosystems.

1.3.4 MESSAGES AND DOCUMENTS

Various data exchange approaches can be used to create interoperable systems and the content of the exchange can be a combination of data and documents. Distinguishing these concepts will aid in achieving interoperable eReferral ecosystems.

Documents: In data exchange, the main aim of structuring information as a 'document' is human-readability, persistence, and self-containment, which includes wholeness and context. As described by Rene Spronk, an expert in data exchange solutions: "The v3 Clinical Document Architecture (CDA) is an HL7 standard for the representation and machine processing of clinical documents in a way that makes the documents both human readable and machine processable. The following concepts apply to documents:

- They are persistent in nature, have "static" content and tend to be used "post occurrence", i.e. once the actual process is done. Documents are about persisting "snapshots" as understood at a particular time.
- They contain data "as it was" when the document was created. For documents such as referrals and discharge summaries, it may be more appropriate to see the data as it was understood at the time the referral or summary was constructed rather than viewing the data as it exists now.
- They are "passive". Documents capture information and allow that information to be shared, but do not in and of themselves drive any activity. Documents can be superseded and corrected, but they are still "static documents" rather than dynamic objects." [12]

Messages: In data exchange, the main aim of messages is machine processability. As Rene Spronk explains, messaging is oriented towards the management of the status of business-objects (such as health care client or service provision) and uses a dynamic model (trigger events) based on the status change of one or more business-

[12] Ringholm. (2007). HL7 version 3: Message of CDA Document? Retrieved from: http://www.ringholm.com/docs/04200_en.htm

objects. Messages are capable of providing real-time information, but they may have receiver responsibilities (i.e. cause response messages to be sent). Messages are generally used to support an ongoing process in a real-time fashion. They convey status information and updates related to one and the same dynamic business object. Messages are about "control." Messages represent requests that can be accepted or refused by the receiver and there are clear sets of expectations about what the receiver must do. In such situations the latest version of the data is of importance to support an ongoing process; historic versions of one and the same object are generally not of importance apart from regulatory (e.g. auditing) purposes. Messages by and large contain "current" data and the more interactive and tightly coupled your communication process is, the more the use of messages is applicable[13].

The distinction between documents and data is important to health information exchanges. Utilizing the document paradigm to exchange clinical content provides flexibility in how the document is exchanged. It introduces the ability to use various data transfer approaches -such as HL7 version 2, HL7 version 3, XML and File Transfer Protocol. Section 7.0 of the PRM will further describe how this advantage can be leveraged within Ontario's EHR architecture.

1.4 OBJECTIVES

The four concepts above provide a backdrop for describing four key benefits that this revised PRM intends to provide:

Delivery of a conceptual map of the eReferral landscape: The PRM outlines the core business, information, and technical requirements that have been implemented and/or identified by several existing Ontario eReferral initiatives. These can be used by current implementations to assess whether there are additional requirements

[13] Ringholm. (2007). HL7 version 3: Message of CDA Document? Retrieved from: http://www.ringholm.com/docs/04200_en.htm

they may wish to implement. New initiatives can use the PRM to gain an initial 'survey' of existing Ontario eReferral initiatives capabilities. This can assist them in planning the scope and direction of their initiative. Finally, the document can provide a 'common language' to facilitate discussions between eReferral stakeholders. This can help to bring a common understanding and direction for stakeholders within an eReferral initiative.

Guidance for building or buying an eReferral solution: The PRM sections can serve as inputs to the various phases of the software development lifecycle or by initiatives that are establishing an eReferral ecosystem by interfacing existing systems. These requirements and standards can also serve as a starting point for planning and specifying requirements within a request for proposal (RFP). The requirements can be made more specific and additional requirements can be layered in to customize the solution. The standards implementation guide also can be included as a supplementary RFP requirement. Finally, initiatives that have already gathered requirements can use these as a comparative checklist or 'third-party review' before publishing the RFP.

Leveraging provincial EHR assets: The PRM is grounded on the eHealth Ontario Blueprint and Ontario's EHR Connectivity Strategy. It can assist an eReferral project or program in business planning and investment decisions by identifying those provincial assets that should be considered for short-term and longer-term interoperability.

Enabling interoperability within and between eReferral ecosystems: The PRM assists delivery partners in determining how to align and connect eReferral ecosystems. The standards section of this document specifies how interoperability can be achieved between existing and future components of eReferral ecosystem.

1.5 ASSUMPTIONS

It is assumed that the reader possesses familiarity with at least several referral pathways, as well as a general knowledge of eHealth and EHR concepts. As well, it is assumed that any eReferral solution initiative will begin with a business process analysis and design prior to automation, as this is a critical success factor for successful automation.

1.6 APPROACH TO DEVELOPING THE EREFFERAL PRM

The content of this document has been formulated by conducting an environmental scan of Ontario referral pathways, a review of documentation produced by several Ontario-based eReferral initiatives, a broad sample of referral forms from across the Ontario health system, several stakeholder consultations, and Ontario-based eReferral demos.

With information from the environmental scan, eHealth Ontario identified salient concepts and ideas, determined the generation of generic models, and established linkages between the business, information, and technology solution, and standards models.

The following resources were referenced in the creation of this document:

- Ontario's EHR Connectivity Strategy, 2015
  - The Ontario's EHR Connectivity Strategy, describes how EHR assets in Ontario will be connected to form a shared, comprehensive, provincial Electronic Health Record.

- Ontario's eHealth Blueprint, 2014
  - Ontario's ehealth blueprint informs EHR planning and delivery for the province. It provides a future state, high-level view of the EHR in Ontario.

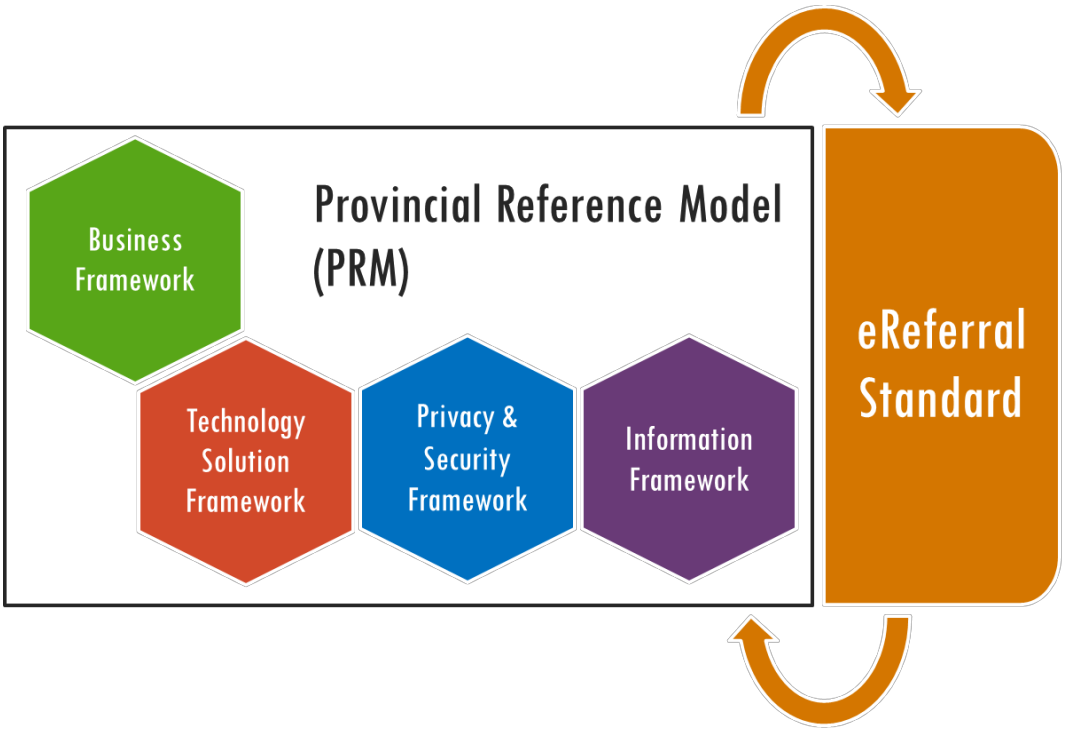
- OntarioMD eConsult Business Case, 2014
  - A proposal, developed by OntarioMD, as requested by MOHLTC, that describes how to enable eConsults between a requesting physician and a specialist by building on the work from pilots in Ontario and other jurisdictions. It describes how an eConsult service would work, the associated costs to build, implement, and operate the service, and the potential savings and other benefits from the service, including decreased wait times and increased patient safety.

- OntarioMD Business Requirements V1.2, January 30, 2013
  - The report summarized the eReferral Business Requirements OntarioMD prepared and delivered to eHealth Ontario. A key deliverable in the amended DCA was the development of eReferral Business Requirements by December 31, 2012 to support referrals among physicians and other health care providers.

- eReferral Strategy White Paper "Clearing the Fog", 2011
  - This white paper is about clearing the "communication fog" associated with navigating the health care system. It provides helpful information on how to build an effective eReferral strategy, and enunciates health care system insights with new perspectives on what works and what does not work for the patient, the PCP, and the specialist.
- RM&R PRM, 2010
  - The PRM defines requirements for implementation of RM&R solutions in LHINs/LHIN clusters across Ontario. It includes business process and data elements, a performance management framework, the technology solution framework and privacy and security requirements to which LHINs/LHIN clusters must align when implementing RM&R solutions.
- Ontario eReferral Standard, 2010
  - The specification enables providers to electronically transfer information for referral purposes.

2.0 AN OVERVIEW OF THE EREFERRAL PRM

The eReferral PRM document consists of 5 sections. These have been sequenced to progressively elaborate on how referral business needs are encapsulated and enabled through eReferral solutions. The purpose and content of each of the sections is described below.



BUSINESS FRAMEWORK

The Business Framework elaborates on the activities that comprise each of the three referral patterns. It includes key business concepts and generic business requirements related to referrals. The activities in each of these patterns can be automated concurrently or implemented in a modular fashion. The referral business requirements were aggregated from key stakeholders, partners, and domain experts. The aim of these requirements is to support all eReferral solution implementations agnostic of system or vendor.

TECHNOLOGY SOLUTION FRAMEWORK

The Technology Solution Framework introduces the technology capabilities to support automation of the referral patterns, and describes the conceptual and logical architecture and service definitions of an eReferral solution. It

describes which referral activities are supported by the various systems in the conceptual architecture and how these systems interact. Readers will learn how to make best use of current and future provincial EHR assets. This section is written to account for the specific requirements at the delivery partner level where solutions are being implemented.

It provides context and describes specific requirements that will be used in the procurement of HIT goods and services throughout the province, particularly those procurements that relate to the exchange of health information outside of a single care provider organization.

PRIVACY AND SECURITY FRAMEWORK

The Privacy Framework presents models in which health care providers exchange personal health information during an eReferral. These are accompanied with high-level privacy requirements derived from legislation. The Security Framework describes the essential, internationally-recognized, security practices that should be employed to secure information technology environments. These practices are overlayed upon the eReferral solution technology architecture to illustrate where they apply. This section is helpful to the delivery partner in creating a private and secure eReferral environment.

INFORMATION FRAMEWORK

The Information Framework describes the health data utilized and exchanged to enable the referral process. It relates the content of referral-related clinical forms and reports to the Conceptual Information Model component of the eHealth Blueprint. Throughout the section users will see how referral data 'fits' within the broader EHR information model. As well, this section offers a logical data model that can be used as a starting point for specifying data requirements for an eReferral solution.

EREFERRAL INTEROPERABILITY STANDARDS

The eReferral Interoperability Standards section describes a standards-based approach to interoperability between eReferral ecosystem components and explains the various eReferral interoperability scenarios. It provides users with an overview of the Clinical Document Architecture (CDA) standard and how it can be used for data exchange, along with an overview of the components of the eHealth Ontario provincial HL7 version 3 eReferral standards. Readers will be advised as to which components of the standard should be used for either workflow integration or health information exchange. This section is illustrated using the same use cases as the Business Framework and explains the relationship between the standards and other frameworks.

2.1 USING THE PRM FOR BUILDING OR PROCURING AN EREFERRAL SOLUTION

Each framework contributes concepts to explain how referrals can be automated. These concepts are further elaborated upon by recommendations and/or requirements to guide the development or procurement of an eReferral solution. Except for the Business Framework, the requirements stemming from the other Frameworks are included as appendices due to their length. Also, the updated provincial eReferral Standard Implementation Guide and accompanying artefacts will be published on the eHealth Ontario website – see http://www.ehealthontario.on.ca/en/architecture/standards

2.2 FUTURE CONSIDERATIONS

There are many important dimensions of the referral process that are not included in this PRM document. These topics may be included in future versions but were excluded in this iteration because the focus of the document is on the activities needed to support the administrative transition in care between providers. In some cases, eHealth Ontario was not in a position to provide sufficient guidance. The reader is encouraged to conduct additional research and stakeholder engagement to obtain business, technical, and information requirements for the following topics:

- Referral waitlist management;
- Secondary use of eReferral data for health system management and research;
- Appointment scheduling;
- Patient-centric functionality (e.g. patient-driven automated resource matching, alerting patients that their referral has been sent or a consult report has been generated);
- Incorporating payment mechanisms into the referral process (e.g. billing generated automatically through the issue of a consult report, co-payment options);
- Providing a knowledge base to enable provider 'self-help' as a pre-emptive alternative to requesting a referral;
- Requisitions for laboratories, diagnostic imaging, and prescriptions; and,
- Algorithms for resource matching.

Three additional considerations are not covered in this document, include:

1. Change management: These are the activities related to assisting the stakeholders that will need to change their work methods, is a critical success factor to achieving the benefits of automation. These activities include pre and post-automation workflow assessments, communications (about the future

vision, reasons for the change, the status of the project and achievement of project goals), working with adopters to find value in the new work methods, training and support.

2. An eReferral program management structure must be ready to maintain the solution once it is in operation, providing supports such as policy and procedures, system management, training, and service desk.

3. An eReferral data management plan is needed to guide the governance, use, quality, integrity and retention of the eReferral solution data.

2.3 EREFERRAL PRM MAINTENANCE

The eReferral PRM is currently in draft and is expected to be updated as it is reviewed with the broader healthcare community. eHealth Ontario's Architecture, Standards and Planning division is responsible for maintaining the PRM, based on ongoing engagement with the Ministry of Health and Long Term Care and the broader healthcare community in Ontario. The authors seek to continually add to the value of this document so that it contributes to realizing the province's EHR vision.

Subsequent to version 1 release of the eReferral PRM (Q4 FY14-15), the eHealth Ontario Architecture Program Office (APO) will release maintained versions of the document on an annual basis. At any time, input and feedback can be sent to architecture@ehealthontario.on.ca.

3.0 BUSINESS FRAMEWORK

3.1 PURPOSE

The Business Framework provides an overview of the business context for electronic referrals and a context for other domain designs throughout this document. The framework has a base set of use cases and business requirements to accelerate business analysis in eReferral solution implementation projects, and offers guidance for project sponsors, managers, and business personnel to facilitate business discussions with partners and vendors during procurement activities. (Please note that the patterns and business process examples in Sections 3.3, 3.4 and 3.5 are for illustrative purposes. Projects should customize these to meet their business process requirements.)

When implementing referrals the Business Framework can be leveraged by reviewing:

1. **The referral concepts in section 3.2.1.**
    a. These concepts will help determine the appropriate business model to use for eReferrals in order to leverage the proposed eReferral solution. It also outlines points that need to be discussed in business conversations along with vendors and stakeholders.

2. **The process models presented in sections 3.3, 3.4, and 3.5 for the three patterns.**
    a. Section 3.3 outlines the generic model; section 3.4 outlines the generic NTOC model for the case of an endocrinology eReferral; and, section 3. 5 outlines the generic TOC model for the acute-to-LTC case.

3. **The list of generic business-level requirements in section 3.6.**
    a. This section describes the generic business requirements for an eReferral solution. They should be augmented with any additional requirements generated from steps 1 and 2 above, and customized for your specific situation.

3.2 GUIDING PRINCIPLES FOR BUSINESS FRAMEWORK

The framework was created to support different referral business models and patterns of the complex chain of referrers in different care settings. This focuses on the business outcomes and identifies “what needs to occur” and leaves the implementation “who” and “how” for the delivery partners to decide.

Overall, the following guiding principles were followed when creating the framework. The framework is:

- Modular to accommodate partial implementations and adoptions.
- Scalable and flexible to help easy adoption for local implementations.
- Focuses on requirements to support federated model of solutions as well as standalone applications.
- Stateless and not intended to be current or future state as it is agnostic of any specific implementation or practice.

As outlined in 1.3.1 Referral Patterns Versus Pathways, the evolution from "pathways" to "patterns" emerged from the growth of 'referral based' solutions throughout the province and the need to provide a model which would sustain multiple types of referrals regardless of the health care domain/setting. Based on extensive review the classification of "referral patterns" emerged as an outcome of applying the content from the various referral pathways to confirm that, regardless of the content on the forms, all referrals fell into one of three classifications (patient self-referral, non-transfer of care, and transfer of care).

3.2.1 REFERRAL CONCEPTS

The following referral concepts are important to understand and guide the referral principles of the Business Framework.

1. Referral models come in following types:
    - Direct – in which the referring provider sends the referral to the selected provider without an intermediary.
    - Centralized – in which a referring provider selects a type of service but not the specific provider. This includes:
        - Brokered (Source: Health Care Provider – Intermediary Service Provider – Destination Health Care Provider);
        - Internal (Source: Health Care Provider – Internal Coordinator(s) for a Community of specialized services - Destination Health Care Provider).

2. There are three resource matching methods:
    - Preferred: The referring provider selects the specific health service provider they wish to be referred to;
    - Central triage programs: The referring provider sends a referral to an intake function that reviews the request and assess the health care client's level of urgency based on predetermined triage criteria;
    - Pooled referral systems: The referring provider sends a referral to an intake function which directs to the next available health service provider in the pool; no triage occurs.

3. There are two resource matching types:
    - Manual; Performed manually by a role responsible for resource matching based on formal rules or personal judgment;
    - Automated: based on catalog of specialty service and preset criteria (such as program / specialty and bed level).

4. From the time a health service provider conceives of a referral to the time it is complete, the status of the referral changes based upon actions and decisions of the actors within the referral ecosystem. The following referral states can apply at different stages within the business process:

#	Status	Description
1	Draft	The requesting provider has created a referral, but has not yet submitted it to any receiving provider.
2	Submitted	The requesting provider has completed and sent the referral to the receiving provider.
3	New	The receiving provider has received a new referral that needs a response.
4	Send-back	The receiving provider is requesting additional information about the referral in order to decide and respond to the referral.
5	Accepted	The receiving provider has accepted to provide the requested services in the referral.
6	Accepted - Conditionally	The receiving provider has accepted to provide the requested services in the referral if an identified condition is met.
7	In Process	The referral is being worked on.
8	Declined	The receiving provider has declined to provide the requested services in the referral.
9	Revised	The referral has been updated by a member of the care team.
10	On Hold	The referral has been put on hold by the requesting provider.
11	Cancelled	The referrals has been cancelled by the requesting provider or withdrawn by the receiving provider.

12	Deleted	The requesting provider has deleted a referral created in error.
13	Complete	The requesting provider decides that the required services have been provided satisfactorily and closes the referral.

5. A referral can lead to a chain of other referrals requesting same services or additional ones. The schematic below indicates the possibilities for chain of referrals and its traceability between the referring provider (HCP1) and providers (HCP2, HCP3) who receive the original referral or related referral.

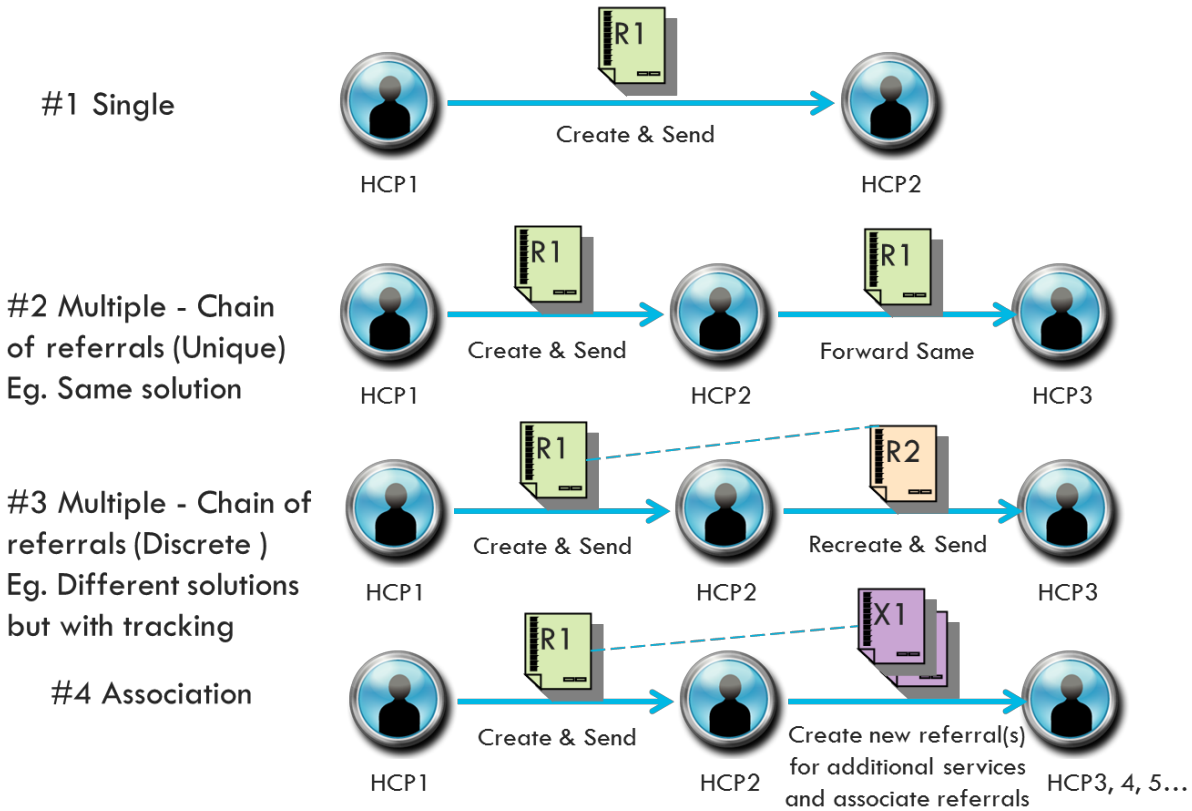


Figure 2 - Chain of Referrals Illustration

The following 5 concepts are out of scope for this iteration of the eReferral PRM.

6. Referral reporting and analytics:
    - Measurements on key set of metrics related to the referral process will help in assessing the performance of referral related programs and processes and help drive improvements.

7. Consent:
    - Referrals are subject to consent privacy legislations that determine whether a referral could be sent to a certain health care provider, which would influence the referral matching activities.

8. Patient preparation:
    - A set of prerequisites are expected from patient to initiate work on a referral. They include: forms that may need to be filled, test results, or clinical procedures that need to be performed.

9. Patient registration and enrollment:
    - This refers to the onboarding of patients into the practice, and / or relevant information systems.

10. Scheduling:
    - All activities related to managing the scheduling of appointments and associated communications and tracking.

11. User access and authority:
    - This refers to the management activities and processes related to providing access and role based authorities to Health System Users for relevant information systems.

3.2.2 BUSINESS PROCESS CONCEPTS

The following business process concepts are important to understand the following sections.

1. Business model types - As described in section 1.3.1, the PRM classifies all referral pathways into three patterns. Two types of business models, included in the sections below, describe each pattern to illustrate the relationships between patterns and pathways:

    - The *generic referral process models* are not definitive descriptions of the referral processes, rather, they are abstractions of the process that can be used to explain common concepts and aspects of different referral processes in various health care settings. They are process frameworks that may be extended and adapted to create more specific referral processes suitable for local requirements with specific referral solution implementations and health care settings. Each model is comprised of events, activities, decision points, and information flows.

They also contain the types of information resources (i.e. lists, forms, and reports) that are used throughout the process.

- *End to End models* are examples of how the generic models can be extended and adapted to reflect a specific referral pathway from initiation to closure.

2. Business process model standards and methods - Business Process modeling is done following Business Process Modeling Notation (BPMN 2) standards from the Objects Management Group (OMG), which is accepted as the Industry standard for process modeling. The 1.0 Business Framework Appendix offers an adaptation of the BPMN standards notations, which will be used in the business process models throughout this section.

3.3 PATIENT SELF REFERRAL PATTERNS

The business process models in the health care client self-referral pattern (PSR) support referrals processing in the following pathways and clinical domains:

- Outpatient Mental Health & Addictions
- Community Support Services

3.3.1 GENERIC REFERRAL PROCESS MODEL – PATIENT SELF-REFERRAL

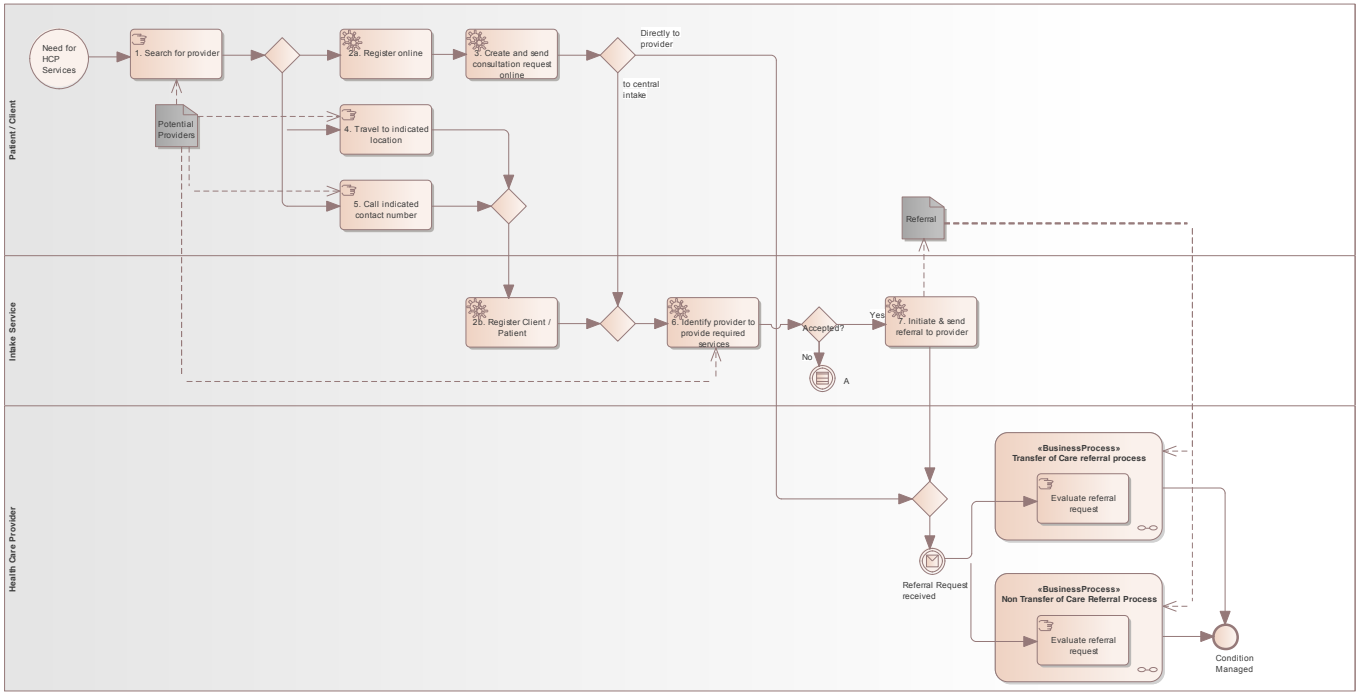
This section elaborates the Generic Referral Process for the Patient Self-Referral pattern.

Process Description

This generic model, shown below, describes the typical process wherein a health care client directly refers for health care services. There are two roles within this process, they are the:

1. Patient / Client, which is the person seeking health care services.
2. Intake service, which is an external organization or internal function performing intake of referrals form.

This process is typically triggered when a health care client decides to seek health care services. This process ends when the client's condition has been managed by the service provider. The following information resources are part of this process: a referral and a potential provider list.



PRM - eReferrals -
PSR - Generic Process

Figure 3 - Patient Self-Referral (PSR) – Generic Model

Activity #	Activity Name	Activity Description
1	Search for provider	The patient / client searches for providers for required health care services.
2a	Register online	The patient / client can choose to register with the provider online to request the services (Continue with 3). For other alternatives see 4 and 5.
3	Create and send consultation request online	Following registration, the patient / client sends a request detailing the services sought and associated information (Continue with 6).
4	Travel to indicated location	The patient chooses to travel to the providers location to seek services (continue with 2b).
5	Call indicated contact number	The patient chooses to call the contact number of the provider (continue with 2b).
2b	Register client / patient	The intake function of the provider organization registers patients / clients who walk in or call for services.
6	Identify provider to provide request services	The intake function assesses the request and identifies the provider based on set rules and criteria.
7	Initiate and send referral to provider	The intake informs the selected provider through a referral.
Depending upon the clinical scenario and services requested, the referral follows the NToC or ToC process		

Table 1 - Patient Self-Referral (PSR) – Generic Model

Exception paths and loops: A: The intake function can decline the request based on the set criteria. For example, some services need to be referred through another provider and cannot be requested directly.

3.3.2 END TO END PATIENT SELF-REFERRAL MODEL EXAMPLE: MENTAL HEALTH AND ADDICTIONS

This section illustrates the end to end process model of a patient seeking care from a mental health and additions outpatient intake service based on the Generic Referral Process Model for Patient Self-Referral.

Process description

This generic model, shown below, describes the typical process of a mental health and additions outpatient intake service wherein the mental health and additions outpatient intake service triages a health care client self-referral to identify the appropriate mental health and additions outpatient intake service provider directly who can best provide the services requested.

The following roles are included in this process:

- The patient / client requesting mental health and additions outpatient intake services.
- Mental health and additions outpatient intake service function.

The events in this process are triggered when a patient feels need for mental healthcare support. The process ends when the referral appointment is created for the patient seeking mental health care. The key resources in this process include the referral and the potential provider list.

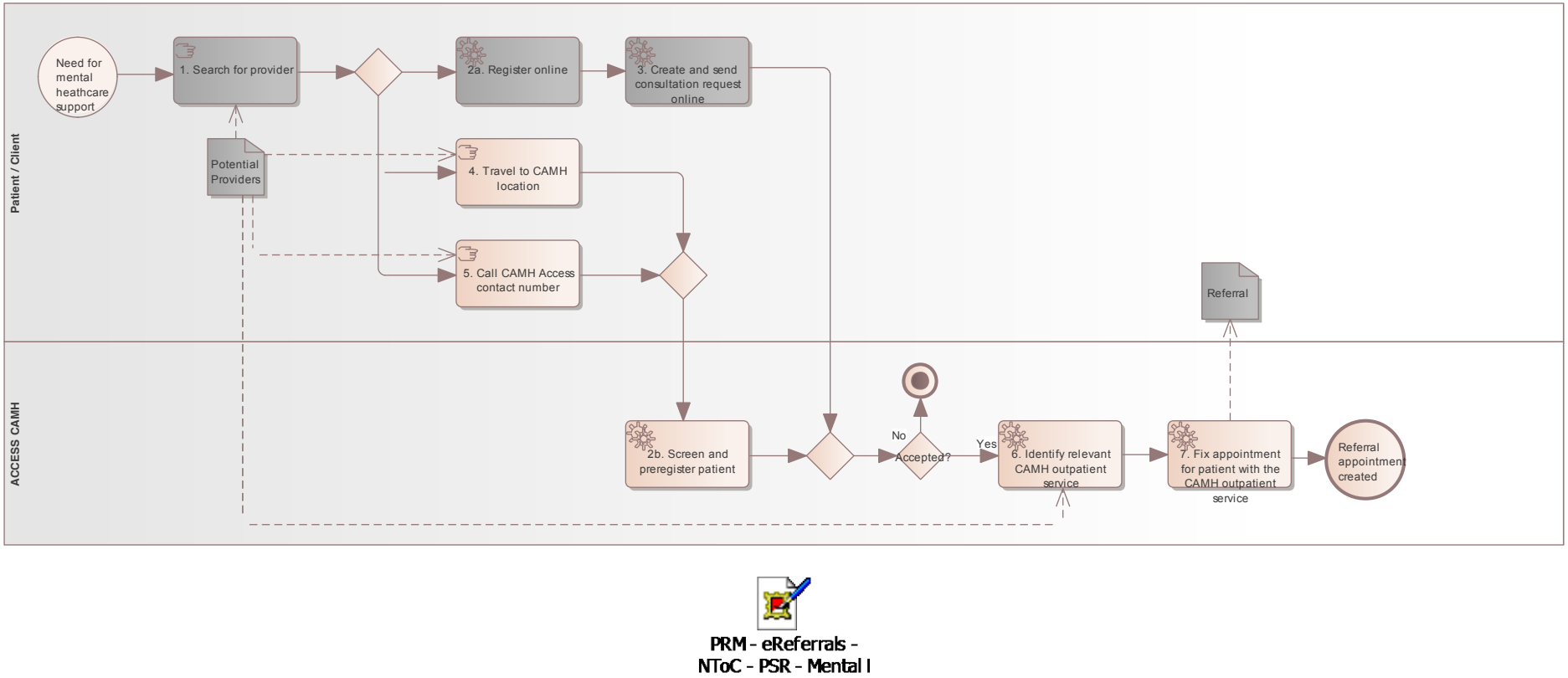


Figure 4 - Patient Self-Referral (PSR) – Mental Health and Additions Outpatient Intake Service

Activity #	Activity Name	Activity Description
4, 5	Travel to / Call mental health and additions outpatient intake service contact number	The patient walks into the mental health and additions outpatient intake service location or calls a mental health and additions outpatient intake service number to request services.
2b	Screen and preregister patients	The patient is registered and assessed to determine if they are eligible for mental health and additions outpatient intake services. If the patient is accepted, the process proceeds with activity 6. If patient is declined the patient is informed of the decision not to proceed.
6	Identify relevant mental health and additions outpatient service	The mental health and additions outpatient intake service identifies the appropriate mental health and additions outpatient service for the patient.
7	Fix appointment for patient with the mental health and additions outpatient service	An appointment is fixed for the patient with the mental health and additions outpatient service for the patient.

Table 2 - Patient Self-Referral (PSR) – Mental Health and Additions Outpatient Intake Service

3.4 NON TRANSFER OF CARE REFERRAL PATTERN

The business process models in this non-transfer of care referral (NToC) pattern support consult and referral processing in the pathways and clinical domains of physician to specialist and mental health and addictions.

3.4.1 GENERIC CONSULT AND REFERRAL PROCESS MODELS

This section elaborates the generic processes for the Non Transfer of Care pattern. The models are based on requirements extracted from various models that have been rationalized and abstracted to suit the goals and purpose of the PRM.

Process Description – eConsult

The generic model, shown below, describes the typical eConsult activities in a primary care setting involving Health Care Providers seeking advice.

Consults are a subtype of referrals that are initiated by a provider seeking consultative advice from a specialist typically for: (modified from 'eConsult Business Plan Proposal' consultation draft v2)

- Determining urgency of a case;
- Confirmation of diagnosis or to gain advice to conclude a differential diagnosis;
- Direction of specific treatment choices or diagnostic testing options;
- Pre-consultation work-up and management questions for a referral and while waiting for consultations.

There are 3 roles within this process:

1. *Consult requestor:* A health care provider who seeks advice from a specialist.
2. *Specialty services provider - Intake function:* A function, within the organization, providing specialty services that triage and assign specialist to respond to consult requests.
3. *Specialist:* A health care provider providing specialty services

The process starts when the health care provider and health care client decide that advice is required from a specialist to proceed with a client's case. The process ends when the consult is closed upon receiving a satisfactory response from the specialist. Typical Information resources used to support the communication of a particular domain include: consult request, specialty service providers, and consult report.

Figure 5 below, shows the generic eConsult process model for a typical consult activity.

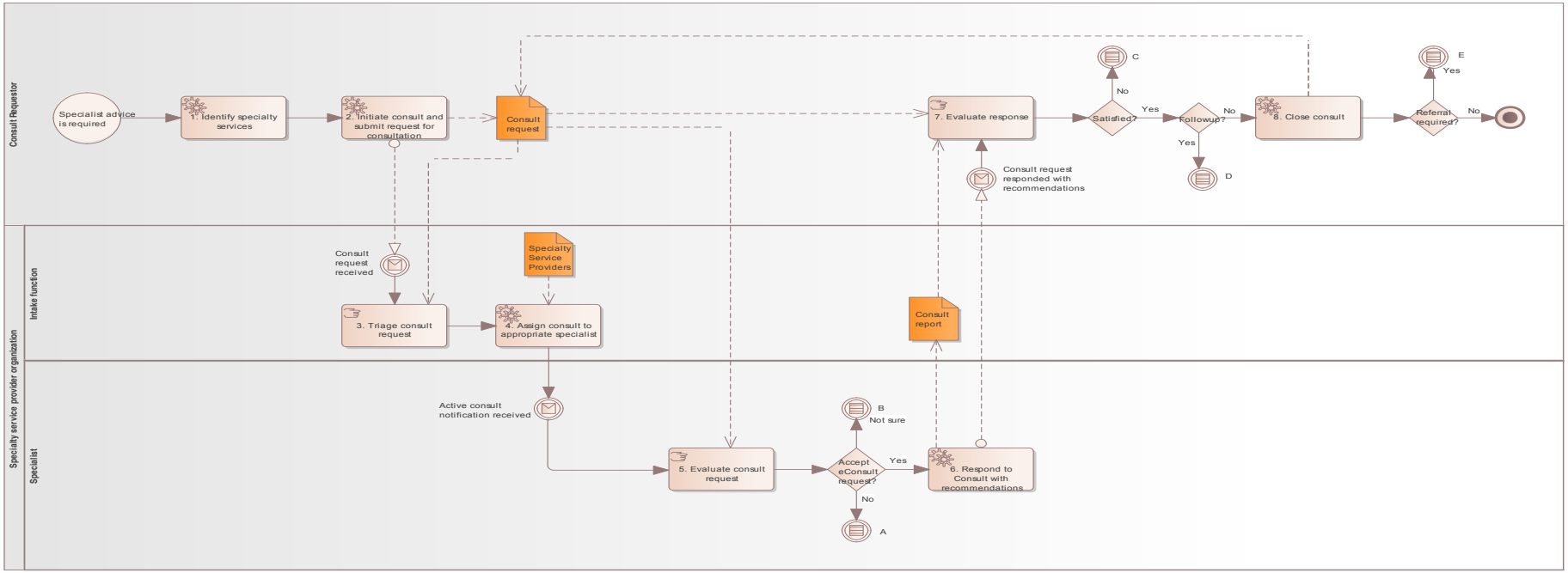


Figure 5 - Non Transfer of Care (NToC) - Generic eConsult Process Model

PRM - eReferrals - NToC - Generic Proce

Activity #	Activity Name	Activity Description
1	*Identify specialty services*	A physician / specialist may identify a specialist or a specialty when in need to seek advice.
2	*Initiate consult and submit request for consultation*	The physician / specialist creates and sends out a consult request for specialist services.
3	*Triage consult request*	The consult is typically triaged by an intake function.
4	*Assign consult to appropriate specialist*	Based on the triage and availability of the specialists, the intake function identifies the specialist to be assigned the consult.
5	*Evaluate consult request*	The specialist evaluates the consult request and proceeds if accepted. - If the consult cannot be responded to it might be declined (See Exception Paths & Loops A). - If an assessment is not possible due to additional information requirements (See Exception Paths & Loops B).
6	*Respond to Consult with recommendations*	The Specialist responds to the consult with appropriate response and recommendations.
7	*Evaluate response*	The requesting Physician / Specialist reviews the received consult report. If satisfied with the response the Specialist proceeds to close the consult. - If not satisfied with the response (See Exception Paths & Loops C). - The recommendations could also suggest follow ups (See Exception Paths & Loops D). - The recommendations could also suggest the need for referrals to proceed (See Exception Paths & Loops E).
8	*Close consult*	The respective consult is closed.

Table 3 - Non Transfer of Care (NToC) - Generic Consult Process Model Narrative

Exception paths and loops:

A. Decline: The specialist receiving the consult declines the request. The intake function has to identify an alternate specialist.

B. Additional information required: The specialist may seek additional information or clarifications to act on the consult request. This leads to additional dialogue between the specialist and consult requestor.

C. Not satisfied with response: The consult requestor might not be satisfied with the response from the specialist and may seek services from another specialist.

D. Follow up: If there are follow ups recommended by the specialist, the consult is kept open till the consult has been satisfactorily responded to.

E. New Referral: The result of the consult report could be the initiation of a new referral. The new referral will follow the referral process. The consult response is provided as part of the referral package.

F. Cancelled (not shown in diagram): Due to changes in the situation / circumstances a consult could be cancelled by the requestor at any point of time in the process.

Process Description - eReferral

The generic model shown below describes the typical referral activities in a primary care setting involving PCPs and specialists engaged in providing care to a health care client. It does not show any exceptions or case specific scenarios, and only depicts a chain of referrals / consults. Within the model the following actions could take place:

- The PCP may request for the services of multiple specialists.
- Specialists, in turn, may request for further services of other specialists.

There are three roles within this process:

1. Primary Care Provider (PCP)
2. Specialist 1: The specialist referred by the PCP
3. Specialist N: The specialist(s) referred to by another specialist

The process starts when the health care client decides to see the PCP or an eConsult suggests further services resulting in a referral request. The process ends when the health care client receives appropriate care. Typical information resources use within the process include: referral forms, consult reports, lab reports, diagnostic images, and other contextual information.

Figure 66, shows the generic eReferral process model for a typical referral activity.

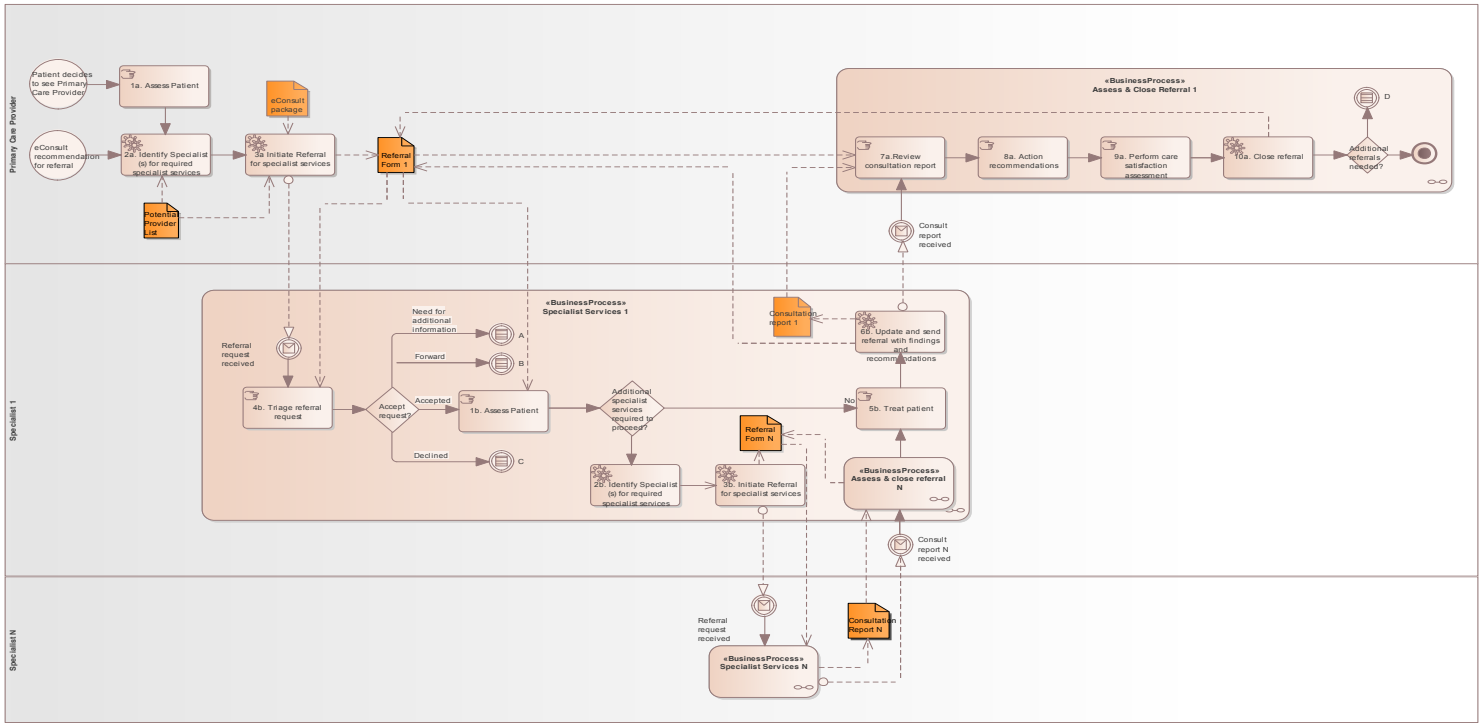


Figure 6 - Non Transfer of Care (NToC) - Generic Referral Process Model

PRM - eReferrals - NToC - Generic Proce

Activity Number	Activity Name	Activity Description
1 (a,b)	*Assess Patient*	The PCP / specialist perform an evaluation of the patient to determine next steps.
2. (a,b)	*Identify Specialist(s) for required specialist services*	A specialist (or a specialty) is identified for required specialist services.
3 (a,b)	*Initiate Referral for specialist services*	The PCP / specialist creates and sends out a referral request for specialist services.
4. (b)	*Triage referral request*	The referral is evaluated to decide and respond. This could be performed directly by the receiving specialist or through centralized intake such as a centralized triage programs, or pooled referral type. - If an assessment is not possible due to additional information requirements (See Exception Paths & Loops A). - The specialist may forward to another specialist if not able to provide the services but knows another Specialist who could provide it (See Exception Paths & Loops B). - or, based on the set rules and policies, If the referral does not meet the criteria it might be declined (See Exception Paths & Loops C).
5 (b)	*Treat patient*	The specialist provides the appropriate services requested.
6 (b)	*Update /send referral with findings and recommendations*	The specialist provides the findings and recommendations to the patients' circle of care.
7 (a)	*Review consultation*	The requesting PCP / specialist reviews the received consultation report

	report	
8 (a)	*Action recommendations*	The requesting PCP / Specialist take necessary action based on recommendations in the consultation report
9 (a)	*Perform care satisfaction assessment*	The requesting PCP / Specialist evaluates the services provided to the Health care client
10 (a)	*Close referral*	If the requesting PCP / Specialist is satisfied with the services provided the respective referral is closed Additional referrals are created in case they are required

Table 4 - Non Transfer of Care (NToC) - Generic Referral Process Model Narrative

Exception paths and loops:

A. Additional information required: The specialist may seek additional information or clarifications to act on the referral request. This leads to additional dialogue between the referral originator and the specialist.

B. Forward: The specialist receiving the referral is unable to provide the services, may choose to forward the referral to another specialist who could potentially provide the services requested.

C. Decline: The specialist receiving the referral declines the request for services. The referral originator has to identify an alternate specialist and initiate another referral.

D. Additional Referrals: Additional referrals maybe required to continue with the care for the health care client after the current referral is closed based on recommendations from the specialist or assessment of the requesting Physician / Specialist.

E. Cancelled (Not shown on model): Due to changes in the situation / circumstances a referral could be cancelled by the requesting provider at any point of time in the process.

F. Withdraw (Not shown on model): The Specialist could withdraw a referral that he had earlier accepted due to changes in situation.

3.4.2 END TO END NTOC REFERRAL PROCESS MODEL EXAMPLE: ENDOCRINOLOGIST TO ENDOCRINOLOGIST WITH EXPANDED SCOPE OF PRACTICE

This section illustrates the end to end process model of an endocrinologist's referral to another endocrinologist with an expanded scope of practice based on the Generic Referral Process Model for Non Transfer of Care. This use case has been copied from the OntarioMD Business Requirements (version 1.2, January 30, 2013 document).

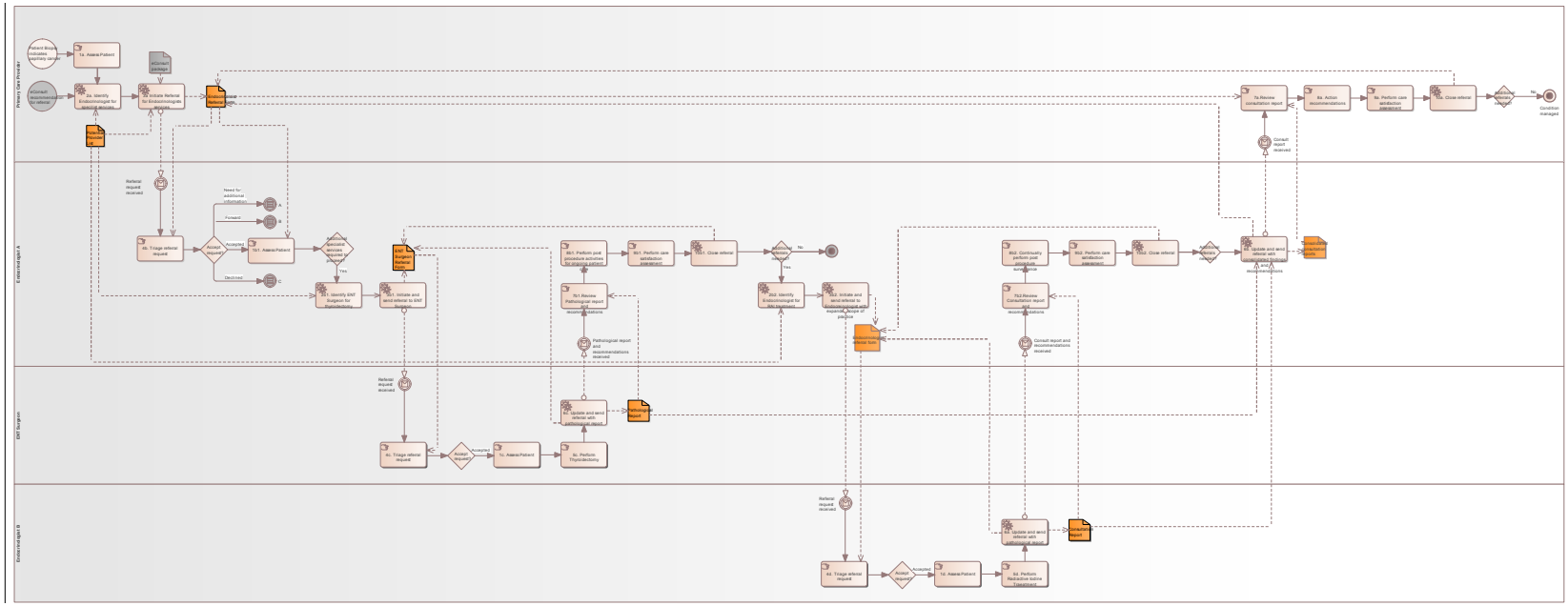
Process description

The process model, shown below, describes the referral and consultation related activities the care team undertakes to treat a patient diagnosed with papillary cancer. The business process is based on the use case described in the 'Electronic Referral Business Requirements' OntarioMD. The key activities and their sequence are illustrated using the generic model as a base, and any activities in the generic model not relevant to this process are removed.

There are four roles within this process:

1. Primary Care Provider (PCP).
2. Specialist 1: Endocrinologist A.
3. Specialist 2: ENT Surgeon.
4. Specialist 3: Endocrinologist B (Expanded scope of practice).

The process is triggered when the patient's biopsy results indicate papillary cancer and ends when findings and recommendations are communicated to the patient, following post procedure surveillance. The key resources in this process include: potential provider list, referral forms, pathological reports, and consultation reports.



PRM - eReferrals - NToC - E2E - Endo to

Figure 7 - Non Transfer of Care (NToC) - NToC Endo to Endo with Expanded Scope of Practice

Activity #	Activity Name	Activity Description*
1a	Assess Patient	A family physician in Thornhill has a patient with a positive thyroid biopsy for papillary cancer. The Physician refers the patient to "Endocrinologist A" to continue with the care.
2a	Identify Endocrinologist for specialist services	
3a	Initiate Referral for Endocrinologists services	
4b	Triage referral request	Endocrinologist A evaluates and accepts the referral.
1b1	Assess Patient	Endocrinologist A assesses the patient and determines that thyroidectomy procedure needs to be performed.
2b1	Identify ENT Surgeon for thyroidectomy	The endocrinologist refers the patient to a local ENT surgeon for a thyroidectomy.
3b1	Initiate and send referral to ENT surgeon	
4c.	Triage referral request	The thyroidectomy is performed and the pathology report reveals a 2 cm lesion with extension through the capsule and a positive pretracheal lymph node. The patient also developed hypocalcemia postoperatively and now requires Rocaltrol and Caltrate for the next few weeks, as well as serum calcium measurements to be performed by the family physician.
1c.	Assess Patient	
5c	Perform Thyroidectomy	
6c	Update and send referral with pathological report	The family physician is informed of any updates.
7b1	Review Pathological report and recommendations	The family physician confirms instructions and caries out associated activities as requested by the ENT surgeon. The patient follows up with their family physician to have serum calcium levels checked. The Rocaltrol is titrated. The patient returns to
8b1	Perform post procedure activities for ongoing patient care	

9b1	Perform care satisfaction assessment	the Thornhill endocrinologist for a discussion on adjuvant treatment.
10b1	Close referral	
2b2	Identify Endocrinologist for Radioactive iodine (RAI) treatment	Given the ongoing shortages of radioactive iodine, the endocrinologist confirms the availability of radioactive iodine and bed space for treatment. Once an appropriate provider is found, the endocrinologist selects the correct referral form and creates
3b2	Initiate and send referral to Endocrinologist with expanded	
4d	Triage referral request	The patient undergoes outpatient radioactive iodine therapy with thyrogen and a total body scan by the UHN Endocrinologist. The consultation report is sent to the family physician and Endocrinologist A.
1d	Assess patient	
5d	Perform Radioactive Iodine therapy	
6a	Update and send referral with pathological report	
7b2	Review Consultation report and recommendations	Commencement of ongoing surveillance post procedure by Endocrinologist A.
8b2	Continually perform post procedure surveillance	
9b2	Perform care satisfaction assessment	
10b2	Close referral	
6b	Update and send referral with consolidated findings and	The endocrinologist consolidates all the reports and findings and sends it to the family physician.
7a	Review consultation report	
8a	Action recommendations	

9a	Perform care satisfaction assessment	The family physician evaluates the progress of the patient and closes the referral once the condition is managed.
10a	Close referral	

Table 5 - Non Transfer of Care (NToC) - Endo to Endo Referral Process Model Narrative

3.5 TRANSFER OF CARE REFERRAL PATTERN

The business process models in this transfer of care (ToC) pattern support referrals processing in the pathways and clinical domains:

- Acute to Rehab (via CCAC)
- Acute to CCC (via CCAC)
- Acute to LTCH (via CCAC)
- Acute to In-Home Services (via CCAC)
- Community Support Services (from/to)
- Mental Health & Addictions (from/to)
- EMS to CCAC
- Acute to Palliative Care

3.5.1 GENERIC REFERRAL PROCESS MODEL

This section elaborates the generic referral process for the transfer of care pattern. The model is based on requirements extracted from various models that have been rationalized and abstracted to suit the goals and purpose of the PRM.

Process Description

The ToC generic model describes the processing of a referral that supports the transition of care of a patient from one care provider to another. This model typically involves sending of multiple referral requests to providers seeking services, and could involve a referral service provider brokering the service.

There are three roles within this process, they are:

1. The role of the referring organization, which includes the hospital requesting services and beds for patient in alternate care setting.
2. The role of the referral service provider, which is the organization or function brokering the selection of provider organization that will provide the services and bed.
3. The role of the referred organization, which includes provider organizations that provide the required services and beds.

The process is typically initiated by a clinical trigger, which leads to a needs assessment. The process ends when the referring organization discharges patient. The following information resources are included in this process: needs assessment, referrals (1&2), and potential provider list.

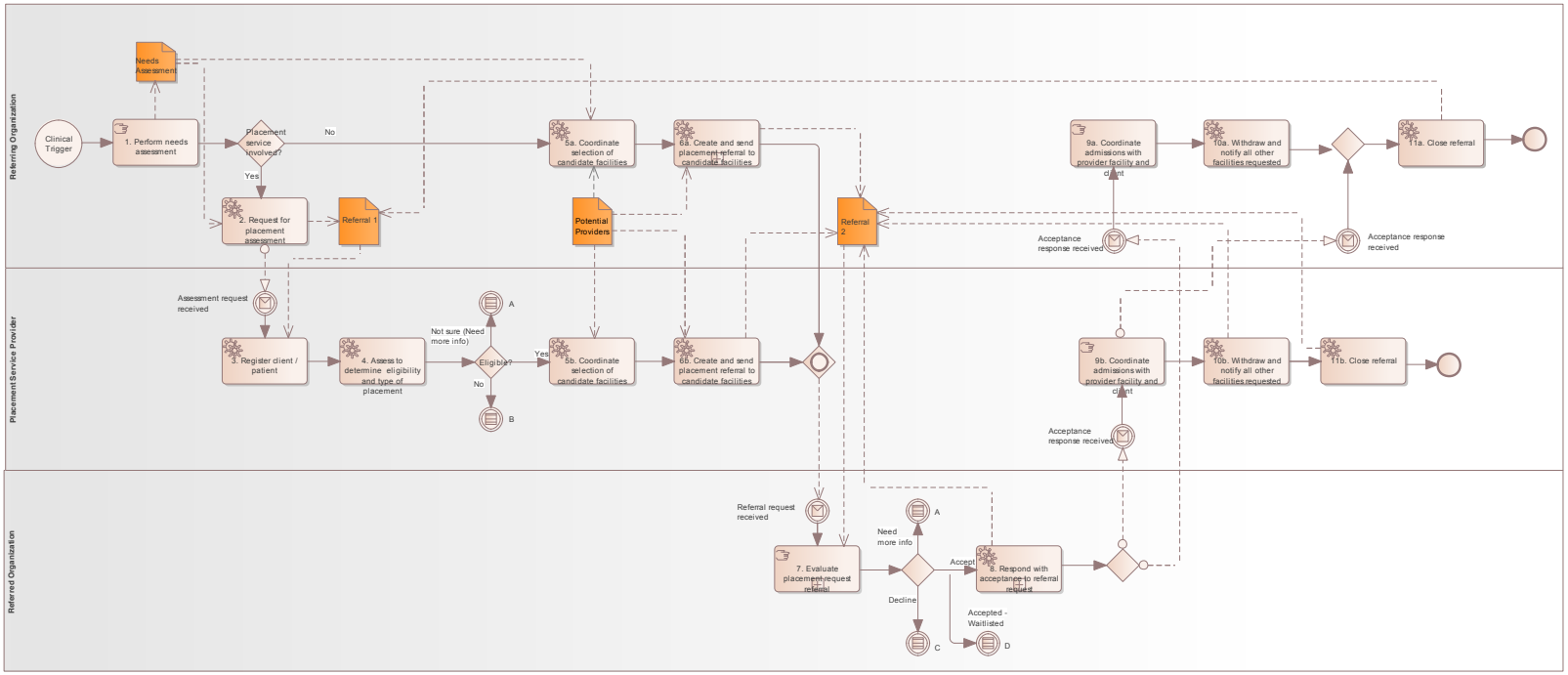


Figure 8 - Transfer of Care (ToC) - Generic Referral Process Model

PRM – eReferrals – ToC – Generic Process

Activity #	Activity Name	Activity Description
1	Perform needs assessment	Assess the patient to identify needs and services. Based on the assessment it is determined if a placement service provider's services are required. (If placement service is not required continue to 5a.)
2	Request for placement assessment	A referral request seeking placement assessment is created. This is then sent to the appropriate referral service provider.
3	Register patient	Upon receiving the request for placement assessment, the placement service provider registers the patient to enable processing.
4	Assess to determine eligibility and type of placement	The referral service provider assesses the placement assessment request and determines the eligibility for placement services. If the patient is eligible, the type of placement is determined if not explicitly requested. - If an assessment is not possible due to additional information requirements (See Exception Paths & Loops A). - or, based on the set rules and policies, If the referral does not meet the criteria it might be declined (See Exception Paths & Loops B).
5a, 5b	Coordinate selection of candidate facilities	The candidate provider facilities for placement, based on the patient's needs and services, are selected.
6a, 6b	Create and send referral requests	The referral service provider creates and sends out referrals to the candidate health service providers seeking a bed and required services.

7	Evaluate placement request referral	Each health service provider evaluates the referral request and accepts the referral if it is able to provide the services and bed requested. - If the Health service provider accepts the referral but for a future date it puts the client on a waitlist (See Exception Paths & Loops D) - If the Health service provider cannot evaluate due to additional information requirements (see Exception Paths & Loops A) - If the Health service provider cannot provide the bed and services requested it declines the referral (see Exception Paths & Loops C)
8	Respond with acceptance to referral request	Based on the evaluation, a response is sent to the referral requestor of acceptance
9a, 9b	Coordinate admissions with provider facility and client	The requestor evaluates the responses and selects a health care provider from the respondents. Following that, discharge planning and coordination are performed.
10a, 10b	Withdraw and notify all other facilities requested	All other facilities that had responded are informed that their services are not required.
11b	Close referral	The placement Service provider closes referral when placement is completed.
11a	Close referral	The hospital closes referral when patient is discharged.

Table 6 - Transfer of Care (ToC) - Generic Referral Process Model Narrative

Exception paths and loops:

A. Additional information required: the referral service provider or referred organization seek additional information to help them evaluate and take decisions. This may involve synchronous / asynchronous conversations with various parties.
B. Decline: When a referral request is declined by a Referral Service Provider a notification is sent to the hospital indicating the outcome. Following which the hospital decides on alternatives.

C. Decline: When a referral request is declined by a Health Service Provider a response is sent to the requesting organization notifying the result. This organization is not considered for placement anymore.

D. Waitlisted: A Health Service Provider could conditionally accept the placement referral, placing the patient in a waitlist.

3.5.2 END TO END TOC REFERRAL PROCESS MODEL EXAMPLE: ACUTE TO LONG TERM CARE

This section illustrates the end to end process model of a referral seeking a Long Term Care Home based on the Generic Referral Process Model for Transfer of Care. (This process is based on OACCAC's *'eReferral to LTCH for Long Term Placement Workflow 2015 01 v1.0'* document)

Process description

This model involves the hospital seeking placement services for their patient through the CCAC. It illustrates the key activities of assessment of the request, brokering of the services, and coordination of the placement.

There are three roles within this process, they are:

1. The role of the hospital, which includes requesting services and beds for patient in an alternate care setting.

2. The role of the Community Care Access Centre (CCAC), which is the organization which "brokers" the selection of provider organization(s) that will provide the services and bed.

3. The role of the Long Term Care Home (LTCH), that provides the required services and beds.

The process is typically initiated by a clinical trigger, which leads to a needs assessment. The process ends when the hospital discharges the patient. The following information resources are included in this process: needs assessment, Home Care Referral (or Placement Request), Resident Assessment Instrument – Home Care (RAI HC), Long Term Placement Referral, Application Package for Long Term Care (Includes Forms and Health Assessment reports), LTCH Information Package, Waitlist and Medical Assessments.

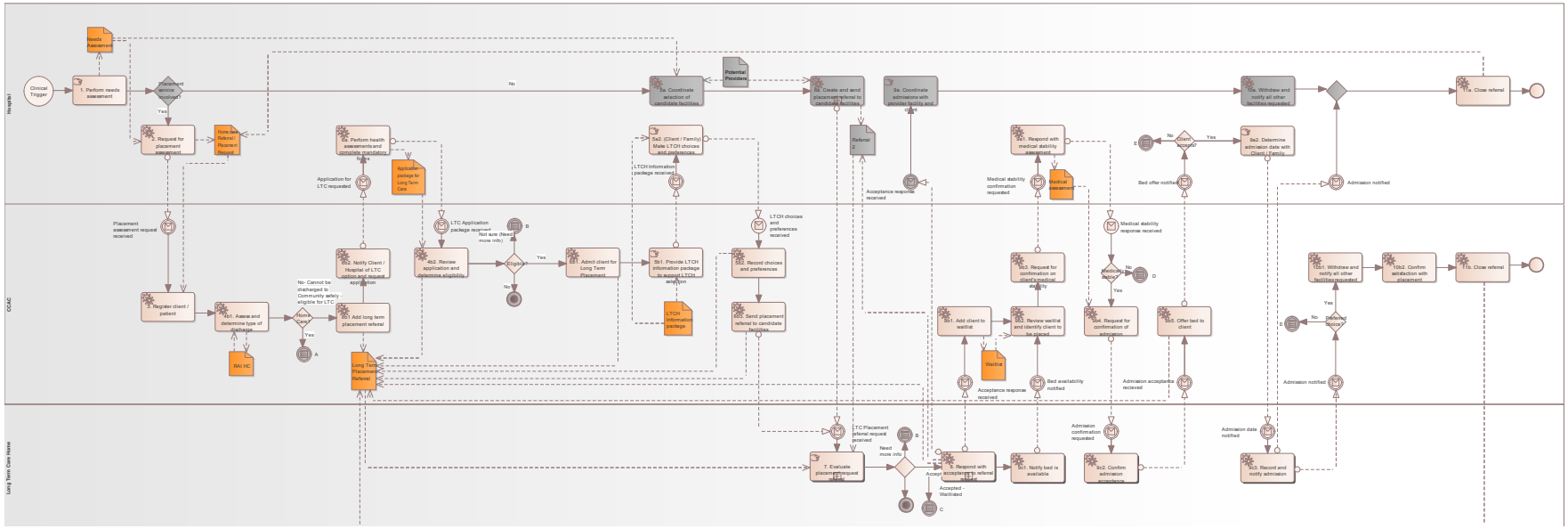


Figure 9 - Transfer of Care (ToC) – Acute to Long Term Care

PRM - eReferrals - ToC - E2E - Acute to l

Activity #	Activity Name	Activity Description
1	Perform needs assessment	Assessment of the patient in a hospital is completed to identify needs and services. Based on the assessment it is determined that a placement assessment for Home Care through the CCAC is required.
2	Request for placement assessment	A referral request seeking assessment for home care is created and sent to CCAC by the Hospital.
3	Register patient	Upon receiving the request, the CCAC registers the patient to enable processing.
4b1	Assess and determine type of discharge	The CCAC assesses the patient using RAI HC to determine the appropriate discharge destination. It determines that the patient cannot be discharged to the community safely and is eligible for Long Term care.
6b1	Add long term placement referral	CCAC adds Long Term Placement referral for the patient.
6b2	Notify patient / Hospital of LTC option and request application	CCAC informs the patient / hospital of the option and application prerequisites.
6a	Perform health assessments and complete mandatory forms	The hospital / patient completes the required Health Assessments and other mandatory placement forms and provides it to CCAC.
4b2	Review application and determine eligibility	The CCAC determines that the patient is eligible based on the information received
6b3	Admit client for Long Term Placement	The CCAC admits the eligible patient for Long Term Placement.
5b1	Provide LTCH information	CCAC provides information related to Long Term Care Homes and

	package to support LTCH selection	the services they provide to help the patient / family to make choices.
5a2	(Client / Family) Make LTCH choices and preferences	The patient / family, along with the Hospital, indicate the Long Term Care Home choices and preferences.
5b2	Record choices and preferences	CCAC records the Long term Care Home choices in the referral including preferences such as priority, waitlist date, bed type etc.
6b2	Send placement referral to candidate facilities	The Long Term Care Home referral is shared with the selection.
7	Evaluate placement request referral	The Long Term Care Home reviews the referral and makes a decision.
8	Respond with acceptance to referral request	The Long Term Care Home records and notifies acceptance of the patient.
9b1	Add client to waitlist	CCAC maintains a waitlist for each choice.
9c1	Notify bed is available	When a bed becomes available, the Long Term Care Home notifies the CCAC.
9b2	Review waitlist and identify client to be placed	The CCAC monitors the waitlist and identifies the client to be placed when a bed becomes available.
9b3	Request for confirmation on client's medical stability	The CCAC requests the hospital to confirm that the patient is medically stable for moving to a Long Term Care Home.
9a1	Respond with medical stability assessment	The Hospital responds confirming that the patient is medically stable.
9b4	Request for confirmation of	The CCAC requests the Long Term Care Home to confirm that it will admit the Patient.

	admission	
9c2	Confirm admission acceptance	The Long Term Care Home confirms that they can admit the patient.
9b5	Offer bed to client	The CCAC offers the bed to the patient and records the confirmation.
9a2	Determine admission date with Client / Family	The patient accepts the offer and, along with the hospital, determines the admission date.
9c3	Record and notify admission	The Long Term Care Home records the patient admission and notifies the CCAC.
10b1	Withdraw and notify all other facilities requested	Since the Long Term Care Home is the patient's preferred choice, the CCAC withdraws all other choices and notifies other Long Term Care Homes that had responded with an available bed.
10b2	Confirm satisfaction with placement	The CCAC confirms that the patient / family is satisfied with the placement.
11b	Close referral	The CCAC discharges the Long Term Placement referral.
11a	Close referral	The Hospital closes its referral following the patient's discharge.

Table 7 - Transfer of Care (ToC) - Acute to Long Term Care

3.6 GENERIC BUSINESS REQUIREMENTS

The requirements listed below are generic business requirements need to be kept in mind when designing an eReferral solution. They have been grouped by function.

1. **Authoring**
   - Attachments: Ability to transmit images and other attachments embedded with the referral.
   - Templates / Forms: Ability to use predefined referral forms / templates / minimum data sets used in the practice.

- Contribution to a referral: Ability of other care team members to contribute to the referral.

2. Sending and accessing

- Sending: Ability of the referral creators to send referral to a particular person or a service electronically.
- Receiving: Ability of the referral recipient to receive referrals electronically.
- Access channels: Ability to send and retrieve referrals electronically using various channels.
- Printing: Ability to print referrals and associated documents.
- Cataloguing, Archiving, Retrieving or Otherwise Storing Attachments: Ability to store, index, search, access and retrieve individual attachments from a referral.

3. Communication

- Care team communication: Ability to support information exchange among the care team members of the patient and participants of the referral identified to be informed.
- Asynchronous information: Ability to support asynchronous information exchange among the care team of the patient and participants of the referral, where required.
- Notifications / Alerts: Ability to provide predefined notifications / alerts / confirmations to identified care team members of the patient and participants of the referral.
- Ability to share copies of the referral to other recipients for information purposes.

4. Tracking & Reporting

- Patient association: Ability to associate referrals to patients.
- Referral association: Ability to associate referrals to other referrals of the same patient.
- Referral status7: Ability to indicate the status of the referral (Suggested statuses are indicated in the concepts section).
- Time stamp: Ability to provide a time stamp for every status of the referral.
- Search: Ability to provide search capabilities based on specific criteria.
- Report: Ability to generate predefined and custom reports based on specific criteria.
- Reason / Comment recording: Ability to record reasons and provide additional information, where required.

5. Referral resource matching

- Resource matching information: Ability to provide catalog of provider services and other relevant information to support matching of resources appropriately and flexibly.
- Resource matching Automation: Ability to perform automated referral matching where required.
- Resource matching criteria: Ability to perform automated referral matching based on predefined criteria.
- Matching models: Ability to support different modes of resource matching (Preferred, centralized triage, pool system etc.).

6. Authentication & Authorization

- Ability to ensure that access to referrals is provided only to authorized persons in the care team.
- Ability to assign roles and support role based authorization to perform referral related tasks.

7. **Interfaces**
    - Ability to retrieve and provide referral, its associated information and client information with other systems, as required.

3.7 SUMMARY

The Business Framework has outlined the generic referral patterns and has illustrated how these can be used to depict specific pathways.

Between the generic patterns there are many common events, activities, and information resources. The set of common activities, as well as the generic business requirements provided above, lay the groundwork for specifying the conceptual and logical architecture described in the Technology Solution Framework (section 4.0). This framework will illustrate the linkage between the patterns' common activities and the components of the eReferral solution's conceptual architecture. The information resources that support the generic referral patterns will be further elaborated upon in the Information Framework (section 6.0). Finally, achieving interoperable information flows between various systems that might support any of these referral patterns will be described in the provincial eReferral standard (section 7.0).

4.0 TECHNOLOGY SOLUTION FRAMEWORK

4.1 PURPOSE

The objective of the Technology Solution Framework (TSF) is to support the implementation of the business and clinical needs for the eReferral solution, by providing:

- Content that can be used as requirements in a system procurement process;
- Flexibility to account for unique requirements at the Delivery Partner level where solutions are being implemented;
- Guidance and direction on making best use of Provincial Assets;
- Alignment with Ontario's eHealth Blueprint and Ontario's EHR Connectivity Strategy.

In the context of the other Frameworks, the TSF provides the system design artifacts typically done in early stages of a system implementation. The Business Framework is used as the business or clinical requirements to drive the design and the following System View diagram, from the eHealth Blueprint, illustrates the eReferral Solution as an EHR resource, accessed through the Health Information Access Layer (HIAL).

Ontario's Ehealth Blueprint

Systems View: Detail

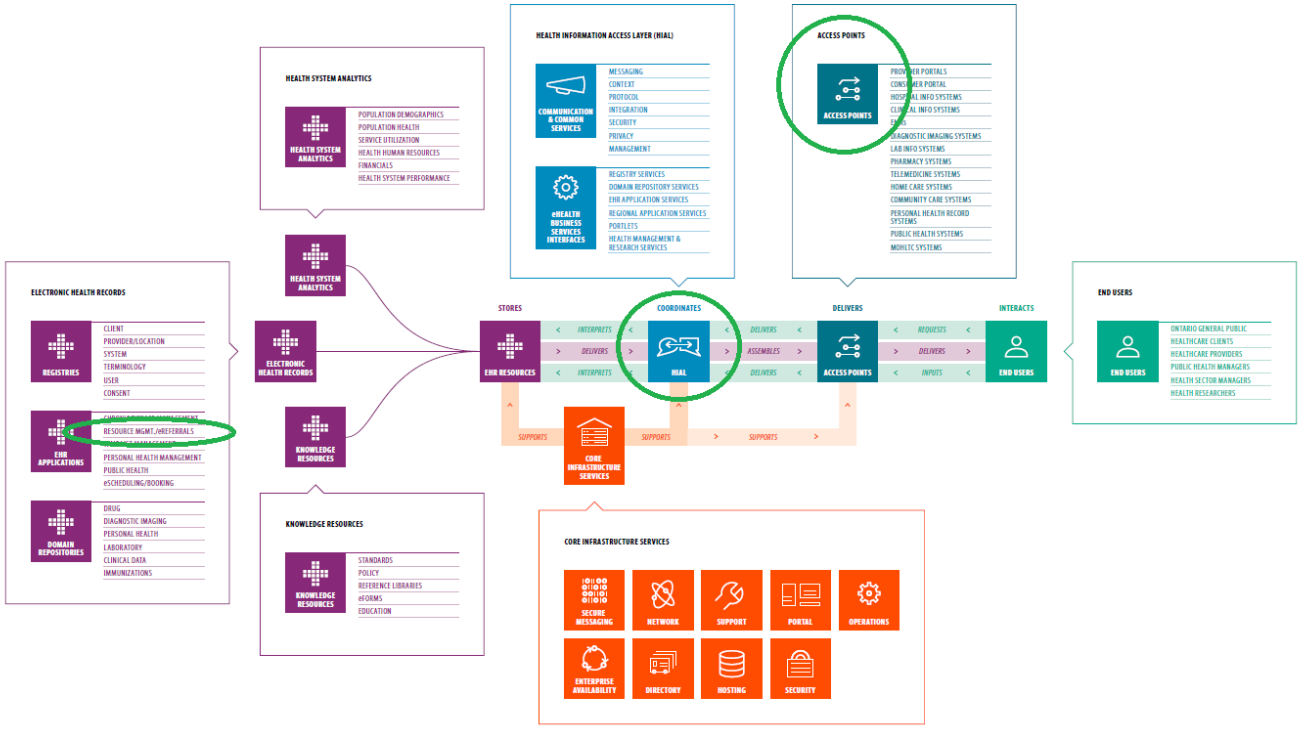


Figure 10 - Ontario's eHealth Blueprint - System View: Detail

4.2 CURRENT ASSESSMENT

Although the TSF provides details on how an eReferral solution should leverage existing EHR assets, delivery partners should still **assess their current technology landscape** and the availability of provincial/regional assets. A gap analysis is recommended to determine the architecture and implementation requirements for an eReferral solution in their jurisdiction compared to what EHR assets and services are available for use as part of the solution.

The requirements found in this document (Technology Framework Appendix) are intended to inform possible future features and enhancements where **existing eReferral solutions** already exist. Content from the PRM may be included in a procurement process for **new eReferral automation initiatives** whenever it reflects delivery partner requirements. It is hoped that many of the requirements found in the TSF and other frameworks are already on solution roadmaps.

4.2.1 CONSIDERATIONS

Delivery partners need to be **aligned to the Ontario's eHealth Blueprint and the Ontario's EHR Connectivity Strategy** for eHealth in Ontario, as each Delivery Partner is accountable for procurement and implementation of the eReferral solution. Delivery partners should be aware and **leverage parallel, regional, and provincial activities/assets** to determine and understand how they may affect an eReferral implementation. This includes, but is not limited to:

- Provincial and Regional (ConnectingSouthWestOntario's, ConnectingNorthernandEasternOntario, ConnectingGreaterTorontoArea) Health Information Access Layer (HIAL) services.
- Clinical Data Repository (CDR).
- Provincial Client and Provider Registries.
- Identity Federation and Single Sign On services (i.e., ONE ID).

The number of provincial solutions available for integration will increase over the next several years.

The **availability of the provincial solutions** is an important consideration in the eReferral solution planning process since delivery partners will be able to leverage additional provincial solutions over the next years. The remaining content in this section describes the target eReferral solution architecture that includes:

- **Initial State** – the architecture of the solution if it were implemented today and indicates provincial solutions that are available for integration this year.

- **Future State** – the architecture of the solution if it were implemented 12+ months from now and indicates provincial solutions that will be available over the next several years.

Delivery partners should be aware that the PRM is **technology and system agnostic**, therefore it may be provided by either a standalone system (whether new or the expansion of an existing system) or an aggregation of multiple systems.

The eReferral solution should be capable of **integration with Point-of-Service systems**, in order to reduce manual data entry and minimize the risk of data input errors as well as avoid providers having to log into another application to submit a referral. As well, the solution should align with the provincial eReferral Standard and other relevant industry interoperability specifications. See Section 7.0, the **Ontario eReferral Standard**. See the Non-Functional and EHR Connectivity Requirements sections in the Technology Framework Appendix for further information.

In the **absence of a given provincial service**, delivery partners will be required to provide the services locally, but the design should prepare for the use of regional and provincial services, and these services and standards must be adopted by the eReferral solution, as they become available.

4.2.2 DESIGN

Existing or in-progress work from eReferral projects has been leveraged as input to the Technology Solution Framework. The TSF will comply with provincial privacy and security requirements for health information management, and support standards based on interoperability. The framework has been designed for the future state and directly aligns with the Blueprint and Ontario's EHR Connectivity Strategy.

4.3 THE PRM TECHNOLOGY SOLUTION FRAMEWORK

The PRM Technology Solution Framework is composed of the sections identified in the diagram below. The items outlined in the diagram will be discussed in the subsections below and in the Technology Framework Appendix:

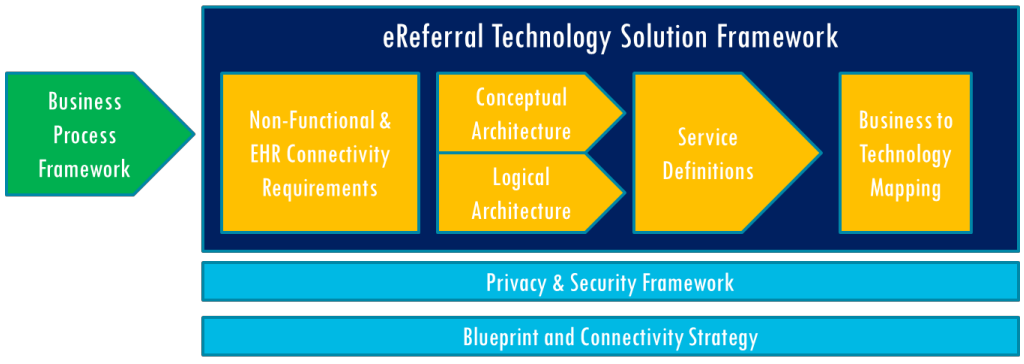


Figure 11 - eReferral Technology Solution Framework Features

Non-Functional and EHR Connectivity requirements are outlined in the Technology Framework Appendix, which provides an overview of solution requirements that support the business requirements and provide the foundation for the TSF. These requirements are intended to provide guidance on common non-functional requirements, technical specifications, and interoperability requirements that could be included in a standard RFP. As well, definitions of the various actors and components within each model are found in this appendix.

4.4 CONCEPTUAL ARCHITECTURE

This section provides a conceptual representation of how eReferral solutions fit within the Ontario's EHR Connectivity Strategy through the use of provincial integration models (PIMs). The PIMs show how the eReferral solution interacts with different entities in its initial and future states, which describe the conceptual data and the interactions between systems within the eReferral solution.

Both the Conceptual and Logical Architecture include two views – an Initial State and a Future State. The Initial and Future State views are related to the availability of the Provincial solutions:

1. **Initial State** – This view describes the architecture of the eReferral solution if it were to be implemented today (or the date of the publishing of the PRM). It reflects the EHR services that are currently available to form part of the overall solution.

2. **Future State** – This view describes the architecture of the solution if it were to be implemented in 12+ month from today (or 12 months from the publishing of the PRM). It reflects the availability of the EHR services that are both currently and imminently available to form part of the overall solution. Colour coding is used to distinguish currently and imminently available assets (see the Diagram Legend).

For definitions of the various systems and services depicted in the PIMs, please see section 4 "Definitions – Conceptual Architecture" in the Technology Framework Appendix.

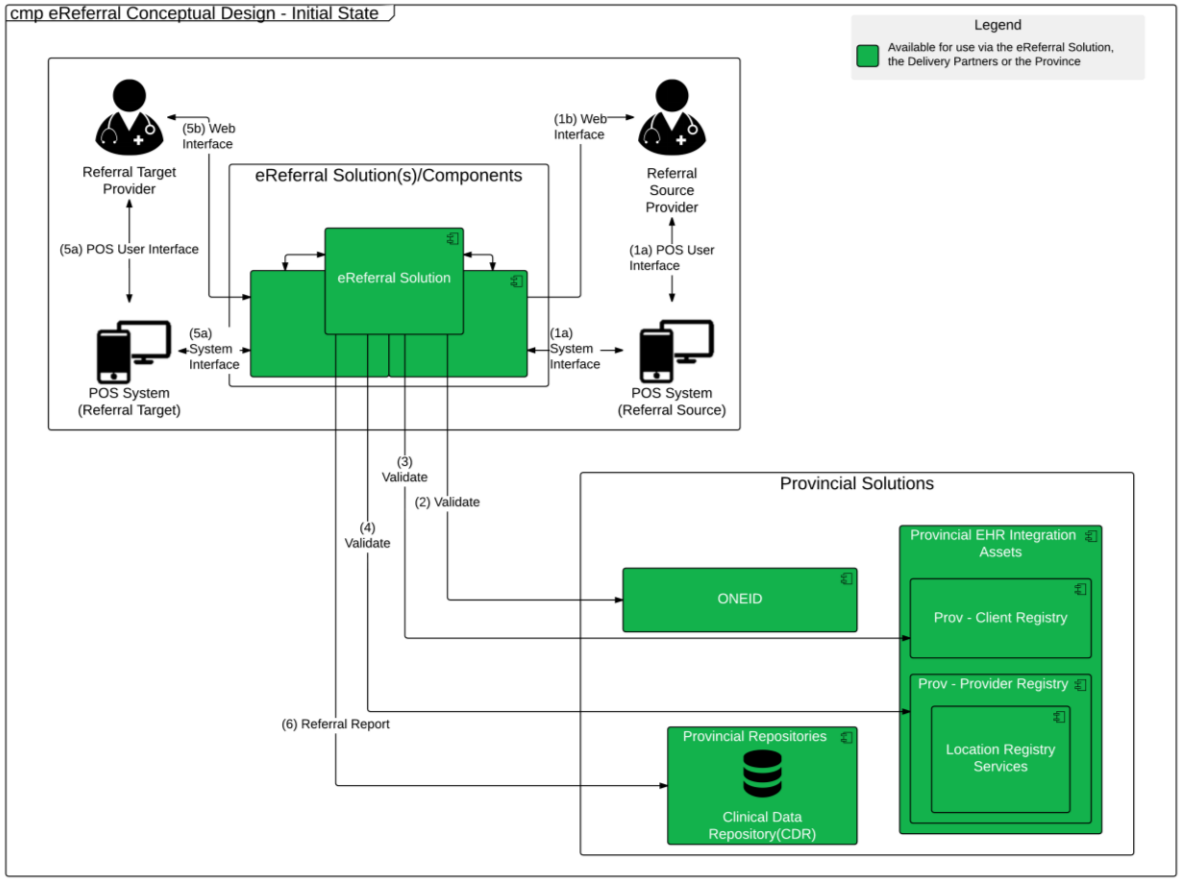


Figure 12 - Conceptual Architecture – Initial State

4.4.1 INITIAL STATE - DESCRIPTION OF FLOW

1. A referral request is created via either an EHR system or a web interface:

    a. Within the *EHRS (Electronic Health Record System) User Interface* the care team manages referral requests via their EHR System. On the *system interface* the EHR System exchanges information with the eReferral solution in near real-time as required to support the referral business processes.

    b. Using the *web interface* the care team creates and manages referral requests.

2. The eReferral solution performs system and user identity validation against the provincial ONE ID authentication layer.

3. The solution resolves client information identifiers to the most current information using the Provincial Client Registry in order to validate the client information in the referral request.

4. The solution resolves provider and location identifiers to the most current information using the Provincial Provider Registry in order to validate the provider information in the referral request.

5. Referral Target providers are notified of the referral request and response initiated.

    a. Within the *EHRS User Interface* the Referral Target providers are notified and are given direct access to the eReferral solution to respond to the referral. On the *System Interface* the eReferral solution collaborates with the target EHR system to provide additional information, in order to finalize the referral.

    b. The Referral Target providers are notified via *Web Interface* and are given direct access to the eReferral solution to respond to the referral.

6. Referral/Consultation Reports are uploaded to the CDR.

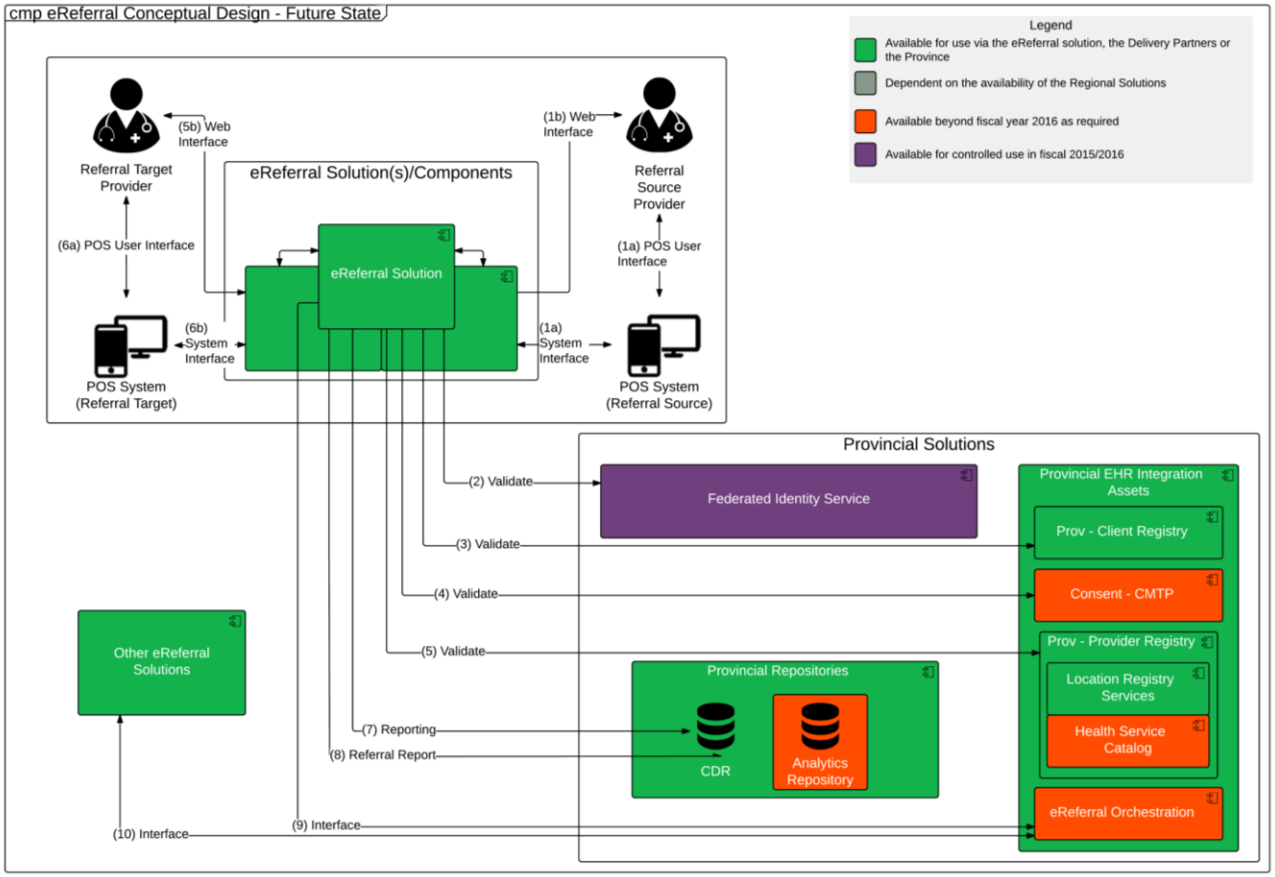


Figure 13 - Conceptual Architecture – Future State

4.4.2 FUTURE STATE - DESCRIPTION OF FLOW

1. A referral request is created via the EHR system or the web interface.

    a. Using the *EHRS User Interface* the care team manages referral requests via their EHR System. Within the *system interface* the EHR System exchanges information with the eReferral solution, in near real-time, to support the referral business processes.

    b. On the *web interface* the care team creates and manages referral requests via the web interface.

2. The eReferral solution performs system and user identity validation against the Federated Identity Service (see the Federated Identity Flow diagram in section 4.4.3).

3. The solution resolves client information identifiers to the most current information using the Provincial Client Registry in order to validate the client information in the referral request.

4. The patient consent can be validated against the Provincial Consent Registry.

5. The solution resolves provider and location identifiers to the most current information using the Provincial Provider Registry in order to validate the provider information in the referral request. The solution resolves and validates healthcare services offered by the target provider using the provincial Health Service Catalog.

6. Referral Target provider notification and response initiated.

    a. Selected referral Target providers are notified via the *EHRS user interface* about the Referral and are given direct access to the eReferral solution to respond to referrals. On the *system interface* the eReferral solution collaborates with the target EHR system to provide additional information, in order to finalize the referral.

    b. Referral Target providers are notified via the *web interface* and are given direct access to the eReferral solution via the Web interface to respond to referrals.

7. The eReferral solution provides data to the Provincial Analytics Repository to enable trending and reporting of eReferral data and metrics.

8. Referral/Consultation clinical Reports are uploaded to the CDR.

9. Communication to other eReferral solutions are implemented by a different group of delivery partners (via Provincial eReferral Orchestration Service).

10. Communication to other eReferral solutions implemented by a different group of delivery partners (via Provincial eReferral Orchestration Service).

4.4.3 IDENTITY FEDERATION DIAGRAM – DESCRIPTION OF FLOW

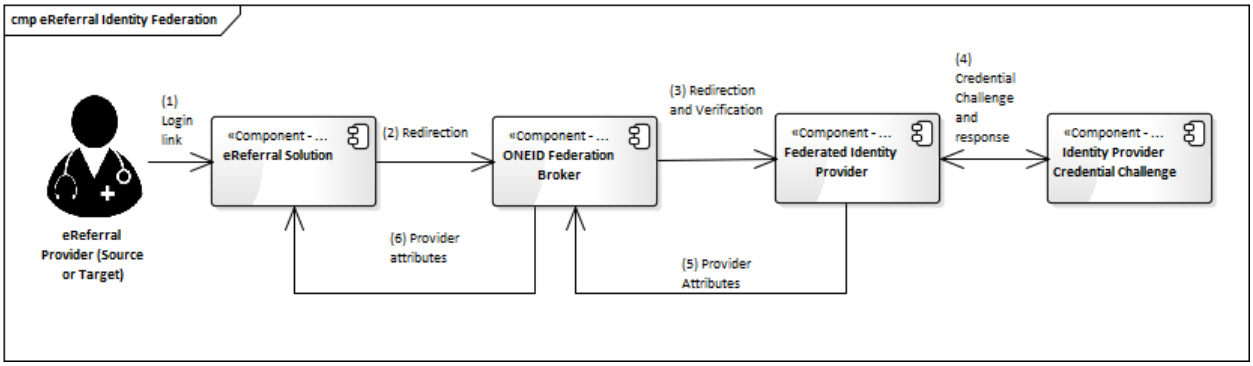


Figure 14 - Identity Federation Diagram

This section provides an overview of the system and user identity validation against the Federated Identity Service, as described in step 2 of the Conceptual Architecture future state description flow.

1. The Health Care provider clicks the login link on his/her web interface.

2. The Federated service provider redirects the logon request to a federation operator, and includes an authentication request token.

3. The Federated Broker redirects the logon request to the selected Federated Identity Provider (IDP) with an operator- issued request token. The IDP ensures that the request message originated from the Federation Operator.

4. The IDP challenges the Health Care Provider for a standard login and validates the response.

5. The IDP issues a Security Assertion Markup Language (SAML) response token and returns the request and token to the Federation Broker. The hub validates that the user authentication assertion came from a trusted IDP and performs value added processing.

6. The Federation Broker issues a provincial Single Sign On (SSO) token and redirects the request back to the originating service provider. The service provider then determines authorization, based on the attributes asserted by the IDP and brokered via the Federation Operator.

4.5 CONCEPTUAL ARCHITECTURE AND HIGH-LEVEL BUSINESS PROCESS TRACEABILITY

The following section describes the enablement of the high-level business process by technology. The goal of a technology implementation is to support the business process. The traceability diagrams in this section describe how the business process could utilize technology for automation. The following notes apply to the traceability diagrams below:

- The business process activities are generalized for the purpose of the traceability.
- The activities on the traceability diagram are very high level activities and represent generalized activities common for both the Non-Transfer of Care process and the Transfer of Care process described in the Business Section.
- The relationships between the activities and technology are represented by downward dotted arrows that indicate technology enablement opportunity.

The following diagram illustrates the initial state of the Conceptual Architecture and Business Process traceability.

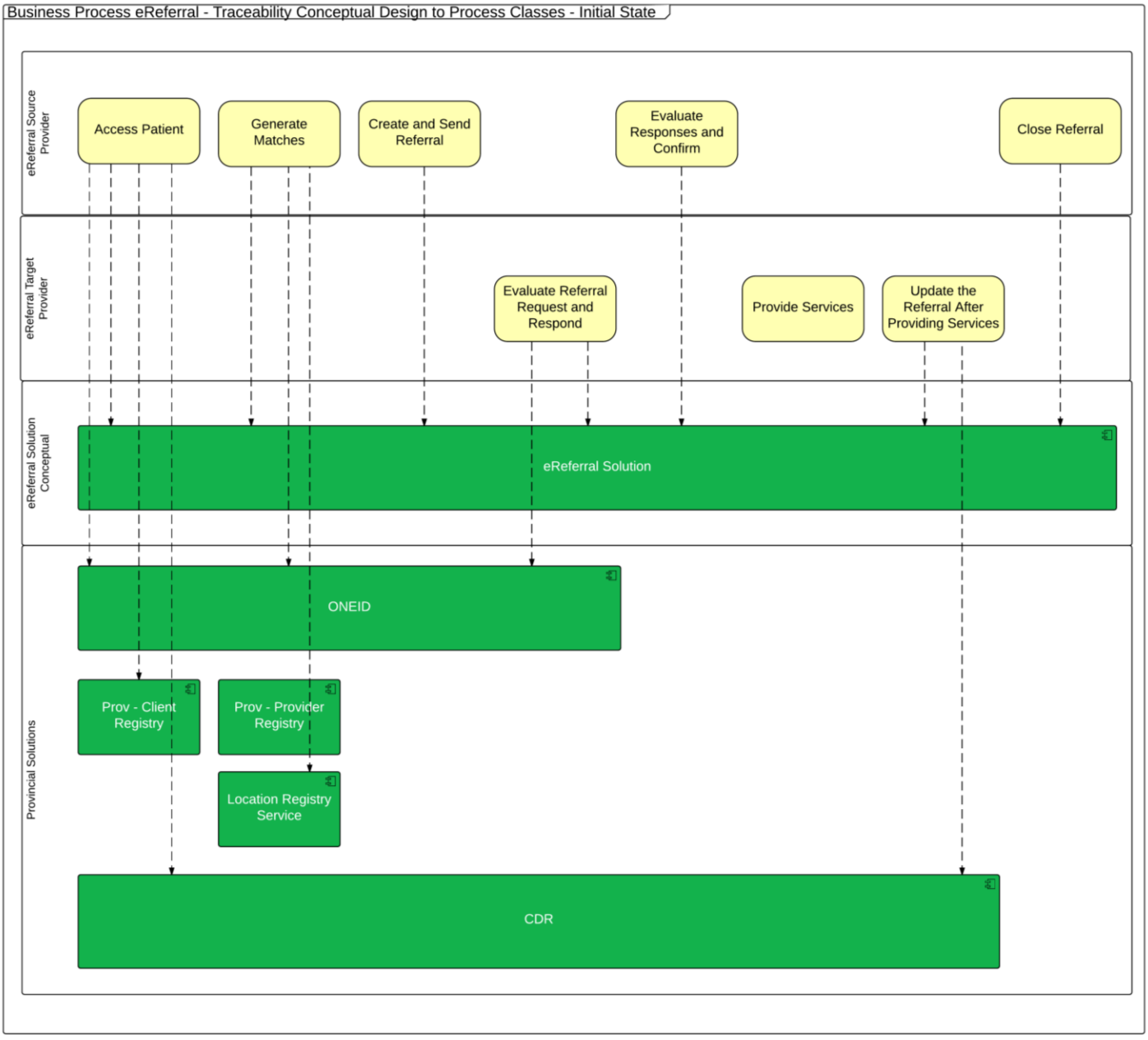


Figure 15 - Traceability Conceptual Architecture – Initial State and Business Process

Within the initial state of the Conceptual Architecture and Business Process Traceability the following activities are supported by the specific conceptual components listed below each activity.

Activity	Technology Enablement
Assessing Patients	• ONEID • eReferral Solution • Prov - Client Registry • CDR
Generating Matches	• ONEID • eReferral Solution • Prov – Provider Registry • Location Registry Service
Creating and Sending Referrals / Evaluating Referral Requests and Responding to Requests / Evaluating Responses and Providing Confirmation	• ONEID • eReferral Solution
Providing Services	Indicates the healthcare services provided to the client. The activity does not have technology enablement at the eReferral solution or provincial level.
Updating the Referral after Providing Services	• ONEID • eReferral solution • CDR
Closing the Referral	• ONEID • eReferral Solution

Table 8 - Initial State: Activities Supported by Conceptual Components

The following is the future state of the Conceptual Architecture and Business Process traceability.

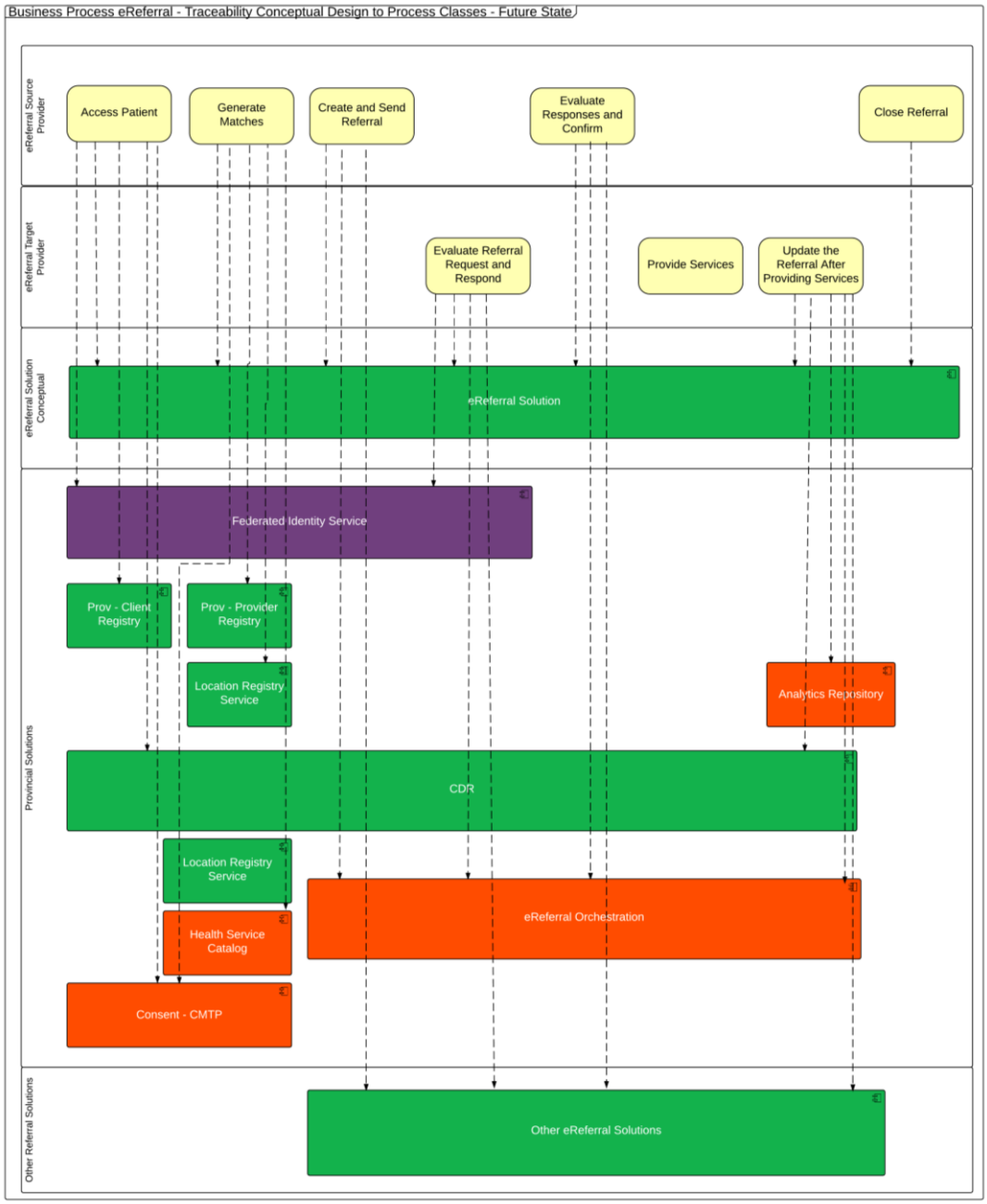


Figure 16 - Traceability Conceptual Architecture – Future State and Business Process

Within the future state of the Conceptual Architecture and Business Process Traceability the following activities are supported by the specific conceptual components listed below each activity.

Activity	Technology Enablement
Assessing Patients	• Federated Identity Service • eReferral Solution • Prov - Client Registry • CDR • Consent
Generating Matches	• Federated Identity Service • eReferral Solution • Consent - CMTP • Prov – Provider Registry • Location Registry Service • Health Service Catalog
Creating and Sending Referrals / Evaluating Referral Requests and Responding to Requests / Evaluating Responses and Providing Confirmation	• Federated Identity Service • eReferral Solution • eReferral Orchestration • Other eReferral Solutions
Providing Services	Indicates the healthcare services provided to the client. The activity does not have technology enablement at the eReferral solution or provincial level
Updating the Referral after Providing Services	• Federated Identity Service • eReferral Solution • eReferral Orchestration • Analytics Repository • CDR • Other eReferral Solutions • eReferral solution
Closing the Referral	• Federated Identity Service • eReferral Solution

4.6 HIGH LEVEL LOGICAL ARCHITECTURE – INITIAL STATE

This section provides a logical view of the architecture and outlines components that make-up the eReferral Solution, HIAL based integration, identity management, and provincial services in its initial state. For definitions please see section 5 “Definitions – High Level Logical Architecture” in the Technology Framework Appendix.

When reading the flow of the high level logical architecture in its initial state please note that:

- In the absence of the availability of a provincial health services catalog, the eReferral solution should maintain a catalog and provider relationships.

- In the absence of integration with a provincial consent registry, consent must be supported by the eReferral Solution (e.g. within the solution or by a manual process, as it is done today).

- In the absence of a regional HIAL segment, the Provincial HIAL could be used to provide functionality for systems integration which could include, but not limited to:

    - Message Translation – for example translation to HL7 messages.
    - Message routing, transformation.
    - Authentication, authorization and audit.

- In the absence of integration with a provincial terminology service, the eReferral solution should provide functionality for terminology translation if structured data will be included in the referral content. Alternatively Delivery Partners could follow the provincial and pan-Canadian standards in preparation for the integration with the provincial Terminology Services. Further information can be requested from: architecture@ehealthontario.on.ca

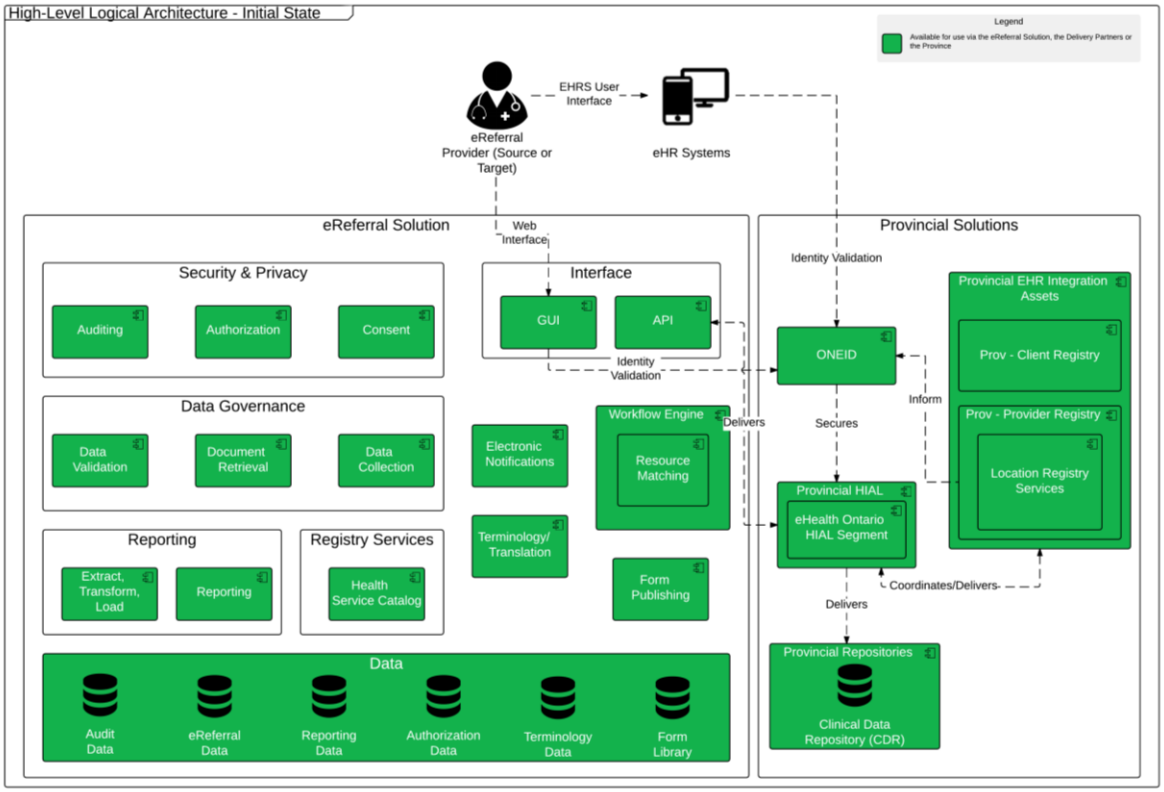


Figure 17 - Logical Architecture – Initial Stat

Initial State - Description of process

- Using the Web Interface, the care team **creates and manages referral requests**.
- Within the EHRS (EHR System) user interface the eReferral providers can **create, manage, and respond to eReferral requests**.
- In Identity Validation (EHR system to ONEID) the EHR system performs **user identity validation** for the EHR users against the provincial ONE ID authentication layer.
- In Identity Validation (GUI to ONEID) **user identity validation** is performed using the Web interface users against the provincial ONE ID authentication layer.
- ONEID enforces **security** for all services exposed through the HIAL.
- The Registry and Common Services **provide information** to ONEID, to help validate providers, used by ONEID to secure the HIAL.
- The HIAL **coordinates data delivery** from the registries using the registries themselves and the Common Services.
- Data is **delivered** to the Provincial Repositories through the HIAL to the CDR. The clinical data intended for the CDR is any information that would be used by other clinicians in the care of the patient. An example in the processing of a referral would be the Consultation Report.
- The eReferral solution **delivers** information between GUI and Provincial HIAL, to the Provincial Repositories, and receives information form the Registries through the HIAL. System to system interaction between the EHR System and the eReferral solution is also performed through the HIAL.

4.7 HIGH LEVEL LOGICAL ARCHITECTURE – FUTURE STATE

This section provides a logical view of the architecture and outlines components that make-up the eReferral Solution, HIAL based integration, identity management, and provincial services in its future state. For definitions please see section 5 "Definitions – High Level Logcial Architecture" in the Technology Framework Appendix

The diagram below does not depict an exhaustive list of services, or the functional and non-functional requirements, and works to provide the minimum requirements needed for the eReferral solution. If there are regional or provincial services that are not available at the time of implementation then secondary implementation options need to be determined.

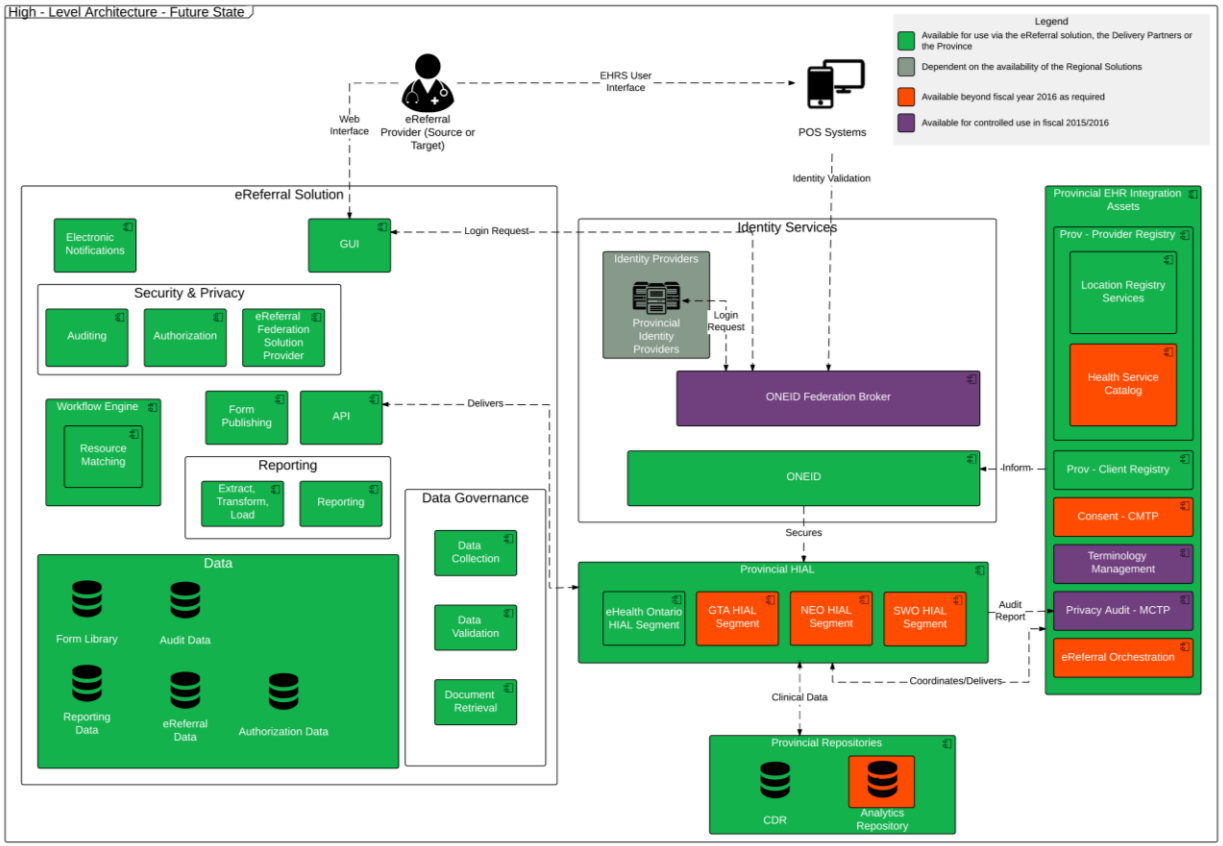


Figure 18 - Logical Architecture – Future State

Future State - Description of process

- The care team **creates and manages referral requests** via the Web interface.
- The eReferral providers have access to the EHRS (EHR System) User interface to **create, manage, and respond to eReferral requests.**
- The EHR system performs user **identity validation** for the EHR users against the provincial ONE ID authentication layer.
- A **login request** is initiated, between GUI, ONEID federation Broker, and Provincial Identity Providers.
    - The Federation Broker acts as the intermediary between the services requesting authentication and the identity provider that holds the digital identity.
    - Upon successful authentication and response from the IDP, the Federation Broker issues a signed and encrypted ONEID Federation SAML response token and forwards the requester back to the initiating service provider.
    - For more information - see the Federated Identity Flow diagram
- ONEID **enforces security** for all services exposed through the HIAL.
- The Registry and Common Services **provide information** to ONEID used by ONEID to secure the HIAL.
- The HIAL **coordinates data delivery** from the Registries using the Registries and the Common Services.
- **Delivery** (Provincial HIAL to CDR: Data to the Provincial repositories is delivered through the HIAL.
- The eReferral solution **delivers** information between GUI and Provincial HIAL to the Provincial Repositories and receives information form the Registries through the HIAL.
    - System to system interaction between the EHR System and the eReferral solution is also performed through the HIAL.

5.0 PRIVACY & SECURITY FRAMEWORK

This framework serves two purposes:

- It identifies a generic set of privacy and security requirements for eReferral solutions, including requirements for specific referral models and security deployment patterns. This can be used to drive out appropriate requirements for solution procurement or development.

- It overlays the technology framework architecture and enhances it with privacy and security architecture by showing components and services to which specific privacy and security requirements apply.

5.1 PRIVACY FRAMEWORK

5.1.1 PURPOSE

To protect the privacy of Individuals whose personal health information (PHI) is collected, used, disclosed, transported, retained, destroyed or otherwise handled as a result of eReferral solutions, and to facilitate compliance of Heath Information Custodians (HICs), their agents and third party service providers with the *Personal Health Information Protection Act*, 2004 (PHIPA).

5.1.2 GUIDING PRINCIPLES

The Privacy Guidelines are driven by the Canadian Standards Association Model Code for the Protection of Personal Information. As custodians of PHI health care providers have obligations under PHIPA and Ontario Regulation 329/04 (Regulation). HICs utilizing eReferral solutions will be involved in the collection, use, and disclosure of PHI by HICs and must be compliant with applicable laws including PHIPA, the Regulation, the Freedom of Information and Protection of Privacy Act R.S.O. 1990 (FIPPA) and orders and decisions of the Information and Privacy Commissioner of Ontario.

HICs, their agents and third service providers recognize that a core principle in health care is respect for privacy. An effective privacy program must proactively address privacy issues by building privacy throughout the program lifecycle and into the broader program operations in accordance with Privacy by Design Principles.

5.1.3 EREFERRAL ROLES

At the conceptual stage, those procuring eReferral solutions will need to ensure that the legal authority exists to collect, use, and disclose the eReferral data. It is at this stage that analysis will also determine the role participants will play. Each of the roles described below has its own requirements under PHIPA which will need to be reviewed to ensure compliance with applicable laws.

- **Health Information Custodian**

  A person or organization who has custody or control of PHI as defined in section 3 of PHIPA.

- **Agent**

  As defined in Section 2 of PHIPA, "agent", in relation to a health information custodian, means a person that, with the authorization of the custodian, acts for or on behalf of the custodian in respect of personal health information for the purposes of the custodian, and not the agent's own purposes, whether or not the agent has the authority to bind the custodian, whether or not the agent is employed by the custodian and whether or not the agent is being remunerated

- **Electronic Service Provider** (see section 6(1) of the Regulation)

  A person who provides goods or services for the purpose of enabling a HIC to use electronic means to collect, use, modify, disclose, retain or dispose of PHI, and includes a health information network provider.

- **Health Information Network Provider** (see section 6(3) of the Regulation)

  Has the same meaning as Ontario Regulation 329/04: "a person who provides services to two or more health information custodians where the services are provided primarily to custodians to enable the custodians to use electronic means to disclose personal health information to one another, whether or not the person is an agent of any of the custodians."

5.1.4 ROLES AND RESPONSIBILITIES OF HICS

A HIC should consider committing to having in place and maintaining policies, procedures and practices in respect of privacy that are necessary to enable them to comply with its obligations under PHIPA including, but not limited to:

- Privacy and Data Protection Policy;

- Access and Correction Policy;
- Consent Management Policy;
- Inquiries and Complaints Policy;
- Logging and Auditing Policy;
- Privacy and Security Training Policy;
- Privacy Breach Management Policy; and
- Retention Policy.

eHealth Ontario has established a provincial privacy governance structure known as the Connecting Privacy Committee (CPC) which consists of membership from across Ontario's three regional hubs, the Ministry of Health and Long term Care and the Office of the Information Privacy Commissioner of Ontario. The CPC has developed a set of electronic health record privacy policies that set requirements for Health Information Custodians and Program Offices participating in the electronic health record.

Participating organizations are encouraged to review and leverage any applicable privacy policies while using eReferrals.

- **Consent**

  HICs should have in place and maintain policies, procedures, and practices that are necessary to enable them to comply with their obligations under PHIPA and that enables an Individual to exercise his or her right under PHIPA to give, withhold, and withdraw consent for the collection, use, and disclosure of his or her PHI for the purpose of providing or assisting in the provision of health care to the Individual.

- **Accuracy**

  A HIC collecting PHI through the eReferral Solution should take reasonable steps to ensure that PHI is accurate, complete, and up-to-date as is necessary for the purposes for which it is using the PHI.

  A HIC that has created and contributed PHI to the eReferral solution should take reasonable steps to ensure that PHI is as accurate, complete, and up-to-date as is necessary for the purposes of providing or assisting in the provision of health care to the individual.

- **Secure Retention, Transfer, and Disposal**

HICs should have in place and maintain policies, procedures, and practices in respect of secure retention, transfer, and disposal of PHI that are necessary to enable them to comply with their obligations under PHIPA.

- **Inquiries and Complaints**

  HICs should have in place and maintain policies, procedures, and practices in respect of inquiries and complaints related to the eReferral solution that are necessary to enable them to comply with their obligations under PHIPA.

- **Access and Correction**

  HICs should have in place and maintain policies, procedures, and practices in respect of Requests for Access and Requests for Correction related to eReferral solutions that are necessary to enable them to comply with their obligations under PHIPA.

- **Transparency**

  The policies, procedures, and practices governing the eReferral Solution should be publically available to ensure that Individuals are well-informed about how the solution protects the privacy of the individual.

- **Training**

  HICs should have in place and maintain policies, procedures, and practices in respect of training related to eReferral solutions that is necessary to enable them to comply with their obligations under PHIPA. A comprehensive privacy training policy is essential for compliance with obligations under PHIPA.

- **Logging and Auditing**

  HICs should have in place and maintain policies, procedures, and practices in respect of logging and auditing that are necessary to enable them to comply with their obligations under PHIPA. HICs should take steps that are reasonable in all the circumstances to keep an electronic record of all accesses to all or part of the personal health information contained in the electronic health record, and shall ensure the record identifies the person who accessed the information, the date and time of access, and the authorizing HIC.

  Service level agreements with third party service providers should clarify who is responsible for archiving and maintaining audit logs and retention of such logs should be in accordance with the applicable retention policy.

- **Privacy Breach Management**

  HICs should have in place and maintain policies, procedures, and practices in respect of privacy breach management that are necessary to enable them to comply with their obligations under PHIPA. Such a process should require HICs, their agents and service providers to provide notification at the first reasonable opportunity if information is stolen, lost or accessed by unauthorized persons.

- **Assurance**

  HICs should have in place and maintain policies, procedures, and practices in respect of assurance that are necessary to enable them to comply with their obligations under PHIPA.

- **Contractual Agreements for Health Information Network Providers**

  Providers acting as a HINP should enter into a written agreement with each HIC concerning the service provided to that custodian that:

  I. describes the services that the provider is required to provide for the custodian;
  II. describes the administrative, technical and physical safeguards relating to the confidentiality and security of the information; and,
  III. requires the provider to comply with the Act and s. 6(3) of the Regulation.

- **Search Controls**

  Restricting searches in an eReferral solution greatly reduces the chance that a user is randomly entering data attributes in order to obtain PHI for unintended and unauthorized purposes. In order to retrieve any eReferral data, searches should require a minimum of three identifiers such as health number, date of birth and gender.

- **Disclaimer**

  The guidelines above have been developed at the conceptual stage of the eReferral solution and will be revised as appropriate during the life-cycle of the eReferral Provincial Reference Model. In particular, consideration will have to be given to whether eReferral data forms part of the EHR and whether that facilitates the need for a central eReferral data repository, revision to the applicable legal authorities and subsequent deployment of EHR agreements and policies.

5.2 SECURITY FRAMEWORK

5.2.1 INTRODUCTION

The overarching goals of security are to maintain information confidentiality, availability, and integrity (including authenticity, accountability and auditability). The Security aspect of the PRM is driven by the legislation in healthcare identified in the privacy requirements, an organization's risk management, and interpretation of the industry standards listed below within its own context, legal and business requirements.

The security requirements are developed based on the international standard ISO/IEC 27001:2013 – Information Security Management Systems – Requirements, with a cross reference to ISO/IEC 27799 – Health Information Security Management in health using ISO/IEC 27002. It is also informed by Canada Health Infoway's Conceptual Privacy and Security Architecture methodology.

The security requirements presented below are organized based on applicability to two Referral deployment scenarios:

1. the eReferral solution is hosted within the healthcare organization(s);
2. the eReferral solution is not hosted within the healthcare organization(s);

This Security section also introduces the concept of security trust zones in alignment with the Technology Solution Framework to deliver an eReferral solution with privacy and security by design.

Scenario 1 - The eReferral solution is hosted by an existing health care organization such as OACCAC, CCAC, cGTA, UHN, a LHIN Cluster, or even eHealth Ontario. In these organizations an information security program shall be established, developed, implemented and maintained in according with laws, regulations, contractual agreements and international and industry security standards, under the guidelines of MOHLTC. If there are gaps identified by the health care organization(s) involved, they shall conduct an analysis and ensure their compliance. Privacy and security by design should be built into their development of the eReferral solution.

Scenario 2 - A non-health care organization provides eReferral solutions in the capacity of the HINP role according to O.Reg 329/04. In this case, it is expected that the organization shall establish adequate information security organizational controls including:

- senior management support of the information security program,
- information security policies that are approved and reviewed periodically,
- assignment of security accountability and responsibility to a specific individual for the organization,
- communication of the policies to all employees and relevant external parties,

- information security in project management,
- mobile devices and teleworking policies and secure implementation thereof,
- physical security, etc.

The following security requirements are not meant to be an exhaustive list of all possible requirements to cover every perspective; however they stipulate the minimum security business requirements that the eReferral solution provider and/or HICs shall meet to start with.

The majority of the requirements apply to both scenarios. There are few extra requirements that apply only to Scenario 2, when the eReferral solution is hosted outside of the health care organizations.

For specific requirements for security scenario 1 and 2 please refer to appendix 3.

5.2.2 EREFERRAL SECURITY ARCHITECTURE

Security zones are to be established based on the relative sensitivity of assets and the role the systems in each respective zone play in the data and transaction flows. The security control objective of zones, as an in-depth, multi-layered defense best practice strategy, are to provide an approach of granting the most restrictive set of privileges needed for performance of authorized tasks as specified by security policy.

The following architectural principles apply to security zones:

- Security zones must be segregated.
- Functional tiers (e.g., application and messaging tier) within the same security zone may be segregated as appropriate.
- A zone should only communicate directly with its adjacent zone (e.g., the Untrusted Zone should not directly communicate with the Medium-Trust Zone).
- Only the High-Trust zone may store high-sensitivity information. Other zones may collect, process and transmit the information but not store it.
- Access Control should deny all communication by default and must be configured to allow virtually segregated application zones to communicate as required.
- The concept of trust is relative to the system, rather than to the absolute level of assurance.

The following description and diagrams depict the security zones and domains of control within the eReferral PRM.

Security Zones within eReferral

- **The High Trust Zones** typically contain systems that are responsible for providing persistent storage of high-sensitivity information, such as personal health information. They also contain authoritative

registries managed by eHealth Ontario (e.g., CR/PR). Systems in this zone communicate with the Medium Trust Zone and through well-defined and tightly controlled interfaces.

- **The Medium-Trust Zone** primarily includes partner domains. Although the project in general has no control over these domains, the partnership involves an inherent degree of trust further reinforced through requirements, Memoranda of Understanding, Federation Agreements, Data Sharing Agreements and Service Level Agreements, as applicable. Partner systems in the Medium Trust Zone communicate with the High Trust Zone through well-defined and tightly controlled interfaces.
    - The Medium Trust Zones typically contain the external-facing components of the HIAL or an alternative integration layer, which expose interfaces to external domains and process, but do not store, Personal Health Information.

- **The Low-Trust Zone** refers to one with minimal control over the system but not typically over the environment.

- **The Untrusted Zone** generally refers to public networks (i.e., the Internet). The project has no control over the data in transit over public networks.

The following diagrams are to illustrate how the security zones shall be designed in the context of the eReferral solution. The security architecture is overlaid on the initial state and future state diagrams of the High-Level Logical Architecture.

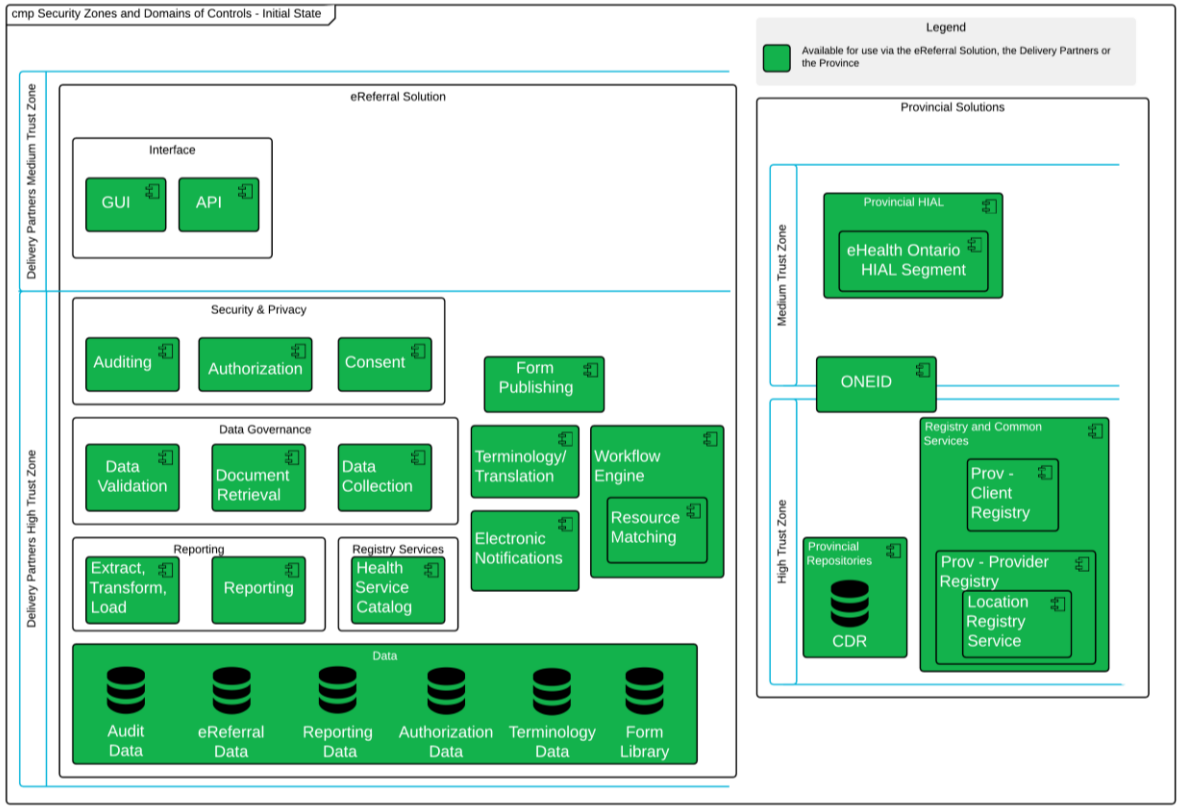


Figure 19 - Security Zone and Domains of Control – High Level Logical Architecture (Initial Stat

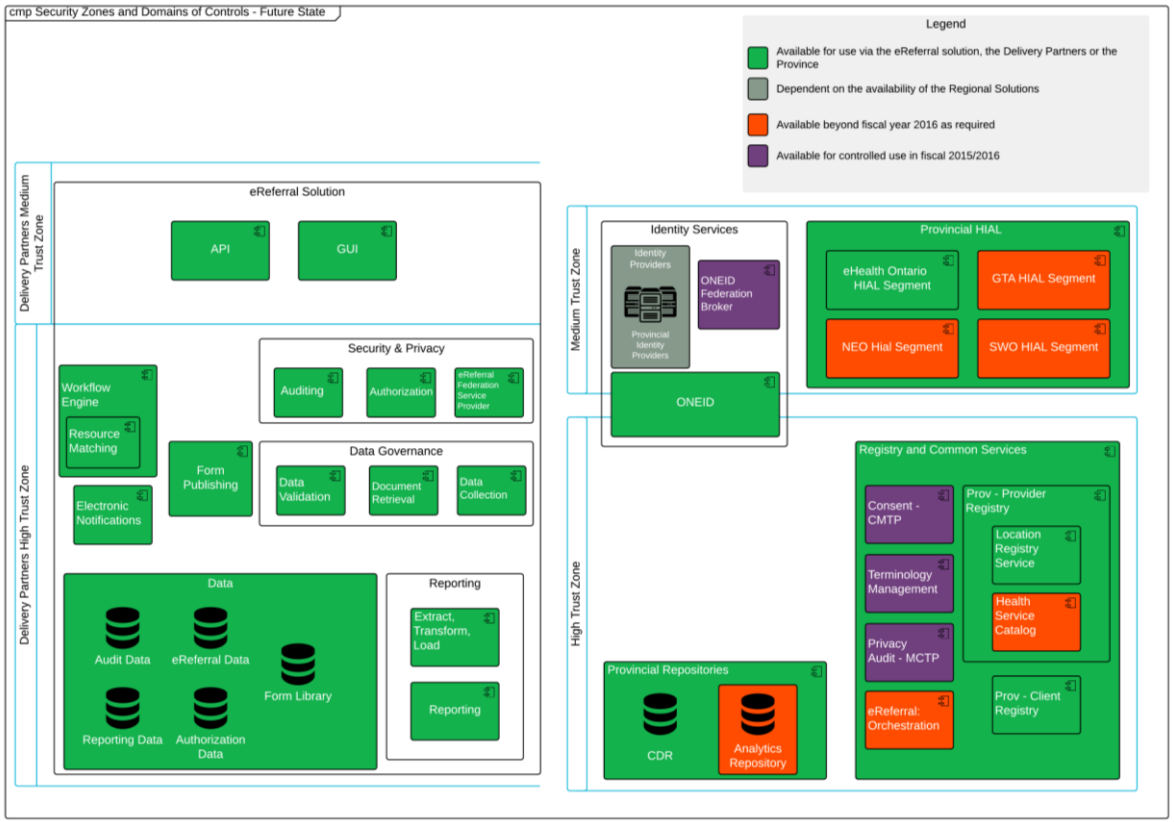


Figure 20 - Security Zones and Domains of Control – High-Level Logical Architecture (Future State)

5.2.3 SECURITY ARCHITECTURE AND REQUIREMENTS TRACEABILITY

In order to show how the security business requirements that are required in the previous section shall be applied and realized when designing the technology architecture components, two traceability views have been developed below to demonstrate the concept for the eReferral Security Requirements of Scenario 1.

The relationships between the components and requirements are the "realization" link in the model. As with the security zone and domain of control concept, the views are modeled as an overlay of the eReferral High-Level Logical Architecture framework's initial and future state discussed in section 2.6.

Please note that the second security deployment scenario (Scenario 2 – for description, see the Introduction section in the Security Framework) and it's specific requirements are not listed on these views, to reduce the complexity of the views. However, the views can be developed easily by the designers and solution providers, by applying the following Principle:

- Not every security business requirement will be met by a technology component, only some are. This is simply because some other security requirements are people and process based, such as the Business owner's security responsibilities, Segregation of Duties and Human Resources Security, etc. These do not fit into the architecture view.

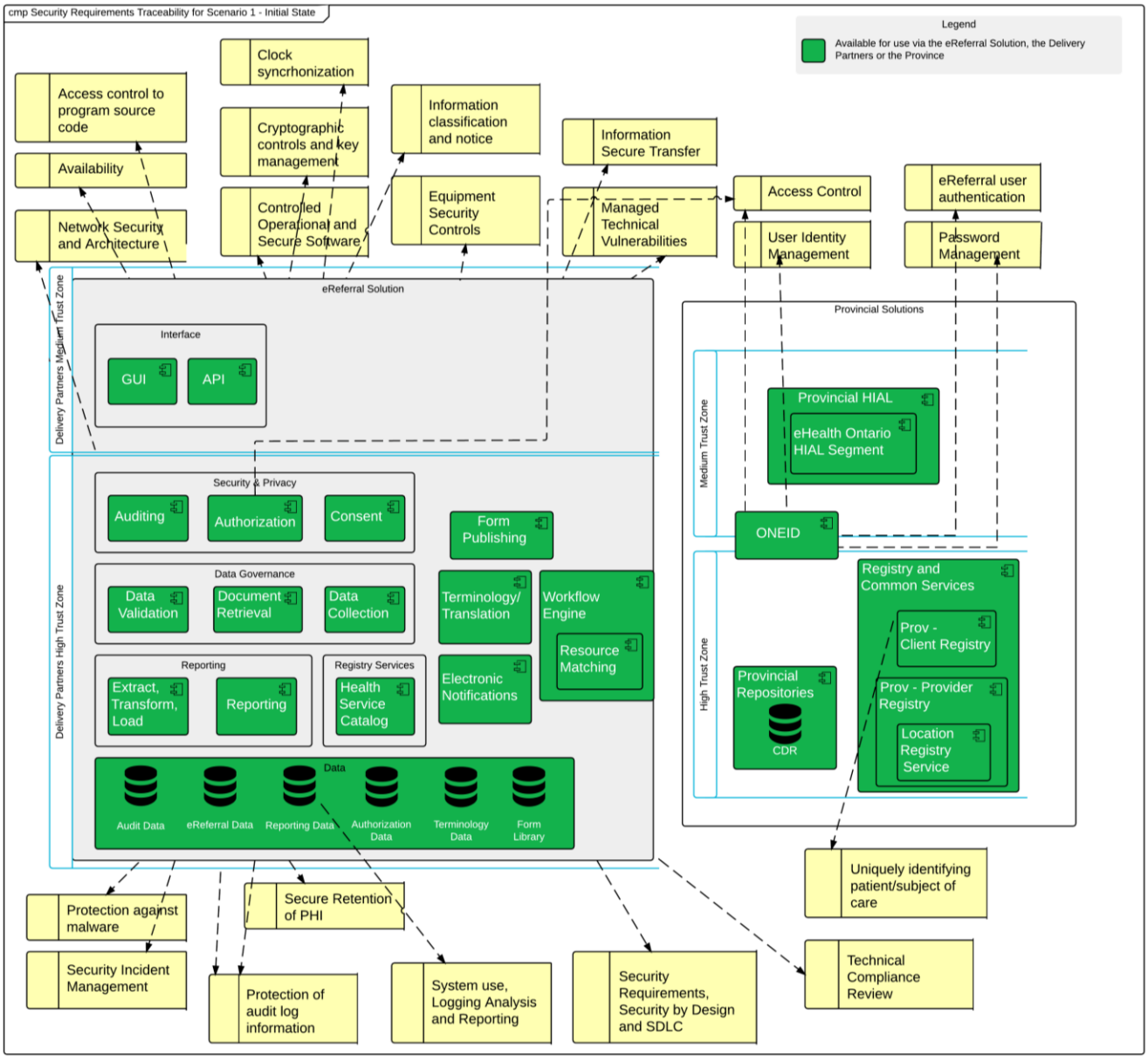


Figure 21 - Security Requirements Traceability for Scenario 1 – High-Level Architecture (Initial State)

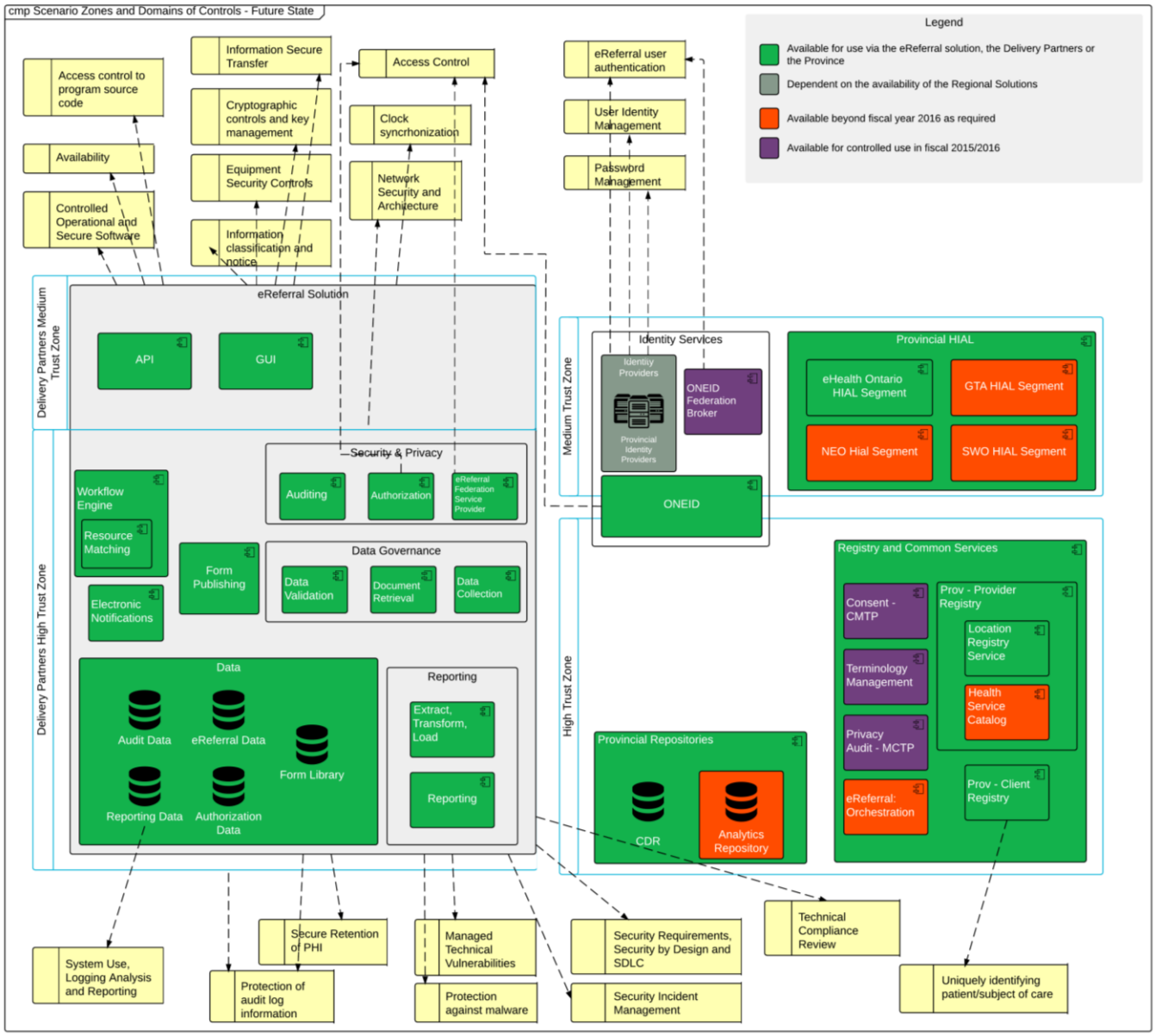


Figure 22 - Security Requirements Traceability for Scenario 1 – High-Level Logical Architecture (Future State)

5.2.4 EHR SECURITY POLICIES

eHealth Ontario has established a provincial security governance structure known as the Connecting Security Committee (CSC) which consists of membership from across the province. The CSC has developed a set of electronic health record security policies that set requirements for Health Information Custodians and Program Offices participating in the electronic health record.

Participating organizations are encouraged to review and leverage the EHR Security Policies while using eReferrals.

As of the release of this document some, but not all, of the security policy documents have been published. Published documents can be found on the eHealth Ontario website:

http://www.ehealthontario.on.ca/en/initiatives/resources

Further documents can be requested from: architecture@ehealthontario.on.ca.

6.0 INFORMATION FRAMEWORK

6.1 PURPOSE

The purpose of the Information Framework is to define all the business and clinical information created and used during referral processes described in the Business Framework. It provides the supporting information for solution needs for an RFP or development process. It informs and supports planning and architecture decision-making for local eReferral solutions.

The Information Framework guides readers in integrating existing and future eReferral systems with one another. It provides:

- **The potential information requirements in a system procurement or development process:**

  Information requirements are recorded in an RFP or project definition documentation through reference to specific referral forms, notes and reports and incorporated into relevant in-scope concepts defined in the Conceptual Information Model. High level requirements for data messaging and storage are given in a Logical Data Model which is aligned with the provincial eReferral Standard, which is compliant with the Clinical Document Specification. The informatics standards remain the authoritative reference for message models and schema and for the application of health terminology.

  Solution procurement and development project activity is driven equally by information requirements. The purpose of the Information Framework is to contribute to both.

- **Flexibility to account for unique delivery partner requirements where solutions are being implemented:**

  Unique requirements are established during gap analysis between the eReferral PRM Document and local referral solution needs. The local Delivery Partner will modify Information Framework models to cover necessary changes. Assistance for this activity is available from eHealth Ontario.

- **Guidance and direction on making the best use of provincial information assets:**

  Best use of provincial information assets includes leverage of provincial registries and repositories. The eReferral PRM is fully aligned with these assets.

- **Alignment with the eHealth Ontario's Blueprint, EHR Connectivity Strategy and interoperability standards:**

  All aspects of the Information Framework are aligned with existing models and standards. The CIM is an integral part of Ontario's eHealth Blueprint. Information Resources are reused with the Connectivity

Strategy in the information flows between business functions. The Logical Data Model is aligned with the provincial eReferral Standards which is itself aligned with the Clinical Document Specification.

6.2 GUIDING PRINCIPLES

The following guiding principles were used for the information framework:

Information Resources: In the eReferral PRM, specialized forms, notes and reports used to communicate vital referral information between health care workers are called Information Resources. These Information Resources (IRs) have standardized definitions and content. The primary focus of the Information Framework is on information from the forms, notes and reports used by clinicians and administrators. An Information Resource Model has been created to record, analyze and define referral IRs. Classic information and data models play a supporting role in the Information Framework, helping to define the IRs and their content at a conceptual and logical level. Detailed field level definitions can be found in the provincial eReferral Standard.

Adaptability: The IF is readily adaptable to new IRs and expanded scope. Health organizations needing to implement referral solutions in their local areas will find it relatively easy to adapt the Information Framework to their own requirements. The Information Framework is a set of normalized information and data models in eHealth Ontario's provincial health model repository. The models can be edited with a UML modelling toolkit.

Technology-agnostic: The Information Framework is not a specification for the direct implementation of a technical solution. Its component models are conceptual and logical. Physical and technical specification and design are left for implementation projects to resolve based on local capabilities and needs.

Statelessness: The Information Framework is stateless. It does not distinguish between current and future states. The business transformation capabilities and information technology expertise of an implementing organization are likewise not prescribed.

Alignment: The models in the Information Framework align with:

- Ontario's eHealth Blueprint 2015
- Ontario's EHR Connectivity Strategy for eHealth in Ontario
- Ontario eReferral Standard 2010
- Clinical Document Specification

6.3 CONTEXT

The Information Framework closely supports the Business Framework by defining and setting the content of Information Resources used in business processes. The relationship between the two frameworks is between the Business Process Use Cases and the Information Resource Model. The Information Framework is dependent on the Business Framework for scope and information requirements.

The Information Framework also contains a Logical Data Model (LDM) for Referral. This model defines data structure at a logical level of abstraction, without offering message schema, field datatype definitions and other technical details associated with implementation. The LDM is a Referral domain model, created by analyzing and consolidating the HL7 message information models from the provincial eReferral standard. This standard gives the highly detailed physical models and schemas necessary for technical design and implementation.

The Information Framework also illustrates at a high level the content of provincial registries such as the client, provider and location registries, and repositories such as OLIS and the CDR.

6.4 THE EREFERRAL PRM INFORMATION FRAMEWORK

Figure 23 below shows the three major components of the eReferral PRM Information Framework:

- Information Resource Model
- Conceptual Information Model
- Logical Data Model

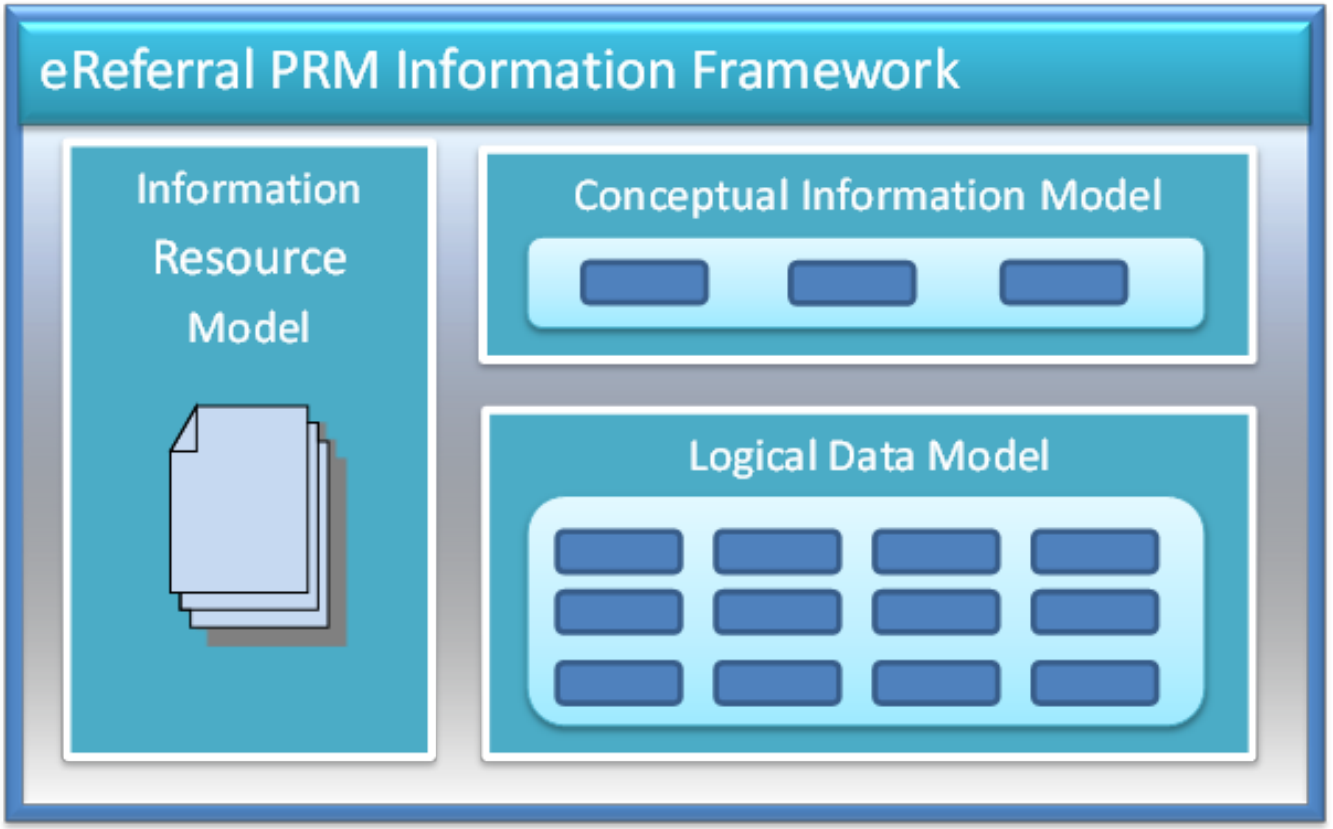


Figure 23 - eReferral PRM Information Framework

6.4.1 FRAMEWORK INTEGRATION

The Provincial Referral Model domains, Business Architecture, Privacy and Security, Standards, and Technology Architecture are integrated through interconnection links between model elements:

- Information Resources are inputs and outputs to activities in Business Architecture process flow diagrams in sections 3.3, 3.4 and 3.5.
- Information Resources are linked to CIM entities to show information content, see Appendix 4.1.
- Client and Provider Registries entities are also linked to CIM entities to record information content.
- CIM information entities are classified by their data privacy sensitivity.
- LDM data entities are logically linked with CIM information entities.
- LDM data entities are logically linked with HL7 message model classes in the Provincial eReferral Standard.

Information entities in the CIM link directly with the information resources listed above.

The Information Framework is made up of three models:

1. Conceptual Information Model:

   a data design representing an abstract view of the real world. It represents the human understanding of a system. It describes how relevant information is structured in the natural world. In other words, it is how the human mind is accustomed to thinking of the information.

2. Information Resource Model:

   a data design representing packages of information as they are used in the real world: forms, reports, webpages, notes and memos consolidate many types of information for use by health care providers in clinical settings. These are information resources and an Information Resource Model shows their definitions and contents.

3. Logical Data Model:

   a platform independent data design representing in scope business data entities, their relationships, and their attributes. The logical data model describes data requirements and needs in support of in scope business activities in as much detail as possible without any regard to physical implementation environment or performance considerations.

Within each of these models are references to the eReferral Standard, which is responsible for message and terminology modelling.

6.5 CONCEPTUAL INFORMATION MODEL

The Conceptual Information Model offers a complete, high-level view constituting a person's electronic health record in the Ontario health system, and a broad outline of how that information should be structured. The CIM model is intended for use by all authorized stakeholders for electronic health records in Ontario, including but not limited to eHealth Ontario, the Ministry of Health and Long-Term Care, Ontario Healthcare Providers and Healthcare Clients (patients), and health care information system vendors.

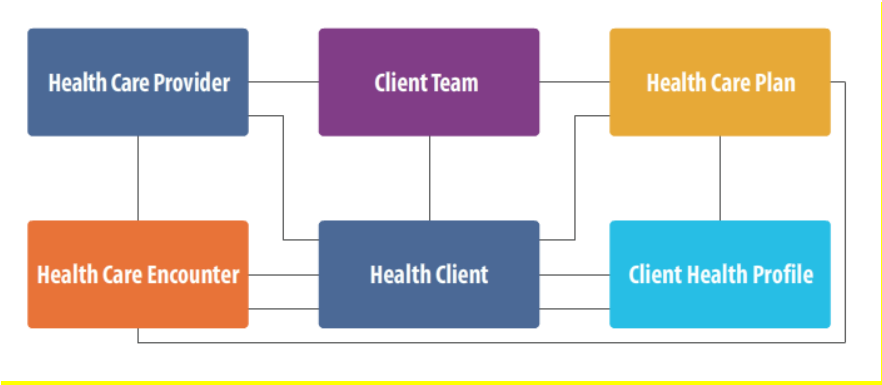
Within the model users will find:

- Common language to facilitate communication and co-ordination between parties within eHealth Ontario and across the broader eHealth environment.
- An overarching information structure to guide planning, design, and data integration of eHealth Ontario's systems.
- A map of information relevant to the business that serves as the basis for information management and governance.
- A Conceptual Information Model diagram with entity definitions and relationships.

The CIM is the model used to define the sensitivity of information, at the entity level. Each entity is classified as one of the following three sensitivity classes:

1. Personal Health Information (PHI) e.g. Chronic Condition or Lifestyle Characteristic.
2. Personal Information (PI), e.g. Health Care Client (containing the attributes birth date and administrative gender).
3. Neither or "not sensitive" e.g. Provider Organization.

The CIM is organized into six subject areas:



As noted in Figure 24 - Conceptual Information Model Diagram


Fig24.pdf

, the entire content of the EHR was required to cover the referral information domain. For this reason the Referral CIM was adopted in its entirety from the enterprise-level eHealth Blueprint Conceptual Information Model[14]. The CIM was then enriched through information analysis of referral Information Resources. A new information entity for Health Financial information was added, a subtype of Personal Health Information entity.

Figure 24 is the CIM diagram showing all of the possible types of data for the many referral types. To see specific data needed by individual referral types see Appendix Figures 1 through 9 in the 4.0 Information Framework Appendix. As an example, an Information Content Diagram for CCAC Referral can be seen in Appendix Figure 3.

[14] eHealth Ontario. (2014) Ontario's eHealth Blueprint. eHealth Ontario.

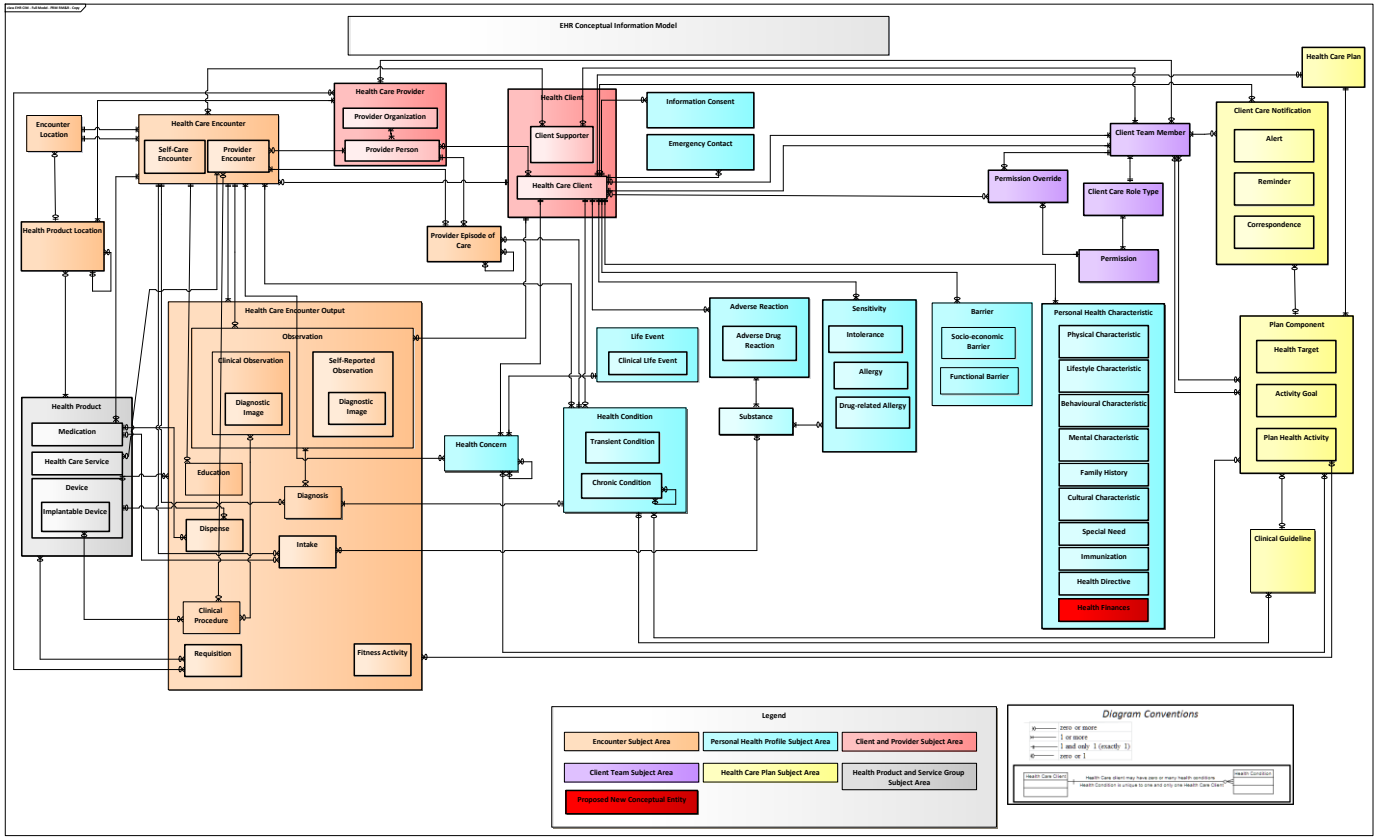


Figure 24 - Conceptual Information Model Diagram

Fig24.pdf

6.6 INFORMATION RESOURCE MODEL

The Information Resource Model consists of Information Resources (IRs) such as forms, notes, and reports that are commonly created, updated, and used by referral solution users in the referral business process. Each of these resources can be classified as one of three types:

1. Specific form or report templates, created by a health care provider or support organization, included in the Information Resource Model for forms analysis or as standard template for universal use. These are classified by reference to the generic information resources e.g. the 'Consultation Report (Template for Consulting Physician) - CFPC & RCPSC' standard form template is linked to the 'Referral' generic information resource. Included in this category are Ontario standardized form templates.

2. Generic form or report templates, to be used in the Business Framework generic process models.

3. A defining IR, a class member of the LOINC Document Ontology. These defining model elements are in the model to provide IRs with standardized definitions e.g. 'Consultation Note' with its standard definition, ' 'Generated by a physician or non-physician practitioner's (NPP) upon request for an opinion or advice from another physician or NPP. Consultations involve face-to-face time with the patient or telemedicine visits. A Consultation Note must be provided to the referring physician or NPP and include the reason for the referral, history of present illness, physical examination, and decision-making component (Assessment and Plan).''.

Figure 25 below further explains the components of the Information Resource Model. The complete IR model is given in Appendix Figure 1.

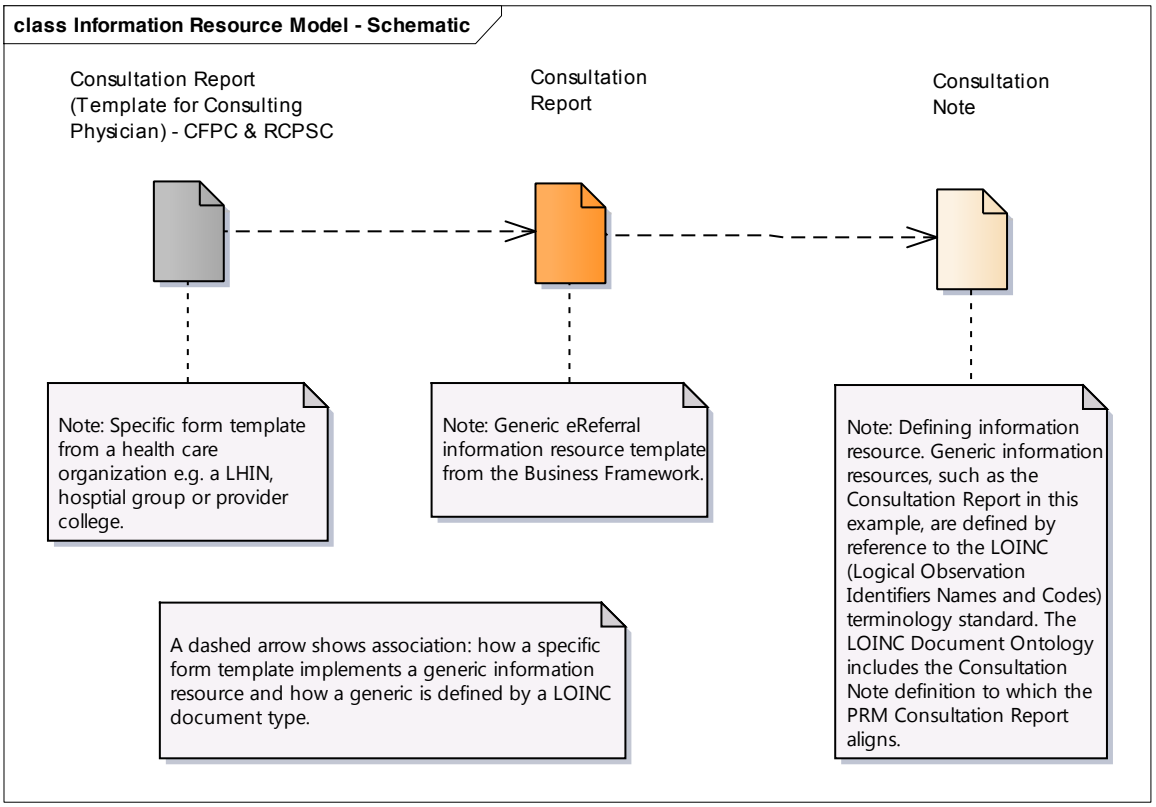


Figure 25 - eReferral PRM Information Resource Model Diagram: How do the elements fit together?

The appendix also contains Information Resource Mapping diagrams for each of the IR's in the PRM. These diagrams show the information content of the specific IRs by mapping each one with CIM entities. Figure 26 below is an example of this kind of diagram. In the example, the information content of the Potential Provider List IR is shown. This content includes the Health Care Provider, the Health Product and the Health Product Location.

Definition of the Potential Provider List IR: Set of eligible health care providers offering services needed to fulfill a referral request.

Definitions of the CIM entities:

- Health Care Provider: A person or an organization that provides health care or other health-related services or products.
- Health Product: Material (i.e. medication or devices), or a service, provided for the treatment, mitigation, cure or prevention of disease or injury.
- Health Product Location: A place at which health products are available. It is a geographic or virtual address of the place at which encounters have occurred, or may occur. It may also be temporary (e.g. flu shot clinic in a mall), mobile (e.g., ambulance, mobile lab), or in the field (e.g., car, accident site).

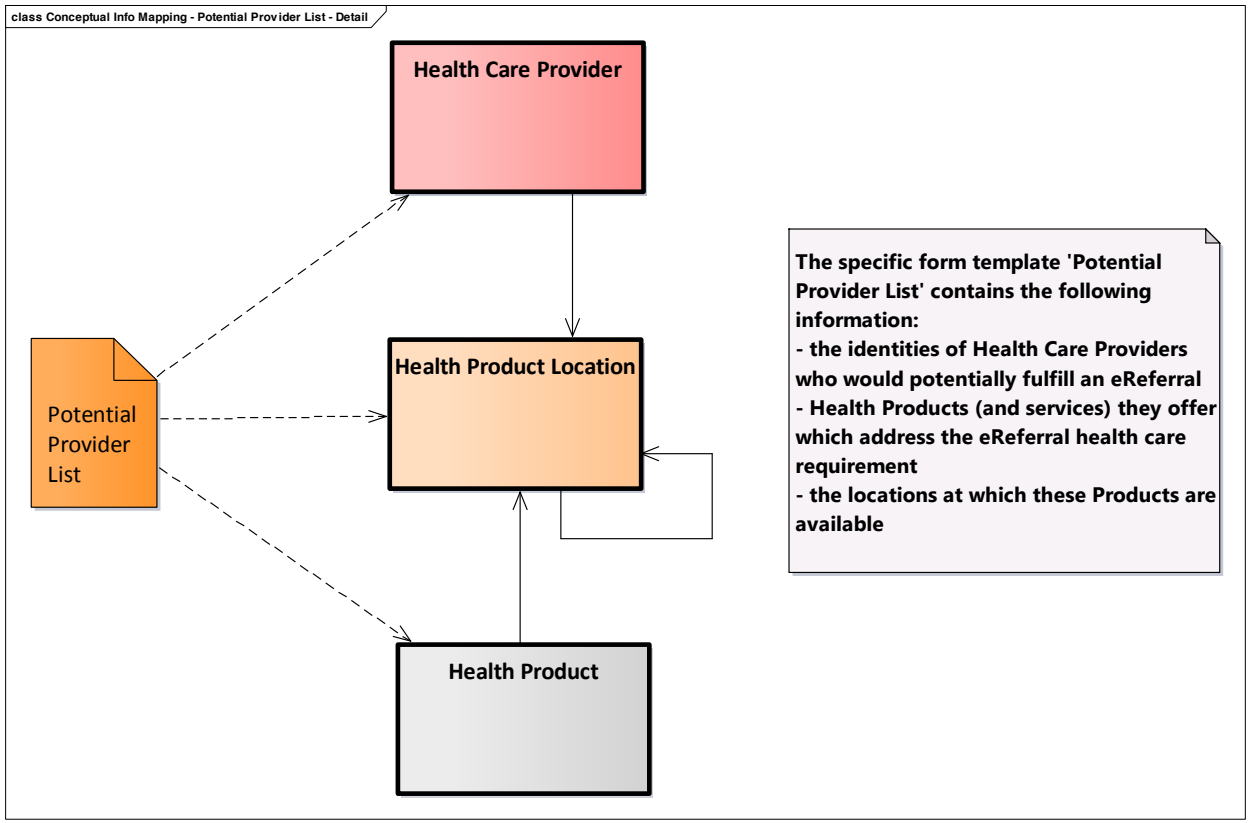


Figure 26 - eReferral PRM Information Resource Model CIM Mapping: What information do the Information Resources Contain?

	Acute Care to Rehab & Complex Continuing Care (CCC) Referral	CCAC Referral	Consent Directive	Consultation Report	Endocrinologist Referral Form	ENT Surgeon Referral Form	Needs Assessment	Palliative Care Common Referral Form - TCPCN	Pathology Report	Potential Provider List	Referral	& RCPSC
NToC Generic eConsult Process Model (See sect 3.3.1 fig 3)			X	X						X		X
NToC Generic Consult and eReferral Process Models (See sect 3.3.1 fig 4)			X	X			X			X		X
NToC End to End NToC Referral Process Model Example: Endocrinologist to Endocrinologist with Expanded Scope of Practice (See sect 3.3.2 fig 5)			X	X	X	X			X	X		X
ToC Generic Referral Process Model (See sect 3.4.1 fig 6)			X				X			X	X	
ToC End to End ToC Referral Process Model Example: Acute to Long Term Care (See sect 3.4.2 fig 7)	X		X				X				X	
SR Generic Referral Process Model – Patient Self-Referral (See sect 3.5.1 fig 8)			X							X	X	
SR End to End Patient Self-Referral Model Example: Mental Health and Addictions (See sect 3.5.2 fig 9)			X							X	X	

Table 9 - Information Resources – Business Processes

	Complex Continuing Care (CCC) Referral	CCAC Referral	Consent Directive	Consultation Report	Endocrinologist Referral Form	ENT Surgeon Referral Form	Needs Assessment	Palliative Care Common Referral Form - TCPCN	Pathology Report	Potential Provider List	Referral	for Referring Physician) - CFPC & RCPSC
Adverse Reaction							X					
Allergy		X						X				
Barrier							X					
Behavioral Characteristic	X											
Client Supporter		X						X				
Clinical Observation								X				
Clinical Procedure	X											
Cultural Characteristic	X	X						X				
Device	X											
Diagnosis	X	X						X				X
Dispense	X							X				
Encounter Location		X					X					
Family History								X				
Health Care Client	X		X									X
Health Care Encounter	X			X			X					
Health Care Provider		X	X				X	X		X		
Health Care Service	X			X				X				
Health Client	X	X		X			X	X				X
Health Concern	X			X			X					X
Health Condition	X			X			X	X				
Health Product							X			X		
Health Product Location	X						X			X		
Information Consent			X					X				
Life Event				X			X					
Lifestyle Characteristic	X							X				
Medication	X											X
Observation	X			X			X	X	X			X
Personal Health Characteristic				X			X					
Plan Component	X			X			X	X				X
Provider Episode of Care	X						X					X
Provider Person	X			X				X				X
Requisition	X	X			X	X		X			X	
Sensitivity							X					
Special Need		X						X				
Substance							X					

Table 10 - Information Resources – CIM Matrix

6.6.1 INFORMATION RESOURCE DEVELOPMENT APPROACH

During the development of the Information Resource Model, over 40 referral forms and reports were gathered from the province and entered in the Information Resource Model. These covered assessments, referral requests, consultation reports, etc. Their content was analyzed and defined by mapping to the CIM. A matrix of relationships between these Information Resources and the CIM are highlighted in Table 10 - Information Resources – CIM Matrix.

The following steps were taken:

- The LOINC Document Ontology was entered in the Information Resource Model as a 'dictionary' resource, making it available for defining referral IRs.
- Provincial standard form types for referral requests were identified through collaboration with referring health care organizations around the province and entered in the Information Resource Model. Their content was analyzed and defined by mapping them to the CIM. An Information Content Diagram shows the information on each form and report included in Release 1 (see Appendix Figure 1 through Appendix Figure 9). Linkages from the forms and reports point to CIM information entities describing the content.
- Generic form and report types were established through business process analysis and entered in the Information Resource Model. They were given standard definitions by mapping them to the LOINC Document Ontology.
- Specific form and report types were related to the Generic forms and reports. Specific forms and reports could and often did have content covering more than one generic type.

This development approach shows the scope of information covered by each eReferral form and report and helps in understanding its role in referral processes, particularly in understanding and resolving issues of information complexity and privacy sensitivity.

Information resources from the IRM are used in business process use case diagrams, and may be used in any other kind of business diagram, with the assurance that an information resource represents a consistent definition and content defined in terms of the CIM, and reused instead of reinvented each time they are needed.

6.6.2 USING THE INFORMATION FRAMEWORK

The Information Framework is an architectural supplement to be used during local referral solution acquisition, development and integration. The typical result of any usage of the Information Framework is expected to be a fully developed set of information requirements and specifications at a logical level of abstraction. These requirements should be incorporated into a Request for Proposal (RFP) document inviting proposals for suitable referral solutions in a local jurisdiction. Likewise if the Delivery Partner is contemplating in-house development, project definition should include these requirements.

Delivery partners should assess their current information landscape, including the capabilities of the organizations they serve to govern, manage, and use electronic information. As well, delivery partners should conduct a gap

analysis to determine the information architecture and implementation plan for an eReferral solution in their jurisdiction. It may be necessary to supplement the Information Framework with local information content. This includes creating a copy of the Information Resource Model for the jurisdiction. Information Content Mapping diagrams for each Information Resource will also help show the content of in-scope Information Resources.

eReferral PRM readers should consider the following activities when planning to use the Information Framework:

- Assess the current information landscape, including the capabilities and maturity of their client organizations to govern, manage, and use electronic information.
- Assess the extent to which referral business processes align with the Business Framework, noting gaps for focused attention.
- Conduct a gap analysis between local requirements and the Information Framework to determine the information architecture and implementation plan for a local referral solution.
- To promote interoperability, consider leveraging PRM provincial standard forms and reports, informatics standards and infrastructure.
- Create new forms, notes and reports as required by local needs.
- Create a Conceptual Information Model and a Logical Data Model based on the Information Framework models and incorporating any changes addressing local needs.
- Consider how data quality will be managed in the new solution.
- Consider secondary use (i.e. business intelligence) requirements in the new solution.
- Using the IRM, CIM and LDM, estimate implementation workload, complexity, issues and risks, and volumetrics and workloads.
- Compose an RFP including the models created.

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6.7 LOGICAL DATA MODEL

The Logical Data Model (LDM) has been included in the Information Framework to consolidate data requirements at a logical level of detail. The LDM also acts as a bridge between the CIM and provincial eReferral standard. It follows the entity-relationship (ER) modelling convention.

The LDM represents in-scope business entities, their relationships and their attributes, and outlines data requirements and needs in support of in-scope business activities in as much detail as necessary without any regard to physical implementation environment or performance. This model includes the following elements:

Logical Data Entity: a package of data associated with a physical object (person, place or thing), an event, or a concept that is important to the eHealth organization.

- Examples include: Health Care Client, Health Care Encounter, and Adverse Reaction.

Logical Data Attribute: a descriptor, characteristic, or property of a logical data entity.

- The attributes of an entity represent the information kept about the entity, which can include field level data or unstructured content objects, such as passages of text or multimedia objects.

Logical Relationship: a meaningful association between two entities defining the business rules about the association.

- These can be thought of as the verbs linking two or more nouns. For example: a Health Care Client participates in a Health Care Encounter or a Health Care Client has an Adverse Reaction.

6.7.1 LOGICAL DEVELOPMENT MODEL APPROACH

Since HL7 does not recognize eReferral as a domain, no HL7 Domain Message Information Model (DMIM) exists for the referral area. The LDM was created through an analysis of over twenty HL7 Refined Message Information Models (RMIMs) that were developed for the eReferral Informatics Standard. In HL7 V3 modelling, RMIMs are developed from the HL7 Reference Information Model (RIM) for a related group of messages. They are an intermediate model used to define physical Hierarchical Message Definitions (HRM); because of this, and to facilitate model linkage between frameworks, a Logical Data Model was created. The following factors went into the development approach:

1. Model entities and attributes were established by a reverse engineering process.
2. Query RMIMs and Common Message Element Types were not included.
3. Plain language datanames, echoing the datanames in the eReferral Standard message models, were used as much as possible.

The LDM is a storage model describing a clinical data repository and associated metadata, therefore it does not comprehensively cover detailed field-level health information documented in the Clinical Document Architecture standard and stored in a Clinical Data Repository. As such, it is a Logical Data Model, not a Logical Information

Model. Logical and physical models for detailed clinical information are found in section 7.0 The Ontario eReferral Standard, which defines informatics standards, including terminology.

The LDM defines data used to store, categorize and index documents contributing to eReferral activity. The LDM data dictionary is in appendix section 4.2 Conceptual Information Model Data Dictionary .

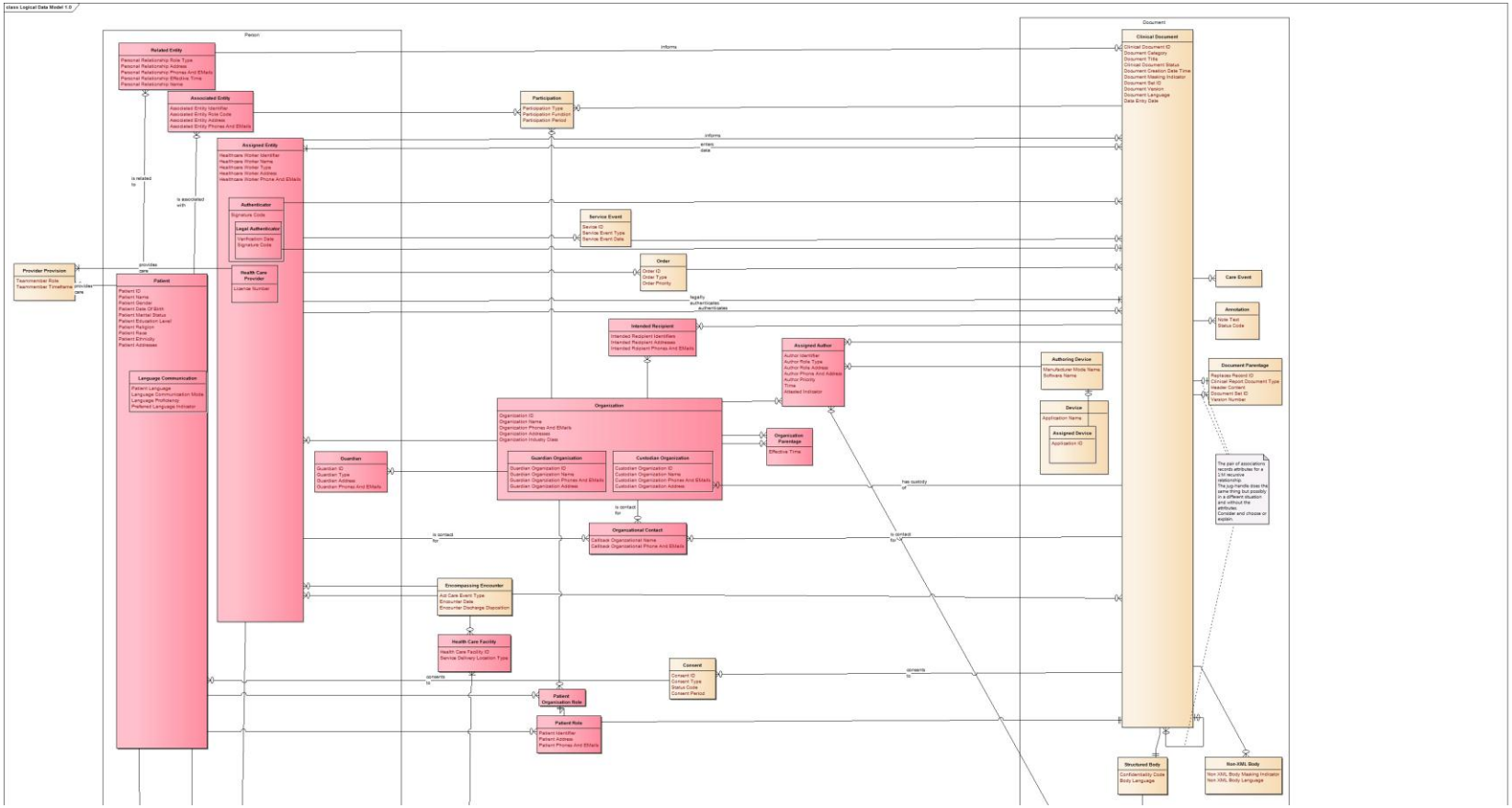

Figure 27- eReferral Logical Data Model Part 1 of 2

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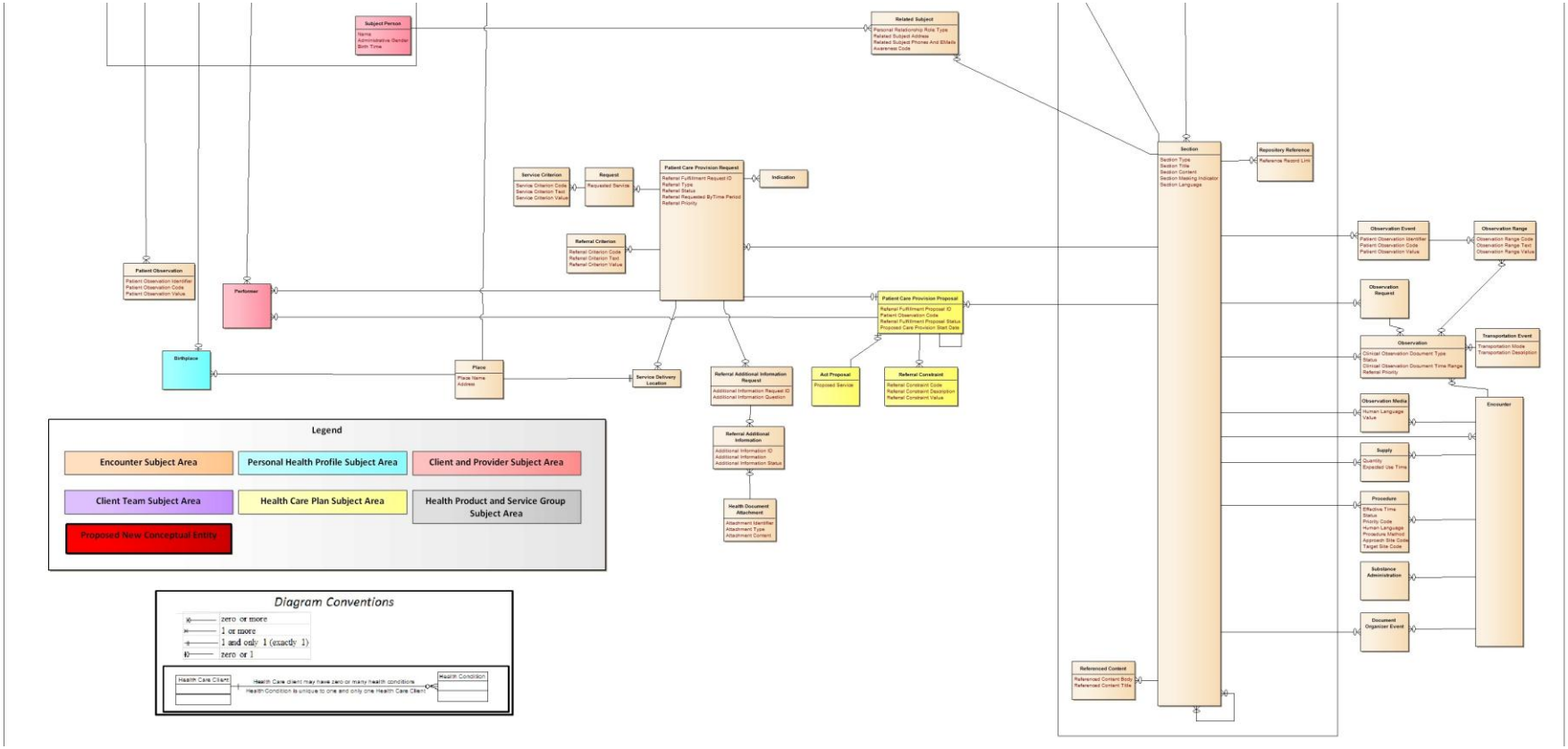


Figure 28 - eReferral Logical Data Model Part 2 of 2

Fig28.pdf

7.0 THE ONTARIO EREFERRAL STANDARD

7.1 PURPOSE

The purpose of this section of the PRM is to describe the provincial eReferral Standard and how to use it to create interoperability between existing systems from data flow perspective or to prepare for future acquisition / development of eReferral Solutions.

The Provincial eReferral Standard is designed to enable seamless sharing of appropriate information between healthcare providers within an eReferral ecosystem. The standard is needed to support the management of automated referrals across two or more systems. The standard provides a common language across multiple systems, allowing the core data needed to describe the health care client and their situation (identified in the eReferral Information Framework, section 4) to be understood by all. It also prescribes how systems should communicate to each other for initiating the exchange of referral data, acknowledging the receipt of this data and for negotiating any additional data needs across the entire referral business process (described in the Business Framework, section 3.0).

This standard, developed in 2010 through extensive consultation across the Ontario health sector, offers a single provincial specification that all systems can adhere to. This can reduce the time to achieve interoperability between systems in an eReferral ecosystem. This section provides an overview of the eReferral Standards Implementation Guide (iGUIDE), which:

1. Explains key concepts for understanding the standard.
2. Highlights the scope and business model that underlies the standard's components.
3. Describes how information is represented when it is exchanged and the role of the Clinical Document Architecture (CDA) in formatting the data for exchanging referral reports.
4. Illustrates the types of interactions that can occur throughout the lifecycle of a referral (the static model) and the data exchange messages that support these interactions (the dynamic models).

Work is underway to update the eReferral implementation guide to align it with relevant HL7 Consolidated Clinical Document Architecture (C-CDA) templates and the Ontario CDA Header standard. Specifically, the Referral Request and Consult Report static models (payloads) will be re-modeled so that they are CDA R2 conformant and constrained for the Ontario domain. The updated implementation guide is expected to be available in early 2016. Please contact architecture@ehealthontario.on.ca with questions and/or for further guidance regarding the changes that will be made.

Figure 29 below illustrates the relationships between the PRM frameworks and the components of the standard.

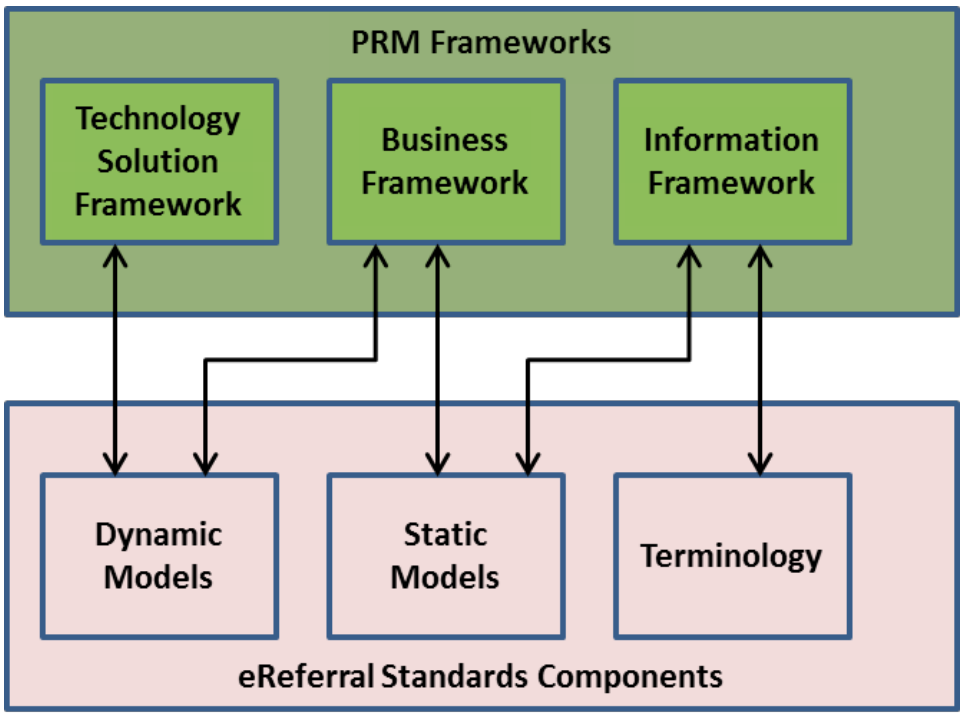


Figure 29 - PRM– eReferral Standards Relationship

7.2 DRIVERS FOR UPDATING THE 2010 EREFERRAL STANDARD

Currently, most referrals in Ontario are standalone, whereby both the Referral Source and Referral Destination generate, manage and close the referral within the same system. The need to bring semantic interoperability to these isolated referral solutions is one of the driving forces behind development of Ontario Referral Standard. Examples of this are the TC LHIN Strata Pathways solution, the OACCAC CHRIS application, and the WW LHIN Caredove application. The major drivers for updating the standard were to allow for:

- Change of integration emphasis from workflow to Health Information Exchange (HIE).
- Change of focus from data driven workflow to documents (via HIE) informing circle of care.

Figure 30 below illustrates the placement of the eReferral Solution in the context of the Ontario eHealth Blueprint, as both a contributor and consumer of electronic health records stored in, and retrieved from sharable Clinical Data Repositories (CDRs). The focus of this diagram is to show the need for interoperability for the purpose of the transfer of documents rather than for workflow / transactional interoperability. The main features of this diagram are the:

- *Referral Service* - also depicted as the Referral Solution. This service accepts and/or facilitates the composition/creation of referral request data content, and manages the end-to-end lifecycle of a

referral. The Referral Solution has the capability to receive and store referral/consultation reports, as well as facility to share reports with external systems.

- *CDR (Clinical Data Repository)* - identified in the Ontario Ontario's EHR Connectivity Strategy as jurisdictional and/or provincial repositories for HIE; including exchange/sharing of referral/consultation reports from Referral Solutions.

- *CDA (Clinical Document Architecture)*– recognized internationally, nationally, and provincially as the de-facto standard and format for exchanging clinical reports/documents in the health system.

Of note in the eHealth Blueprint is the separation of the Referral Solution - with its own repository to maintain the referral object - from the CDR information exchange domain. This separation of repositories, together with the emphasis on CDA information exchange paradigm are touched upon later in this section to drive out how the Provincial eReferral Standard is able to guide Referral Solutions in the information exchange domain in Ontario.

The nature of the referral process may call for a referral to be accompanied by an extraordinary amount of a health care client's clinical information for the consumption of the 'referred-to' provider. The CDA format for enabling information exchange offers significant strengths over other record formats (HL7 v2x), including:

- Wholeness of the information carried by the CDA document;

- Provision for the document to be authenticated (legally and otherwise);

- Vendor uptake and CDA market penetration in North America as attested by projects using CDA (e.g. US Meaningful Use, EHR4CR, Ontario projects);

- The Presentation of information in readable form;

- Allowance for external referencing of pertinent documents, including lab results, diagnostic imaging and assessment results.

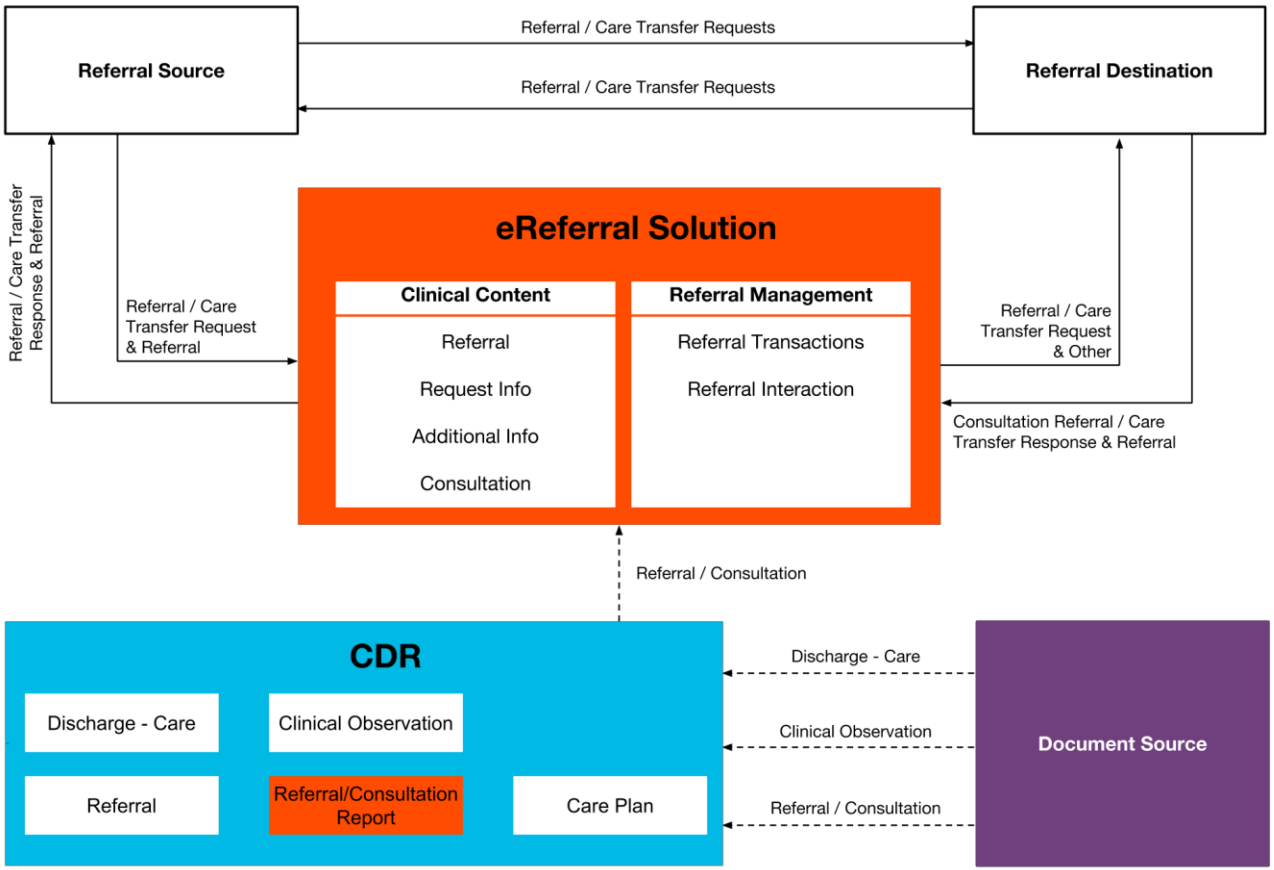


Figure 30 - Referral Solution-CDR/CDA Context Model

7.3 EREFERRAL INTEROPERABILITY MODELS

The referral interoperability model diagram, Figure 31, provides an additional perspective on how the eReferral ecosystem will work to the one provided in Section 4.5. Rather than focusing on the systems that can support

care for a health care client. As such, the interactions illustrate five possible scenarios of Referral Sources and Referral Destinations interacting.

1. Referral Source and Referral Destination directly connected to the eReferral solution (i.e. a standalone eReferral solution).

2. Referral Source uses the eReferral Solution directly and the Referral Destination uses a PoS system.

3. Referral Source uses the POS and the Referral Destination uses the eReferral Solution directly.

4. eReferral Solution A interacts directly with Referral Solution B [15].

[15] A fifth scenario would be a point-to-point' interaction between the referral source and referral destination. Although the standards support this scenario as well, it is assumed that an eReferral Service-brokered technology solution is the future direction of Ontario-based initiatives for referrals.

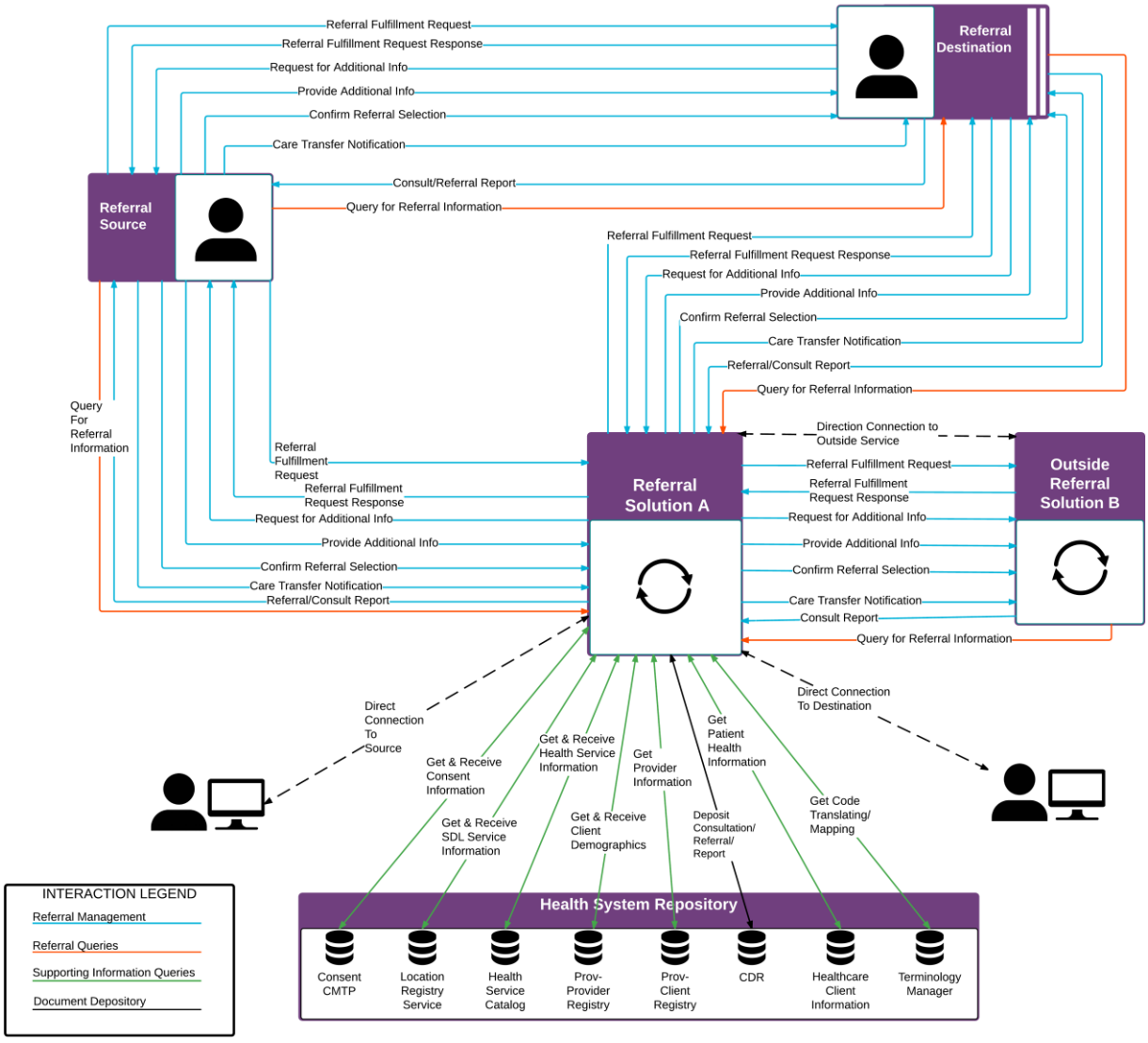


Figure 31 - Referral Interoperability Model

7.4 EREFERRAL STANDARD – TECHNICAL ARTEFACTS OVERVIEW

The eReferral Standard primarily concerns itself with facilitating interoperability between the two ends of the referral process (referral source and referral destination), including the semantic interoperability of the information exchanged.

There are three major components of the eReferral Standard, namely: Static Models (Data Content Standards), Dynamic Models (Messaging Standards) and Terminology (Semantic Interoperability Standards).

7.4.1 STATIC MODELS

In the Standard definition and specification domain, this is known as 'Payload' Model standard. It comprises standardized minimum data sets (MDSs) specified to initiate and manage the referral lifecycle; along with the report required to be shared with the Referral Source on the outcome of the referral request. The Static Models are categorized by the role played in the referral cycle as follows:

Referral Request/Initiation Information Model

- Overall information for initiating the request service for the health care client.
- Primary information for specifying some criteria and constraints (to be taken into account by the Referral Destination) for the service being requested.
- Includes health care client previous and ongoing medical care information, as well as social and demographic information as necessary.

Referral Management Information Models

These are intermediary information (content) models that may be exchanged as part of the dialogue between the referral source and referral destination; separate from the referral initiation content and the referral service completion report. Examples include:

- Information accompanying an "Accept" response, such as:
  - Proposed service and constraints (e.g. wait time, service start date, etc.).
  - Referral Request unique identifier that may be assigned by the Referral Solution, to be used for subsequent communication between Referral Source and Destination.
- Additional Information sent from Referral Source to Referral Destination as a response to a request from the Referral Destination.
  - Following the comprehensive document marshalled by the eReferral Source to initiate the referral request, this is extra or missing information that the Referral Destination requires to help in making an 'accept/decline' decision on the referral request. Depending on the extent of the

additional information requested, the Referral Source may decide to issue a revised document to replace the original referral request document.

Consultation Report Information Model

- Content of the final report sent back to the Referral Source and/or external CDR – this typically 'closes' a non-transfer of care scenario.
- Information content comprises full complement of what the CDA structure allows in a clinical document report, including:
  - Specifics of the service rendered
  - Tests ordered/results
  - Observations made
  - Other pertinent clinical information, including references to external documents and links.

The table below describes the nine information models defined as the information exchange component of the Provincial eReferral Standards. The content of each of these individual information models is fully specified in the eReferral IGUIDE.

Static Model Information Category	eReferral Standard Static Model (Payload Data Content)	Description
Referral Request/Initiation Information Model	**Referral Record**	Used to capture information about a referral, primarily information for requesting the fulfillment of a referral request, includes standardized pathway-specific form-based inputs.
Referral Management Information Model	**Accept Referral**	Used by the referral destination to signify acceptance to fulfill the referral request; may carry unique identifier assigned by a n Referral Solution, and may also carry conditional acceptance information such as waitlist period.
	Referral List Query	Specifies filters to apply when retrieving summary information about referrals.
	Referral List	Used to display summary-level information about a referral.
	Referral Detail Query	Specifies filters to apply when retrieving detailed information about one or more specifically identified clinical records (e.g. referrals, discharge summaries, encounters, etc.
	Referral Detail	Used to display/provide full details about a referral, including link to a previous referral that has been replaced, as well as additional information that has subsequently provided as an addendum to the original referral.
	Referral Additional Information	Used to capture information and questions that a referral

	Request/Response	destination wishes to request of the referral source to help the referral destination make 'accept/refuse' decisions regarding the referral request.
	Referral Additional Information	Used to capture both information and responses that a referral source wishes to provide to the referral destination(s) either unsolicited or as response to a specific request from a referral destination.
Consultation Report Information Model	**Clinical Observation Document Record**	Used to capture information about a clinical observation document containing a report provided upon a referral having been fulfilled/completed.

Table 11- eReferral Standard Information Exchange Components

7.4.2 DYNAMIC MODELS

The 'Transactional/Messaging' Model standard is a dynamic model that describes the business triggers, the exchange of referral information with another provider, and the expectations of the Referral Destination. These standardized exchanges and communications constitute 'Messaging Standards', and are categorized by the role played in the referral cycle, as follows:

Referral Initiation Transaction

- Referral Request/Response that initiates the referral workflow.
- The Referral Source uses the 'Referral Fulfillment Request' interaction/message to send a request to the Referral Destination, via the eReferral Solution.
- The message carries the Referral Record (the payload), describing the requested service, including constraints of the request and other relevant medical information about the health care client.

Referral Management Transactions

- These are intermediary transactions (message) models that may be used to invoke extended dialogue between the Referral Destination and the Referral Source to a natural conclusion of the referral life-cycle; ending in the completion or cancellation of the referral. Examples include:
  - Cancel Referral Fulfillment Request Notification;
  - Referral Destination using the 'Accept Referral Fulfillment Request' response message to respond positively to the Referral Source;
  - Referral Destination using the 'Reject Referral Fulfillment Request' response message to respond negatively to the Referral Source;
  - Referral Source using the 'Cancel Referral Fulfillment Request Notification' message to withdraw the request.

Referral Reporting Transaction

- Referral Destination using the 'Clinical Document Report Notification' to send a report of the completed consultation/referral service back to the Referral Source and possibly, all other parties identified as co-recipients of the report (typically, the health care client's care team).

The table below describes the eleven 'Request/Response' and 'Notification' transactions in the transactional / messaging component of the Provincial eReferral Standards. The complete specifications for each of these is provided in the provincial eReferral iGUIDE.

Transactional Category of Dynamic Model	eReferral Standard Dynamic Model (Transaction/Interaction)	Description	Static Model (payload) used in the Dynamic Model
Referral Initiation Transaction	Referral Fulfillment Request/Response	A request from a referral source to a referral destination indicating a referral source is seeking to fulfill a referral.	**Request:** Referral Record **Response:** Accept: Accept Referral Refused: Order ID
Referral Management Transaction	Provide Info for Referral Fulfillment Notification	This interaction allows a provider to send additional information for a referral fulfillment to a Referral Destination(s) as either an unsolicited, or as response to a request. The same transaction is used for requests.	Referral Additional Info
	Cancel Referral Fulfillment Request Notification	A notice from the referral source that it has cancelled the request for referral fulfillment (identified by the Order ID).	Order ID
	Revise Referral Fulfillment Request Notification	A notice from the referral source indicating that it has revised the request for referral fulfillment; that is, it is replacing the original referral request with a new one.	Referral Record
	Referral Selection Confirmation	A notice from the referral source to a referral solution that it has selected a provider for fulfilling a referral request.	Referral Record
	Accept Referral Confirmation	A referral destination after receiving the confirmation that it has been selected (via *Referral Selection Confirmation* transaction), it sends a notice to the referral solution indicating that it is still able to	Order ID

Transactional Category of Dynamic Model	eReferral Standard Dynamic Model (Transaction/Interaction)	Description	Static Model (payload) used in the Dynamic Model
		accommodate the referral request (identified by the Order ID).	
	Reject Referral Confirmation	A notice from a provider selected to be a referral service provider indicating that it is no longer able to fill that role.(Similar to the above transaction. However it is used for refusal of service.)	Order ID
	Referral Fulfillment Additional Information Request/Response	This transaction is used by a Referral Destination to request additional information in order to determine a response to a Referral Fulfillment Request. A series of questions is included in the request, and the response interaction provides responses to those the questions.	**Request:** Referral Additional Info Request **Response:** Accept: Referral Additional Info Refused: Order ID
	Provide Referral Fulfillment Additional Information	This transaction allows a provider to respond to a request for additional information pertaining to or a Referral Fulfillment already requested.	Referral Additional Info
	List Health care client Referral Summaries	Retrieves an overview list of referrals for a particular health care client, potentially filtered by time or other criteria.	**Query:** Referral List Query **Response:** Referral List
	Get Health care client Referral Details	Retrieves a specific referral record by ID.	**Query:** Referral Detail Query **Response:** Referral Detail
Referral Reporting Transaction	Clinical Document Report Notification	A notification for a consultation report that is sent from one provider to another.	Clinical Observation Document Record

Table 12 - eReferral Transactional Message Components

7.4.3 TERMINOLOGY

Terminology provides the facility for recording the common use and meaning of coded concepts that are used in documents and records in the health systems and other systems. A standard code set fosters common use and understanding of codes and is referred to as 'semantic Interoperability'. This is especially important for eReferrals where Referral Solutions may share their respective Referral/Consultation reports to local and/or the provincial CDRs. The eReferral Standards I-Guide has a separate companion document that addresses all aspects of semantic interoperability of eReferral information items, including health care client demographic data items. Below is a list, with a description and representative referral request data item for where clarity of terminology definition and use is crucial in the referral dialogue:

Referral Type

- *Description:* Codes identifying the general types of care or service categories requested in a referral
- *Example:* A referral to Community Mental Health & Addiction service

Referral Criterion

- *Description:* Codified information representing what a Referral Source believes may impact a Referral Destination's decision to accept or refuse the request.
- *Examples*:
  - Expected Length of Stay;
  - Cost of the Request;
  - Bed Accepted Date;
  - Expected Referral Response Time.

Service Criterion

- *Description:* Represents information that a Referral Destination believes may impact a Referral Source's consideration of care proposed by the Referral Destination.
- *Examples*:
  - Appointment Date and Time;
  - Time of Arrival at Facility;
  - Added to Waitlist Date.

It is important to note that there are specific rules for some formal code systems that are used, and terminology expertise and guidance should be sought to ensure appropriate application of terminology standards, including terminology set development, implementation, and maintenance of terminology sets and any associated mappings. Some organizations may choose to use terminology management systems to support use of terminology content, and expert advice should be sought in the selection, implementation, management and maintenance of such system.

For a complete list of eReferral Standards concept domains, codes, value sets, code systems and OIDs, please refer to eReferral Terminology Spreadsheet, a companion document of the eReferral I-Guide.

7.5 USE CASES

The following use case(s) is intended to illustrate how the eReferral Standard static and dynamic models, as well as terminology, would be used to integrate systems for both the non-transfer of care and transfer of care patterns. The following general messaging/interaction assumptions apply to the all use cases:

- Referral Fulfillment Request responses can only be directed to the original Referral Source. That is, for a 'Request/Response' interaction/message, the response (Accept unconditionally, Conditional acceptance, or outright Reject/Refuse/Decline) from Referral Destination(s) must be directed only to the immediate requester of the referral.
- The interaction diagram for each use case depicts the system-to-system communication/diagram to facilitate the completion of a specific business transaction. It excludes the work-flow activities that take place within specific business area or the internal activities within the Referral Source / Referral Destination's system.

7.5.1 END TO END NTOC REFERRAL PROCESS MODEL EXAMPLE: ENDOCRINOLOGIST TO ENDOCRINOLOGIST WITH EXPANDED SCOPE OF PRACTICE

The storyboard is based on the use case described in Table 3 of the Business Framework. From the interoperability perspective, the storyboard illustrates how the extended care team can be informed of changes and consultation results, and demonstrating the benefit of continuity and timeliness of the information. It highlights a chain of referrals - from source to destination, which, in turn, refer to another destination. The referral request to the first specialist spawns a subsequent chain of referrals amongst downstream specialists. It is also important to note that interoperability is necessary in order to keep the 'upstream' participants informed.

The following assumptions are made about this pattern:

- All of the specialists in this storyboard are utilizing an Electronic Medical Record (EMR) to send/receive information.
- All communication/interaction between providers (PCP – Family Physician, ENDO-A – Endocrinologist A, ENT Surgeon, ENDO-B – Endocrinologist B) pass through the Referral Solution (eRS).
- eRS is able to receive a single consultation note and distribute it to multiple providers as necessary.
- PCP is able to receive referral/consultation reports.
- ENDO-A is able to receive and send electronic referral, as well as receive reports.
- ENT Specialist is able to receive electronic referral, as well as receive reports.
- ENDO-B is able to receive and send electronic referral, as well as receive reports.
- Referral Fulfillment responses (Accept/Refuse) are only be directed to the original Referral Source.

Interaction Diagram

The story event and flow of events have both been described in Table 3 in the Business Framework. The interaction diagram in Figure 32 depicts the points in the business process of the NToC storyboard where there is a dialogue between two participants in the referral continuum with possible exchange of information. Each vertical ladder in the diagram depicts a unique actor in the storyboard that interacts with another actor. The eReferral Solution acts as the broker.

The business interactions between actors in the NToC E2E (Non-Transfer of Care - End-to-End storyboard) are depicted in the interaction diagram below. The message flows related to the transition between two activities is shown as a directed arrow between activities (e.g. 3b →4b).

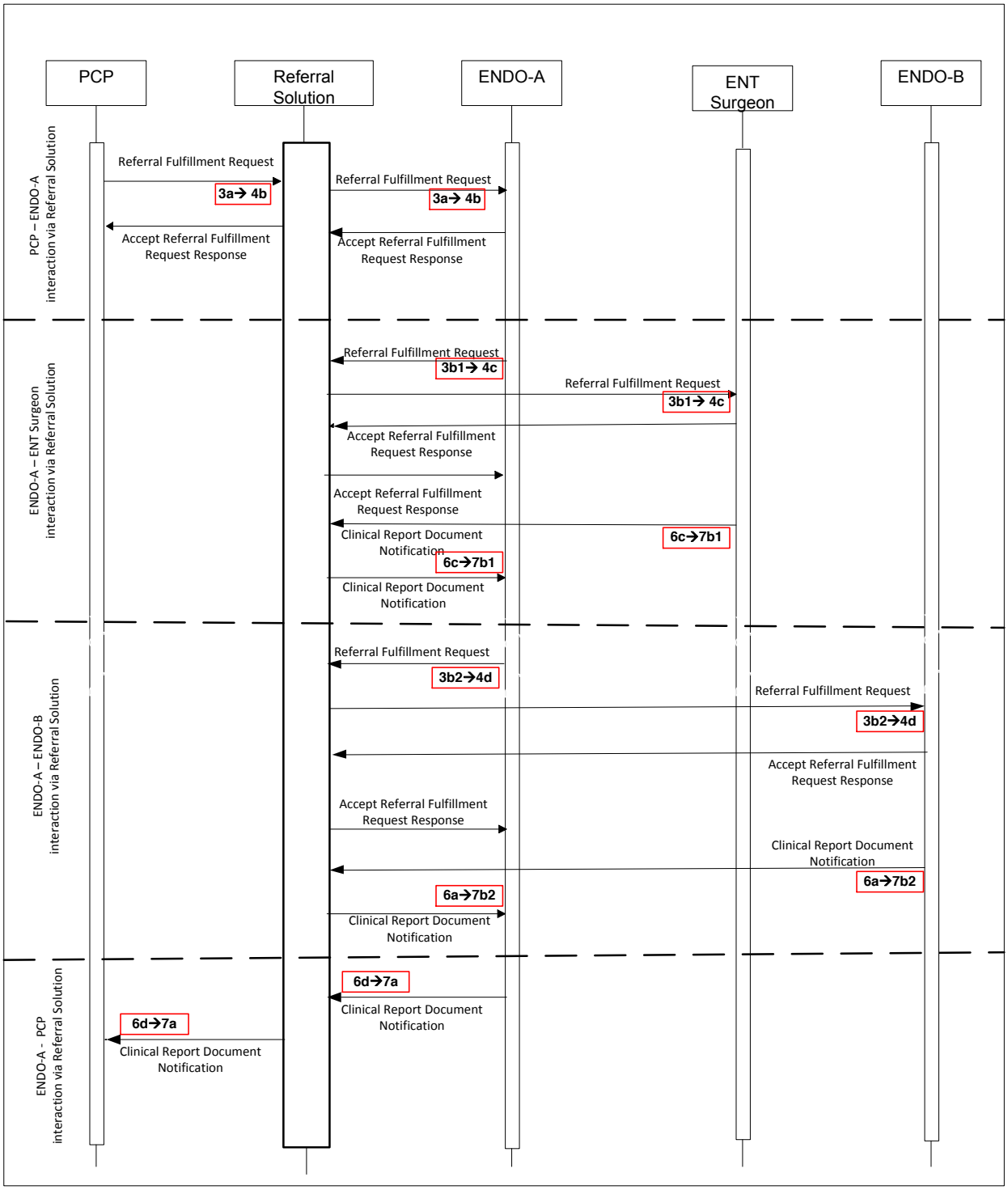


Figure 32 - PCP – eRS – ENDO-A – ENT – ENDO-B Chain of Referrals

Table 13 illustrates the standards components that would be relevant for each of the steps illustrated in the activity sequence of the Non Transfer of Care (NToC) end to end storyboard. The table indicates the use of 3 discrete dynamic models and 3 discrete static models to accomplish the dialogue and flow of information amongst the participants in the referral process.

Business Framework **Use Case 1 – Activity #**	**eHealth Standards Component**	
	Dynamic Model **(Interaction)**	**Static Model** **(Payload)**
3a → 4b	Referral Fulfillment Request	Referral Record
	Referral Fulfillment Additional Info Request	Accept Referral
3b1 → 4c	Referral Fulfillment Request	Referral Record
	Accept Referral Fulfillment Request Response	Accept Referral
6c → 7b1	Clinical Report Document Notification	Clinical Observation Document Record
3b2 → 4d	Referral Fulfillment Request	Referral Record
	Accept Referral Fulfillment Request Response	Accept Referral
6a → 7b2	Clinical Report Document Notification	Clinical Observation Document Record
6d → 7a	Clinical Report Document Notification	Clinical Observation Document Record

Table 13 - NToC – E2E - Business Process - eReferral Standards Interaction X-Ref

7.5.2 END TO END TOC REFERRAL PROCESS MODEL EXAMPLE: ACUTE TO LONG TERM CARE

As described in Table 7 of the Business Framework, this storyboard is about a transfer from acute to LTCH, initiated by a CCAC Case Manager, resulting in an extended dialogue between the CCAC and LTCHs. It illustrates the situation where the CCAC (as a eReferral Solution) is able to simultaneously fan out the same referral request to multiple LTCs.

Assumptions

- All communication/interaction between the Hospital and the LTCHs goes through CCAC, as the eReferral Solution.
- Hospital has the capability to send electronic referral.
- LTC has the capability to receive referral and send referral response.
- The eReferral Solution has the capability to send and receive electronic referral and response.
- The eReferral Solution has the ability to determine which LTCH the referral will be forwarded to.
- Referral from the CCAC is not a pass-through of the initial referral request from the Hospital; instead, it is a referral request crafted by the CCAC, which incorporates the original referral request.

Interaction Diagram

The Story Event and Flow Events have each been described in activity sequence in Table 7. The diagram below is an interaction diagram depicting the points in the business process of the ToC storyboard where there is a dialogue between 2 participants in the referral continuum with possible exchange of information. Each vertical ladder in the diagram depicts a unique actor in the storyboard that interacts with another actor. The Referral Solution acts as the mediator and can also be the source and destination of a referral.

The business interactions between actors in the ToC E2E (Transfer of Care - End-to-End storyboard) are depicted in the interaction diagram below, as a directed arrow between activities (e.g. 3b →4b).

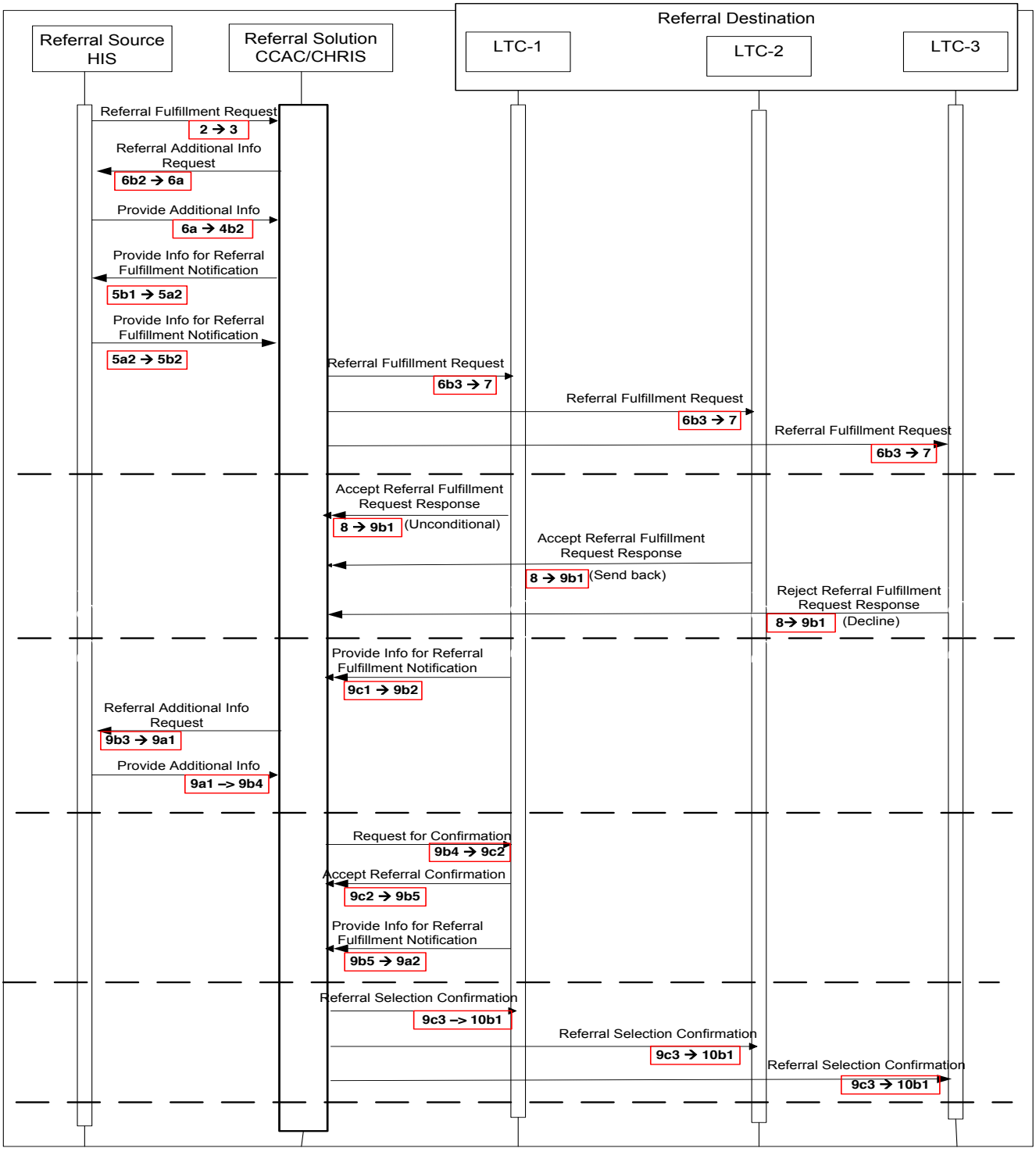


Figure 33 - ToC-E2E – Acute to Long Term Care Facility via CCAC

The following table illustrates the standards components that would be relevant for each of the steps illustrated in the activity sequence of the Transfer of Care (ToC) storyboard. The table indicates the use of three discrete dynamic models and three discrete static models to accomplish the dialogue and flow of information amongst the participants in the referral process.

TOC E2E Use Case Activity #	eHealth Standards Component	
	Dynamic Model (Interaction)	**Static Model (Payload)**
2 → 3	Referral Fulfillment Request	Referral Record
6b2 → 6a	Referral Fulfillment Additional Info Request	Referral Additional Information Request
6a → 4b2	Referral Fulfillment Additional Info Request	Referral Additional Information Request
5b1 → 5a2	Provide Info for Referral Fulfillment Notification	Referral Additional Info
5a2 → 5b2	Provide Info for Referral Fulfillment Notification	Referral Additional Info
6b3 → 7	Referral Fulfillment Request	Referral Record
8 → 9b1	Accept Referral Fulfillment Request Response	Accept Referral
8	Referral Fulfillment Additional Info Response	Referral Additional Info
8	Reject Referral Fulfillment Request Response	Order ID
9c1 → 9b2	Accept Referral Selection Confirmation Notification	Order ID
9b3 → 9a1	Referral Fulfillment Additional Info Request	Referral Additional Information Request

9a1 –> 9b4	Referral Fulfillment Additional Info Response	Referral Additional Info
9b4 → 9c2	N/A	N/A
9c2 → 9b5	Accept Referral Confirmation	Order ID
9b5 → 9a2	Provide Info for Referral Fulfillment Notification	Referral Additional Info
9c3 → 10b1	Referral Selection Confirmation Notification	Referral Record

Table 14- ToC-E2E – Business Process - eReferral Standards Interaction Traceability

7.6 EREFERRAL STANDARDS – GUIDANCE TO REFERRAL SOLUTIONS IN ONTARIO

As noted earlier, two of the drivers for revising the provincial eReferral standard are the need to align with industry direction with regards to the HL7 version 3 and CDA, and to support the move towards interoperable eReferral ecosystems. While it is not expected that the full standard will be utilized, each of the HL7 v3-based components of the eReferral Standard described above can be used to guide the approach to integration for existing and new Referral Solutions:

Leveraging eReferral Static Models (Information Content):

- With the significant shift to using the HL7 version3 Clinical Document Architecture (CDA) in the international, national and Ontario Health Information exchange domain, as the preferred structure and format for sharing clinical reports, it is recommended that the appropriate eReferral Standard Static Models be examined for guidance to the Referral Solutions in Ontario.
- Of the nine Provincial eReferral Standard Static Models (see **Error! Reference source not found.** – Referral Standard Information Exchange Components), the following are the two are prime candidates that lend themselves for possible leveraging by the prevailing and future Referral Solutions:
    - Referral Record (Referral Request information content)
    - Clinical Observation Document Record (Referral/Consultation Report information content))

Sending Consultation Reports to the Connecting Ontario CDR

- The Provincial eReferral Standard has defined an Ontario CDA compliant Consultation Report to be used in exchanging Referral Consultation Reports. This CDA can be sent to the Connecting Ontario CDR via the Connecting Ontario CDR input specification. There are constraints imposed on the CDA by this specification. The iGUIDE will provide specific guideline that would have to be adhered to, to foster interoperability between the consult report document creator and the CDR.

Leveraging eReferral Dynamic Models (Transaction/Messaging):

- Although it is desirable to use the provincial eReferral standards dynamic models, it is recognized that many initiatives will choose to use other data exchange methods. However, due to the extent and thoroughness of the provincial eReferral standards' dialogue, coupled with the extensive stakeholder approval process that was undertaken, with appropriate analysis these transactions can be used as a basis for specifying the full lifecycle of interactions of any other data exchange approach.

Leveraging eReferral Standard Terminology:

- Referral, being one of many types of requests clinical service for a health care client (others include: request for a medication to be dispensed to a health care client, laboratory test requisitions, etc.), the need for standardizing information used in the referral space will introduce terminology requirements currently addressed by the eReferral Standard Terminology process and artefact.
- The four ALC RM&R BTI approved referral request forms e.g. acute to CCCA, acute to LTC, have already introduced concepts that needed to be rationalized as coded concepts, requiring terminology work. The

move to the Physician-to-Specialist referral and consultation domain is bound to introduce another wave of referral information concepts that would require additional terminology effort.

7.8 REVISIONS TO THE 2015 EREFERRAL STANDARD

The 2010 eReferral standard has been revised to account for industry direction. The following is a summary of the major changes. A more detailed description will be included in the iGUIDE.

Referral Record - Static Model:

- Changes were made to accommodate the four ALC RMR&R BTI approved referral forms.
- Changes were made to ensure alignment with the eReferral Standard

Clinical Observation Document Record – Static Model:

- This report has been defined to be fully compliant with the eReferral Standard.
- This has also been specified to be fully compliant to the CDA Body as defined by CCDA and used widely by vendor applications to share clinical reports.
- The leveraging of the eReferral Standards information model will allow the existing Referral Solutions to produce/contribute Ontario CDA compliant Consultation / Referral Report destined for Community/Regional/Provincial CDRs for wider information sharing.

Transactions/Interactions – Dynamic Models

- Validate the list of eReferral transactions and interactions to ensure coverage for additional pathways introduced as part of the refresh, specifically 'Physician-to-Specialist' and 'Health care client Self-Referral' into the health system.

Despite the emphasis on the HL7 version 3 for the transactional aspect of the Provincial eReferral Standard, there are areas and components of the refreshed standard that offer guidance to the Referral Solution base in Ontario. These areas of guidance are detailed out in this section of the PRM , and are summarized below as follows:

- Providing terminology guidance for fostering semantic interoperability for referral information items throughout Ontario Referral Solutions.
- Possible Referral Solution integration with external systems (e.g. EMRs, other Referral Solutions).
- Rendering of CDA compliant Request and Report documents even when the Referral Solution is not capable of consuming CDA formatted XML external record as input for referral initiation.
- Allowing Referral Solutions to create and provide Ontario CDA compliant referral/consultation report for consumption by external CDRs (Community/Jurisdictional/Provincial).

7.9 CONCLUSION: RELATIONSHIP BETWEEN THE STANDARD & OTHER PRM FRAMEWORKS

The PRM has described many of the business, technology solution, privacy, security, and information considerations to support an eReferral ecosystem. The provincial eReferral standard adds flexibility in deploying an

ecosystem but specifying how these considerations can be supported in an environment of multiple distinct systems. The table below illustrates the relationships between Standards Framework and many of the concepts that have been introduced by the other PRM Frameworks throughout this document:

Provincial Reference Model (PRM) Framework/Component		**Provincial eReferral Standard Artefact/Component**
Framework	**Component**	**Standard Artefact/Component**
Business Framework	The Business Process Model describes the workflow that occurs at each of the role-participants (actors), as well as the interaction between the actors to accomplish the process of the health care client's referral process.	The eReferral Standard defines the information that needs to be exchanged between one actor (referral source) and another (referral destination), from referral initiation, through intermediary communication processes to the fulfillment of the referral request.
	Gathers necessary information, decide/select potential referral destination provider(s) – organization/person	Static / Dynamic / Terminology: - Part of scenarios - Informs referral participants and end points - Informs specification of triggers
	Shows the Communication/Dialogue between referral source and referral destination (primarily exchanging of information) during the life cycle of the referral process	Dynamic/Transaction Model: - Defines Trigger Event & Receiver Responsibility - Interactions (along with possible information payload accompanying the interaction) - Interaction Type: Request/Response, Notification, Query/Response
Technology Solution Framework	Recommends eReferral Solution as a referral broker and possibly, referral repository	Dynamic/Transaction Model: This is the system-to-system (S2S) referral setup that has been described by the Provincial eReferral Standard.
	Point-To-Point Referral setup is not supported architecturally	Dynamic/Transaction Model: - Though not explicitly defined by the eReferral Standards, a limited set of the transaction/interactions defined in the Standard will allow for a point-to-point referral dialogue, with a prior agreed upon understanding by the trading partners
Privacy & Security	Provides Role-based Access	Static Model / Dynamic Model: Clear identification of participant roles that enable logging of who

Provincial Reference Model (PRM) Framework/Component		Provincial eReferral Standard Artefact/Component
Framework	**Component**	**Standard Artefact/Component**
Framework		is able to do what, in the referral continuum.
	Health care client Consent Directives:	Static Model: Classes/Attributes/conformance specifications that provide facility for the enforcement of general health care client consent directives, as well as detail level masking of records/data elements at the health care client's discretion
Information Framework	Conceptual Information Model (CIM) Logical Information Model	The eReferral Standard defines the shareable /transmittable pieces of referral information. These informational items constitute the logical and physical instances of the referral information in the Ontario EHR CIM (Conceptual Information Model). The properties of these informational items include: - classes/groupings - attributes - vocabulary of the coded items - conformance and multiplicity of the items
	Structures the information to be exchanged between the source and the destination	Static Model: - Referral Minimum Dataset (MDS) - Clinical Document Structure (CDA)
	Ensures readability and comprehension of information being exchanged	Static Model: - Referral Initiation information record - Referral Fulfillment completion information record (specifically, Consultation/Referral Report) Terminology: - Common meaning and use of coded concepts as widely understood universally, Canada wide, or more importantly, Ontario wide

Table 15 - Standards and PRM Framework Components

APPENDIX

ACRYONYMS

ACRONYM	FULL TEXT	DEFINITION
AA	Application Architect	Designer of applications and how they cooperate, promoting common presentation standards to facilitate rapid training and implementation of new applications and functions.
ADT specification	Admission, Discharge and Transfer specification	System used to track a health care client's hospital bed use from admission to discharge. The system facilitates tracking of client location and encounters.HL7 Version 3 Standard: Patient Administration also known as ADT - Admit, Discharge, and Transfer.
AODA	Accessibility for Ontarians with Disability Act, 2005	Ontario legislation to develop, implement and enforce accessibility standards to achieve accessibility for Ontarians with disabilities with respect to goods, services, facilities, accommodation, employment, buildings, structures and premises on or before January 1, 2025. It also provides for the involvement of persons with disabilities, of the Government of Ontario and of representatives of industries and of various sectors of the economy in the development of accessibility standards.
APO	Architecture Program Office	The Architecture Program Office is a shared service within the agency and province, responsible for Architecture, Standards and Planning Program Management including service request intake and triage, reporting, project prioritization, business, technical and strategic governance and stakeholder communication and engagement.
ARMs	Ambulatory Referral Management	The Ambulatory Referral Management (ARM) system, a local eReferral system developed in 2006 by Sick Kids hospital in Toronto, was integrated in 2012 into the Electronic Child Health Network (eCHN), a paediatric patient information portal.
BASE	Building Access to Specialists through E-Consultation	An E-Consultation collaborative pilot project between a University of Ottawa academic research team and the Champlain LHIN; it is designed to enable primary care physicians to submit a question to a specialist, through a secure web-based service, along with supplementary laboratory results, digital images, and/or health history.
BPMN	Business Process Modelling Notation	Graphical representation for specifying business processes in a business process model.
BTI	Business Transformation Initiative	The ALC RM&R Business Transformation Initiative involves standardizing terminology, forms and cluster referral processes across the province.
CCAC	Community Care Access Centre	Community Care Access Centres (CCACs) are local agencies that provide information about care options in your area. They help people to:

ACRONYM	FULL TEXT	DEFINITION
		•live independently at home •apply for admission to a day program, supportive housing or assisted living program, or certain chronic care or rehabilitation facilities •apply for admission to a long-term care home.
CCC	Complex Continuing Care	In Ontario, the term "complex continuing care" (CCC) is used interchangeably with "chronic care". Complex continuing care provides continuing, medically complex and specialized services to both young and old, sometimes over extended periods of time. CCC is provided in hospitals for people who have long-term illnesses or disabilities typically requiring skilled, technology-based care not available at home or in long-term care facilities. CCC provides patients with room, board and other necessities in addition to medical care.
CCeH	Continuing Care e-Health	Formed in 2005, the Continuing Care e-Health Program was created to support seamlessly-integrated, community-based client care where all service providers can securely share and access consistent and accurate information electronically.
CDA	Clinical Document Architecture	Clinical document architecture is a standard for exchanging clinical documents between various health information technology systems and platforms. It is comprised of a header, which is consistent across all clinical documents, and a body containing human readable content.
CDIF	Clinical Document Information Framework	Terminology focused guidance for populating a CDA formatted Report (Header & Body).
CDR	Clinical Data Repository	An EHR repository that contains data not specific to clinical lines of business (i.e. labs, drugs, and diagnostic images).
CEO	Chief Executive Officer	The most senior corporate officer (executive) or administrator in charge of managing a for-profit organization. The CEO of a corporation or company typically reports to the board of directors and is charged with maximizing the value of the entity.
cGTA	Connecting Greater Toronto Area	Six LHINs encompassing the Greater Toronto Area and North Simcoe Muskoka.
CHRIS	Client Health and Related Information System	The Client Health and Related Information System (CHRIS) is a web-based patient management system for Ontario's CCACs that plays an integral role in enabling CCACs to provide quality care to patients. CHRIS gives CCAC staff access to patient information and care plan details from wherever they are working. This information is vital for ensuring safety and consistency in care delivery, and also enables quick responses to patient and provider queries.
CIM	Conceptual Information Model	Model representing an abstract view of the real world. It represents the human understanding of a system. It describes how relevant information is structured in the natural world. In other words, it is how system users are accustomed to thinking of the information.
CMTP	Consent Management Transaction	The main processing engine invoked by the consent interface to apply consent, allowing or blocking a transaction or masking its content.

ACRONYM	FULL TEXT	DEFINITION
	processing	
cNEO	Connecting North and Eastern Ontario	Four northern and eastern LHINs.
CPOE	Computerized physician order entry	Computerized physician order entry (CPOE) (also sometimes referred to as Computerized Provider Order Entry or Computerized Provider Order Management) is a process of electronic entry of medical practitioner instructions for the treatment of patients (particularly hospitalized patients) under his or her care.
CREMS	Community Referrals by EMS	Community Referrals by EMS (CREMS) Project has expanded LHIN-wide in the GTA.
cSWO	Connecting South Western Ontario	Four south west LHINs.
DI repository	Digital Image repository	Diagnostic imaging repositories contain health care client diagnostic imaging reports and digital images such as x-rays, MRIs, and ultrasounds. There are four diagnostic imaging repositories in Ontario (known as DI-Rs), each serving a different geographical area in the province.
DICOM	Digital Imaging and Communications in Medicine	Medical imaging generates vast amounts of data, using a very large array of imaging technologies. DICOM is the standard to create, store and transmit medical images and associated information between systems. The DICOM standard is comprehensive and defines all standards necessary to exchange images, including hardware specification, transport protocols, messages, content and document standards, and vocabulary and terminology sets.
DI-CS	Diagnostic Imaging (DI) Common Service	Diagnostic Imaging (DI) Common Service will enable the sharing and viewing of patients' diagnostic images and reports from across Ontario, to hospital and community-based health care providers anytime, anywhere.
DMIM	Domain Message Information Model	Model representing the totality of concepts embodied in a set of RMIMs needed to support the communication of a particular HL7 domain.
DPV	Drug Profile Viewer	eHealth Ontario hosted application allowing hospital Emergency Department staff to view drug history of patients; covered by the Ontario Drug Benefits Program (ODB).
EA	Sparx Enterprise Architect	Visual platform for designing and constructing software systems, for business process modeling, and for more generalized modeling purposes. It is based on the UML 2.4 specification. UML defines a visual language used to model a particular domain or system (either proposed or existing). It covers all aspects of the development cycle, providing traceability from the initial design phase through to deployment, maintenance, testing, and change control:http://www.sparxsystems.com/downloads/whitepapers/EAReviewersGuide.pdf

ACRONYM	FULL TEXT	DEFINITION
eCHN	Electronic Child Health Network	eCHN is Canada's first province-wide integrated electronic health record. It is a secure electronic network that enables authorized care providers across Ontario to access health information about paediatric patients, instantly, from many different sources.
EHR	electronic health record	The EHR is a secure and private lifetime record of a person's health history. The record is available electronically to authorized Ontario health care providers anywhere, anytime, in support of high quality care.
EHR Roadmap	Electronic Health Record Roadmap	A list of planned milestones that describes when components of the Blueprint are going to be available from eHealth Ontario and its partners.
EHR4CR	Electronic Health Records for Clinical Research	EHR4CR is one of the largest public-private partnerships aiming at providing adaptable, reusable and scalable solutions (tools and services) for reusing data from Electronic Health Record systems for Clinical Research. Electronic Health Record (EHR) data offer large opportunities for the advancement of medical research, the improvement of healthcare, and the enhancement of patient safety.
EHRS	Electronic Health Record Solution	Canada Health Infoway defines EHRS as "a combination of people, organizational entities, business processes, systems, technology and standards that interact and exchange clinical data to provide high quality and effective health care".
EMR	Electronic Medical Record	A partial health record under the custodianship of a health care provider(s) holding a portion of the relevant health information about a person over their lifetime. This is often described as a provider-centric or health organization-centric health record of a person. The EMR represents a point of service application used by providers in their practice management and patient care, for storage, retrieval and manipulation of (for example) patient health records, clinical encounter notes, medications, orders, test results and a cumulative patient profile.
EMS	Emergency Medical Services	Paramedic Services provides emergency ambulance service to the City of Toronto.
ER/ALC	Emergency Room / Alternative Level of Care	To support reductions in emergency room (ER) wait times, improve patient flow and inform decision making, better information on patients waiting in hospitals for alternate levels of care (ALC) is required.
ERD	Entity Relationship Diagram	Graphic presentation of an information or database design. Follows any of several diagraming conventions to depict semantic items such as entities, their attributes, and relationships between entities.
ERE	eReferral ecosystem	A collection of socio-technical actors – providers, patients and systems – involved within a bounded referral system.
eRS	electronic Referral Solution	eReferral Solution: A health information technology to automate the processes involved in referral initiation, receipt and tracking between referral requestors and (potential) health service providers.

ACRONYM	FULL TEXT	DEFINITION
FTP	File Transfer Protocol	A standard network protocol used to transfer computer files from one host to another host over a TCP-based network, such as the Internet.
GTA	Greater Toronto Area	Central LHIN: Includes a northern section of the City of Toronto, most of York Region and part of Simcoe County. Central East LHIN: Includes the eastern section of the City of Toronto (former City of Scarborough), Durham Region, Haliburton, Northumberland, Victoria County, and Peterborough. Central West LHIN: Includes all of Dufferin County, the northern portion of Peel Region, part of York Region, and a small part of the City of Toronto. Mississauga Halton LHIN: Includes a southwest portion of the City of Toronto, the south part of Peel Region, and all of Halton Region except for the City of Burlington. Toronto Central LHIN: Includes a large part of the City of Toronto.
GUI	Graphical User Interface	Application interface for users to perform actions by clicking on a visual screen, as opposed to typing commands on a line. GUIs feature the following components: a pointing device (e.g. mouse), icons, windows and menus.
HIC	Health Information Custodian	Any provider accessing the EHR is considered to be acting under the authority of a Health Information Custodian (HIC), as defined in legislation. The HIC could be a large organization (e.g. a hospital), or it could be a sole practitioner's clinic.
HIE	Health Information Exchange	Initiatives, in healthcare, that endeavors to provide virtual, real-time access to patients' health information. An example is Canada Health Infoway's Electronic Health Record Solution Blueprint.
HIS	Hospital Information System	Hospital information systems refer to application suites deployed institutionally. These suites are functionally rich and provide internal consistency, and the hospitals that run them are technically mature.
HIT	Health Information Technology	A 'marriage' between the clinical healthcare activities and computer science for the benefit of patients and those who provide healthcare services.
HL7	Health Level 7	Leading international standard for electronic interchange of healthcare information.
HL7 v3.0	Health Level Seven version 3	An HL7 standard supporting health care workflows. Development of version 3 started around 1995, resulting in an initial standard publication in 2005. The HL7 v3 standard, as opposed to HL7 version 2, is based on a formal methodology (the HDF – HL7 Development Framework) and object-oriented principles.
HMD	Hierarchical Message Description	Specification of the exact fields of a message and their grouping, sequence, optionality, and cardinality. An HMD can contain message types for one or more interactions or that represent one or more common message element types. This is the primary normative structure for HL7 messages.
HSP	Health Service Provider	A person or an organization that provides health care or other health-related services or products.
HTML	Hypertext Markup Language	Authoring language used to create documents on the Internet.

ACRONYM	FULL TEXT	DEFINITION
HTTP	Hypertext Transfer Protocol	Internet protocol defining message format and transmission for media objects in a TCP/IP network. HTTP is typically used to transmit HTML documents between a web server and a web client, e.g. a browser.
IA	Infrastructure Architect	An Information Technology professional responsible for the design of the underlying technologies (infrastructure) of a solution. Underlying technologies typically refer to the specific configurations of servers, storage arrays, network switches, etc.
ICD-10	International Statistical Classification of Diseases and Related Health Problems, 10th Revision	Standard diagnostic tool for epidemiology, health management and clinical purposes. This includes the analysis of the general health situation of population groups. It is used to monitor the incidence and prevalence of diseases and other health problems.
ICD-10-CA	International Classification of Diseases – Canadian Enhancement)	Diseases and Related Health Problems Tenth Revision, Canada a Canadian modification of the ICD-10 disease classification published by the WHO.
IF	Information Framework	PRM architectural domain describing conceptual and logical information resources and models.
I-GUIDE	Implementation Guide	1. A document explaining the proper use of a standard for a specific purpose 2. Method of standardized installation and maintenance of computer software and hardware A system/standard implementer-focused document that provides: - Overview of the specification to be implemented - Overview of the technical artefacts - Conformance requirements - Guidelines for implementing specific nuances of the specification
IHE	Integrating the Healthcare Enterprise	Industry initiative to improve computer systems in healthcare share information. IHE promotes the coordinated use of established standards such as DICOM and HL7 to address specific clinical needs in support of optimal patient care.
IHE PIX-PDQ v2 and V3	Integrating the Healthcare Enterprise (IHE) Patient Identifier Cross-Reference (PIX) HL7 and Patient Demographic Query (PDQ) HL7 version 2 and version 3	The Patient Identifier Cross Referencing (PIX) Integration Profile supports the cross-referencing of patient identifiers from multiple Patient Identifier Domains by: (1) Transmitting patient identity information from an identity source to the Patient Identifier Cross-reference Manager; (2) Providing the ability to access the list(s) of cross-referenced patient identifiers either via a query/ response or via an update notification. The Patient Demographics Query (PDQ) Integration Profile lets applications query a central patient information server and retrieve a patient's demographic and visit information.

ACRONYM	FULL TEXT	DEFINITION
IHE XDS	IHE Cross-Enterprise Document Sharing for Imaging (XDS-I)	Allows authorized health care providers to electronically collect, store, manage, distribute and view patient radiology reports and images entirely in digital format.
IHE-ITI	IHE Information Technology Infrastructure	The IT Infrastructure Domain supplies infrastructure for sharing healthcare information.
IRM	Information Resource Model	Model representing the concepts embodied in a set of forms, notes and reports needed to support the communication of a particular PRM domain
ISO	International Organization for Standardization	International standard-setting body composed of representatives from national bodies.
ISO 3166-1	ISO standard 3166-1	ISO 3166 is the International Standard for country codes and codes for their subdivisions. ISO 3166-1 - Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes.
ISO 639-3	ISO standard 639-3	ISO 639 is the International Standard for language codes. The purpose of ISO 639 is to establish internationally recognized codes (2, 3, or 4 letters long) for the representation of languages or language families. ISO 639-3 - Codes for the representation of names of languages -- Part 3: Alpha-3 code for comprehensive coverage of languages.
LDM	Logical Data Model	Represents in-scope business entities, their relationships, and their attributes. The logical data model describes data requirements and needs in support of in-scope business activities in as much detail as possible without any regard to physical implementation environment or to performance considerations.
LHIN	Local Health Integration Network	Local Health Integration Networks (LHINs) are the health authorities responsible for regional administration of public healthcare services in the province of Ontario, Canada. Created April 1, 2007, the 14 LHINs are mandated with planning, integrating, and distributing provincial funding for all public healthcare services at a regional level. Created by the Ontario government in March 2006, LHINs are 14 not-for-profit corporations who work with local health providers and community members to determine the health service priorities of the regions. LHINs plan, integrate and fund local health services, including: Hospitals / Community Care Access Centres / Community Support Services / Long-term Care / Mental Health and Addictions Services / Community Health Centres. LHINs believe that community health needs and priorities are best understood by people familiar with the needs of our communities and the people who live there, not from those in offices hundreds of miles away.

ACRONYM	FULL TEXT	DEFINITION
LOINC®	Logical Observation Identifiers Names and Codes	LOINC is a terminology standard that provides standardized means of identifying medical observations. It has two main parts: laboratory and clinical LOINC. LOINC is often used to provide standardized names for lab tests, which is essential for clinicians and labs to exchange requests for tests and results electronically.
LTC	Long Term Care	Health care services provided outside the acute care setting, often for extended periods of time.
LTCH	Long Term Care Home	Long-term care homes are places where adults can live and receive help with most or all daily activities and access to 24-hour nursing and personal care.
MOHTLC	Ministry of Health and Long-Term Care	The Ministry of Health and Long-Term Care is working to establish a patient-focused, results-driven, integrated and sustainable publicly funded health system. Its plan for building a sustainable public health care system in Ontario is based on helping people stay healthy, delivering good care when people need it, and protecting the health system for future generations.
NToC	Non Transfer of Care	Referrals are used to obtain specialist or specific treatment from another health care provider (person or organization), yet responsibility and accountability for the patient ultimately remains with the health care provider (person or organization) who is referring the patient.
OACCAC	Ontario Association Community Care Access Centres	The OACCAC serves as the collective voice for our members, Ontario's 14 Community Care Access Centres (CCACs). We also provide a broad-range of member and technology shared services to support the effective and efficient delivery of health care at home and in the community across the province.
OASIS	Advanced Open Standards for Information Society	OASIS is a non-profit consortium that drives the development, convergence and adoption of open standards for the global information society.
OCRDS	Ontario Care Request Data Standard	Developed by Continuing Care eHealth to enable electronic referral messaging, the OCRDS defined the data required to describe the names, definitions, and characteristics of data exchanged within the CC sector.
OLIS	Ontario Lab Information System	Single provincial domain repository that allows all laboratory test order and result information on people in Ontario to be exchanged electronically and securely between authorized practitioners and laboratory service providers. It also provides the Ministry of Health and Long-Term Care with de-identified program management information.
ONPTYPE	Ontario Provider Role Type	A code System defined by the eHealth Ontario Standard Program to hold codes for Healthcare Provider Role (yet to be harmonized with SCPTYPE – CHI Standards Collaborative code system).
OTIX	Ontario Telemedicine Information Exchange	OTIX is an existing solution managed by Ontario Telemedicine Network (OTN) used for processing of specialist referrals leveraging technology to store the referral details so that a specialist can document a consult without the need for a patient visit.
OTN	Ontario Telemedicine	Two-way videoconferencing providing access to care for patients in Ontario hospitals and other health care locations. In addition to clinical care, OTN

ACRONYM	FULL TEXT	DEFINITION
	Network	facilitates the delivery of distance education and meetings for health care professionals and patients.
pCLOCD	Pan-Canadian LOINC Observation Code Database	Terminology based on the Logical Observation Identifiers Names and Codes (LOINC) standard; supports the coding of observations with a significant focus on the laboratory domain.
PCP	Primary Care Physician	A primary care physician or primary care provider (PCP) is a physician who provides both the first contact for a person with an undiagnosed health concern as well as continuing care of varied medical conditions, not limited by cause, organ system, or diagnosis.
PHI	Personal Health Information	Information about an individual in oral or recorded form, if the information, (a) relates to the physical or mental health of the individual, including information that consists of the health history of the individual's family, (b) relates to the providing of health care to the individual, including the identification of a person as a provider of health care to the individual, (c) is a plan of service within the meaning of the Home Care and Community Services Act, 1994 for the individual, (d) relates to payments or eligibility for health care, or eligibility for coverage for health care, in respect of the individual, (e) relates to the donation by the individual of any body part or bodily substance of the individual or is derived from the testing or examination of any such body part or bodily substance, (f) is the individual's health number, or (g) identifies an individual's substitute decision-maker.
PIM	Provincial Integration Model	A diagram that illustrate the flow of information form systems that capture and author health information, to integration systems , shared storage locations, and delivery mechanisms, to consuming systems where it is accessed by clinicials and health care clients. In systems integration terms, PIMs are known as conceptual data flow diagrams (page 10 of Ontario's EHR Connectivity Strategy).
POS	point-of-service	(or POS Application) classes of solutions used by stakeholders at or from points of care that client, providers and health care providers and stewards use for administrative, clinical and information management purposes and include: Ministry/Steward Systems, Electronic Patient Record (EPR) / Hospital Information System (HIS), Electronic Medical Record (EMR) / Clinical Management Systems (CMS), Diagnostic Imaging/Picture Archive and Communications Systems (DI/PACS), Laboratory Information System (LIS), Pharmacy Information System (PMS), Client Management/Electronic Client Record, Telemedicine (or Telehealth), Portals / portlets.
POS	Point of service application or system	A system employing EHRs in a clinical setting (e.g. an EMR system in a health care provider's office, a laboratory information system, or a hospital information system).
PRM	Provincial Reference Model	A Provincial Reference Model is a set of architectural specifications specifying an IT solution to help manage electronic health records. The PRM includes a set of principles and six interrelated architectural frameworks.
ORS	Ontario	Standardized referral content of 4 referrals pathways {Acute to CCAC; Acute

ACRONYM	FULL TEXT	DEFINITION
	Referral Standards	to LTCH; and Acute to Rehabilitation Facility (Rehab), and Acute to Complex Continuing Care (CCC) Facility] that have been implemented across all LHINs
PSSO	provincial standards sustainability office	The Resource Matching and Referral (RM&R) Provincial Standards Sustainability Office (PSSO) was established in 2014, within the TC LHIN for a one year term, to oversee the Provincial Reference Model implementation progress, knowledge-sharing, and change management.
RFP	Request for Proposals	is a solicitation made through a bidding process, by an agency or company interested in procurement of a commodity, service or valuable asset, to potential suppliers to submit business proposals.
RM&R	Resource Matching and Referral	An electronic information system that allows clinicians to send and receive electronic referrals. It also provides matches for patients to the most applicable alternate level of care (ALC) programs. It is designed to ensure all individuals have equitable and timely access to the right care.
RMIM	Refined Message Information Model	Information structure representing the requirements for a set of messages. Contains those classes, attributes, associations and data types needed to support one or more HMDs.
SAML	Security Assertion Markup Language	Standard for exchanging authentication and authorization data between security domains such as an identity provider and a service provider.
SCPTYPE	Standards Collaborative Provider Role Type	A code system defined by CHI Standards Collaborative to hold codes for Healthcare Provider Roles (e.g. 'LPN – Licensed Practical Nurse), yet to be harmonized with HL7 International list of Provider Role Types.
SMS	Short Message Service	Short Message Service (SMS) is a text messaging service component of phone, Web, or mobile communication systems.
SNOMED CT ®	Systematized Nomenclature of Medicine – Clinical Terms	Organized, computer-processable collection of medical terminology covering most areas of clinical information such as diseases, findings, procedures, microorganisms, pharmaceuticals, etc. It allows a consistent way to index, store, retrieve, and aggregate clinical data across specialties and sites of care.
SOA	Service Oriented Architecture	a business-driven IT architectural approach that supports integrating the business as linked, repeatable business tasks, or services. At a technical level, it is a component model interrelating functional units of an application, called services, through well-defined interfaces. The interface is standards-based and independent of the hardware platform, the operating system, and the programming language implemented for the service.
SOAP	Simple Object Access Protocol	The SOAP web services standard permits arbitrary complex business operations to be accessed over the internet. It is more complicated to implement than REST, but it can handle more difficult operations and is useful if more flexibility is required.
SSO	Single Sign On	Allowing approved, trusted providers to use their existing identity credentials to access shared eHealth Ontario resources. A mechanism in which a single action of user authentication (i.e. logon) can permit a user to access to

ACRONYM	FULL TEXT	DEFINITION
		computer systems and applications where authorized, without the need to authenticate for each individual system or application.
TC LHIN	Toronto Central Local Health Integration Network	Toronto Central LHIN is located in the core of the City of Toronto, with its edges reaching out into Scarborough, North York and Etobicoke. Toronto Central LHIN shares its borders with Central East LHIN, Central LHIN, Central West LHIN and Mississauga Halton LHIN.
TLI Specification	Transport Level Interoperability specification	Infoway's TLI Specification identifies mandatory elements realizing transport interoperability requirements to achieve seamless, efficient, secure and reliable information transport and to implement integration between Point of Service (POS) systems and EHR (HIAL). It provides a set of concise rules / conformance statements to guide implementers who build new or adapt existing system capabilities to support interoperability between varieties of EHR solutions in Canada.
ToC	Transfer of Care	Referral activity is focused on moving responsibility and accountability for a patient from one health care provider (person or organization) to another.
TSF	Technology Solution Framework	Provides the system design artifacts typically done in early stages of a system implementation. The TSF introduces the technology capabilities to support automation of the referral patterns, and describes the Conceptual, Logical and Security Architecture and Service definitions of an eReferral solution.
URL	Uniform resource locator	A uniform resource locator (abbreviated URL; also known as a web address, particularly when used with HTTP) is a specific character string that constitutes a reference to a resource.
URL scheme	Uniform resource locator	A URL scheme is the top level of the uniform resource identifier (URI) naming structure in computer networking. The most common form of URI is the uniform resource locator (URL), frequently referred to informally as a web address.
W3C	World Wide Web Consortium	The World Wide Web Consortium (W3C) is an international community where Member organizations, a full-time staff, and the public work together to develop Web standards. Led by Web inventor Tim Berners-Lee and CEO Jeffrey Jaffe, W3C's mission is to lead the Web to its full potential. Contact W3C for more information.
WS	Web Service	Software system designed to support interoperable machine-to-machine interaction over a network. Web services are frequently just web enabled APIs accessed over a network, such as the Internet, and executed on a remote system hosting the requested services.
WW LHIN	Waterloo Wellington Local Health Integration Network	The Waterloo Wellington Local Health Integration Network (WWLHIN) plans, integrates (connects and improves), and funds health services to improve the health and well-being of approximately 775,000 residents in Waterloo Region, Wellington County, the City of Guelph, and the southern part of Grey County.
XDS	Cross-Enterprise Document Sharing	Provides a standards-based specification for managing the sharing of documents between any healthcare enterprise, ranging from a private physician office to a clinic to an acute care in-patient facility and personal health record systems.

ACRONYM	FULL TEXT	DEFINITION
XML	Extensible Mark-up Language	A mark-up language for structuring arbitrary data based on element tags and attributes.

GLOSSARY

TERM	DEFINITION
Business Process Framework	The Business Process Framework is a hierarchical catalogue of the key business processes of a service-focused business. Its business and clinical requirements and models drive solution design.
Ontario's EHR Connectivity Strategy	Describes how EHR assets in Ontario will be connected to form a shared, comprehensive, provincial Electronic Health Record.
Dataname	Technical designator for a field, column or attribute.
Delivery Partner	Government or not-for-profit organization, other than eHealth Ontario and the Ministry of Health and Long-Term Care, that: (a) works collaboratively with other partners to develop and sustain eHealth for Ontarians; and (b) is accountable for delivering and maintaining component elements of the shared infrastructure, integration, record / information management, and other services integral to eHealth.
eHealth Blueprint	Ontario's eHealth Blueprint information EHR planning and delivery for the province. It provides a future state, high-level view of the EHR in Ontario.
eConsult	A provider electronically sends a question to another (specialist) provider without requiring the client to see the provider being consulted.
eHealth Blueprint	Foundational artifact informing EHR planning and delivery for the province. It provides a future state, high-level view of the EHR in Ontario, without specifying when components or capabilities will be available, or who will be responsible for them. It

TERM	DEFINITION
	defines the elements required to realize the goals of the EHR, while providing a framework for describing the architectural principles and patterns that will be employed to deliver its solutions. The blueprint is built on key foundational principles including privacy and security compliance, collaborative governance, regulation and policy, standards, and federation.
eReferral	The automation of one or more activities involved in initiating, negotiating and closing the referral process.
eReferral Ecosystem	a collection of socio-technical actors – providers, patients and systems – involved within a bounded eReferral system
eReferral Solution	A business application to manage health client referrals initiated as a request for healthcare resources to managing the appropriate fulfillment of the referral. This solution receives, processes, and tracks referral requests/responses. An eReferral Solution can be a single system, a component of a larger system or number of integrated solutions.
eReferral Standard	HL7 messaging specification which enables providers to electronically transfer information for referral purposes.
Identity Federation	A 'federated' environment allows distinct systems (from different organizations, lines of business, companies) to achieve cross domain (organization) single sign-on (SSO) which allows a user to experience a seamless method for accessing multiple services. eHealth Ontario's ONE ID service provides user federation services.
Information Resource (Generic and Specific)	A form, note or report in common usage in a healthcare process in a clinical setting in Ontario.
Health Service Catalog	Jurisdictional catalogue of health services that may be provided to/for/on behalf of Healthcare Clients.
LOINC Document Ontology	Conceptual and implementable structure of how clinical documents should be arranged and available for access. Consistent with the vision of a healthcare learning system, the need for document taxonomy has become acute as health information

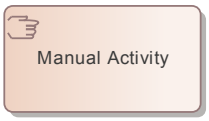
TERM	DEFINITION
	exchange and interoperability requirements dictate an increased level of data liquidity. To support the need for increased information exchange, some level of classification is needed to identify all possible resources. See HL7/LOINC Clinical Document Ontology Implementation Guide (US Realm), Draft Standard for Trial Use, September 2013.
Ontario Clinical Document Architecture Header	Describes constraints that apply to the Clinical Document Architecture (CDA) header as it should be implemented in Ontario. This header reflects the constraints that are defined in the other CDA implementation guides, in order to align as closely as possible with existing implementations. This standard is used for CDA based documents such as the Referral report which is sent back to the referral source.
OntarioMD	OntarioMD is a wholly owned subsidiary of the Ontario Medical Association and receives funding from the Ministry of Health and Long-Term Care through its agency, eHealth Ontario.
Provider Role Service Catalog	Provider specialty specific catalogue of health services that may be provided to/for/on behalf of Healthcare Clients.
Security Assertion Markup Language Token Profile	Web Servers and Application Servers generally maintain security state information for currently active users, particularly once some type of authentication has occurred. This specification defines a format for communicating such security session state based on the OASIS SAML Assertion. It also specifies two different mechanisms for communicating this information between servers via a standard Web browser.
Strata Health	Strata PathWays™ automates patient flow management, reducing time spent on manual transition processes, increasing clinician intercommunication and strengthening healthcare system performance, across the entire health and care ecosystem.
Web Services Addressing	Web Services Addressing (WS-Addressing) is a specification of transport-neutral mechanisms that allow web services to communicate addressing information.
Web Services Definition Language Specification	provides information about the service, WSDL is an XML format for describing network services as a set of endpoints operating on messages containing either document-oriented or procedure-oriented information.

TERM	DEFINITION
version 1.1	
Web Services Interoperability Basic Profile	The WS-I Basic Profile (official abbreviation is BP), a specification from the Web Services Interoperability industry consortium (WS-I), provides interoperability guidance for core Web Services specifications.
Web Services Policy	WS-Policy is a specification that allows web services to use XML to advertise their policies (on security, quality of service, etc.) and for web service consumers to specify their policy requirements.
Web Services Security	Web Services Security (WS-Security, WSS) is an extension to SOAP to apply security to Web services.
Web Services Trust	WS-Trust is a WS-* specification and OASIS standard that provides extensions to WS-Security, specifically dealing with the issuing, renewing, and validating of security tokens, as well as with ways to establish, assess the presence of, and broker trust relationships between participants in a secure message exchange.

1.0 BUSINESS FRAMEWORK APPENDIX

Adaptation of BPMN notations as used in PRM Business Process Models

BPMN element	Representation	Description
Pool		Boundary of business activities for an organization

Activity – Manual		Activity that is performed manually
Activity – Service		Activity that could potentially be automated
Trigger – Start		Event that triggers the process
Intermediate Event - Message		Intermediate event of receiving a message that triggers activities in the receiving organization
Intermediate Event - Conditional		Events based on a condition that trigger alternate sequence of activities
End Event		This event describes how the process ends
End event - Terminate		Process stops based on a condition
Gateway – Exclusive		Enables either or sequence of activities
Gateway - Inclusive		Enables one or more sequence of activities
Data Object		Information that is produced by and activity or consumed by one to perform the task

Sequence flow		Indicates the order in which activities of a process will be performed
Message flow		Indicates the sequence of the activity and the message event that it results in
Data association		Indicates whether an information resource is produced or consumed by an activity

Please note that activities and events greyed out in End to End Models indicate that they are part of the generic model that was used to create the End to End model but has no relevance in the end to end model.

2.0 TECHNOLOGY FRAMEWORK APPENDIX

1. NON-FUNCTIONAL REQUIREMENTS

These requirements are intended to provide guidance on common non-functional requirements that should be included in a standard RFP. Some of the Non-Technical Requirements were based on the requirements included in the OACCAC RFP for a Provincial Assessment Solution.

Functional Area	Description
Availability+	• Uptime - Ability to maintain planned and unplanned uptime at x # of 9s* (See Appendix) • Reporting - The system shall be able to report its availability for any specified timeframe within a two year time span (e.g. for the last 20 days, the last hour, the last year) • Service Level Agreement (SLA)
Capacity+	• Ability to store a minimum x million Assessments • Ability to support a minimum of x concurrent users • Ability support a minimum of x registered users
Deployment+	• Deployment in certified tier 3 rated, or higher, data centers as defined by the ANSI (American National Standards Institute) in ANSI/TIA-942 • System shall be hosted in Canada • Privacy breach notification policies in case the solution is hosted outside of the province of Ontario.

	• Security separation by firewalled network zones; comprising of at least, a zone that contains public internet facing web sites; a zone that contains internal eHealth Network web sites; and a zone that contains business logic and data persistence • Installation via a single executable • Ability to operate in a virtual environment
Disaster Recovery+	The system shall be capable of recovering from a disaster within x hours
Interoperability*	• Inter-System Communication - Ability to communicate with Health Information Systems and other Point of Service systems as needed and adhering to the required standards for Privacy, Security and Interoperability and in near real time • Connection to Provincial Services - Ability to connect to provincial and regional based services as needed and via the required standards for Privacy, Security and Interoperability • Ability to provide Foundational, Structural an Semantics Interoperability as per the Healthcare Information and Management Systems Society (HIMSS) definitions of Interoperability (http://www.himss.org/library/interoperability-standards/what-is-interoperability) : o "Foundational" interoperability allows data exchange from one information technology system to be received by another and does not require the ability for the receiving information technology system to interpret the data. o "Structural" interoperability is an intermediate level that defines the structure or format of data exchange (i.e., the message format standards) where there is uniform movement of healthcare data from one system to another such that the clinical or operational purpose and meaning of the data is preserved and unaltered. Structural interoperability defines the syntax of the data exchange. It ensures that data exchanges between information technology systems can be interpreted at the data field level. o "Semantic" interoperability provides interoperability at the highest level, which is the ability of two or more systems or elements to exchange information and to use the information that has been exchanged. Semantic interoperability takes

	advantage of both the structuring of the data exchange and the codification of the data including vocabulary so that the receiving information technology systems can interpret the data. This level of interoperability supports the electronic exchange of patient summary information among caregivers and other authorized parties via potentially disparate electronic health record (EHR) systems and other systems to improve quality, safety, efficiency, and efficacy of healthcare delivery.6
Language*	GUI - Ability to support, at a minimum, French and English
Localization	• Support for English (Canada) user interface • Support for French (Canada) user interface for all instrument questions and non-free-text answers
Maintenance+	• Ability to support a patching procedure to repair faults • System backward compatibility to at least two major releases • Security Patch Management for 3rd party software components within x business days of patches being made available • Security metrics on any open source component or library used in the solution, with the Morningstar model rating and the Coverity Scan status.
Operations+	• Schedule for planned platform upgrades • Data backup • Encryption of backup data • Restore of backed up data within x hours of request submission by the client, y% of the time • Compatibility with existing backup solutions • Adherence to the ITIL framework for incident management practices • Privacy breach and security incident response practices
Performance*	• Processing Capacity - Ability to process up to x # of transactions* within x seconds* • Processing Speed - Ability to process user events within x seconds* • Response Time - maximum hourly average response time of x seconds • Performance Reporting

Policy*	• Compliance with PHIPPA and FIPPA • Ability to audit the physical infrastructure. • Compliance with CSAE 3416 • Compliance with the Canadian data transfer, processing & storage or SOC2 report • Use of Information Security Management System (ISMS) framework (such as ISO27001) • SOC2 audits for vendors
Scalability*	Expandability - Ability to scale or expand to deliver services to a growing number of users
Support+	• Mean-Time-To-Repair (MTTR) or less than x hours, y% of the time. • Client accessible online help • Help desk coverage during core business hours • Historical reliability data • Average response time • Average resolution time • Availability of on call technician • Incident/problem management • Application and Data Centre monitoring
Training+	• Client accessible training environment • Availability of a user guide and release notes a minimum of x weeks prior to a new release being installed in the training environment
User Interfaces*	1. User interfaces must follow the Accessibility for Ontarians with Disabilities Act (AODA) specification for support of users with disabilities. 2. The eReferral solution shall support the following web user interface specifications: • HTML (Hypertext Markup Language) v4.01 v3.2 • HTTP (Hypertext Transfer Protocol) ext. v1.1 RFC 2817 • ISO (International Organization for Standardization) 9241-8:1998 Displayed Colours W3C (World Wide Web Consortium)

+ Nice to have
*Highly Recommended

2. EHR CONNECTIVITY REQUIREMENTS

The EHR Connectivity requirements cover the core requirements that any clinical Point of Service (POS) system should meet in order to ensure interoperability with Ontario's EHR assets. It provides context and describes requirements that will be used in the procurement of HIT goods and services throughout the province, particularly those procurements that relate to the exchange of health information outside of a single care provider organization.

The requirements cover the following topics:

- Connectivity
- Standards
- Leveraging EHR registries/repositories/systems
- Security

The requirements themselves are published as part of the Ontario's EHR Connectivity Strategy and can be found here: http://www.ehealthontario.on.ca/en/ehr-connectivity-strategy

3. DEFINITIONS – CONCEPTUAL ARCHITECTURE

Actors	
Name	Description
Referral Target Provider	**Initial / Future State / Identity Federation Diagram** A healthcare provider or organization that receives and assesses a referral and determines if the provider's service/organization can accommodate the request. (e.g., Specialist, LTC facility, etc.) • Target providers receive requests from the CCAC and determine if the request can be provided by them. • Target providers receive requests from the delivery partners' eReferral solution and determine if the request can be provided by them.
Referral Source Provider	**Initial / Future State / Identity Federation Diagram** A healthcare provider that prepares and submits request for services (referrals) related to a particular healthcare client: • Source providers can submit referral requests to CCAC (via CHRIS) specific to the CCAC services (i.e., referral for Home care service). • Source providers can submit referral requests to a delivery partner's eReferral system (i.e., Specialist referrals).

Components	
Name	**Description**
Analytics Repository	**Future State** Provides provincial reporting capabilities for aggregated eReferral data
CDR	**Initial / Future State** EHR initiatives in Canada have initially focused on sharing electronic information in the clinical lines of business, especially labs, drugs, and diagnostic images. This focus was adopted to fulfil the immediate needs of clinicians through information sharing. However, clinicians want to share and access other types of information when providing

Components	
Name	**Description**
	care. These will be stored in the clinical data repository.
Consent - CMTP	**Future State** A consent directive is defined as express instruction(s) from a health care client (or someone authorized to act on the client's behalf) to his/her HIC, regarding the collection, use, or disclosure of the client's PHI. The consent registry is a repository that stores and manages the consent directives issued or withdrawn by health care clients, with an accompanying policy store/rules engine to enable enforcement based on roles and access rules.
eReferral :Orchestration	**Future State** Provides the ability for local eReferral solutions to communicate with other eReferral solutions for inter-cluster referrals. The eReferral orchestration could be offered as a HIAL service.
EHR System (Referral Target)	**Initial / Future State** Electronic Health Record Systems represents any Point of Service (POS) application used by Healthcare Provider managing PHI for a patient. This includes, but not limited to physician and dentist EMRs and OPIS (Oncology Patient Information System. A CPOE system used by Cancer Care Ontario).
EHR System (Referral Source)	**Initial / Future State** Electronic Health Record Systems represents any Point of Service (POS) application used by Healthcare Provider managing PHI for a patient. This includes, but not limited to physician and dentist EMRs and OPIS (Oncology Patient Information System. A CPOE system used by Cancer Care Ontario).
eReferral Solution	**Initial / Future State/ Identity Federation Diagram** Business application to manage health client referrals initiated as a request for healthcare resources to managing the appropriate fulfillment of the referral. This

Components	
Name	**Description**
	solution receives, processes, and tracks referral requests/responses. An eReferral Solution can be a single system, a component of a larger system or number of integrated solutions. Solution examples include, but not limited to; TC LHINs Strata, OTN's OTIX and Store-and-Forward solution, OACCAC's CHRIS, etc.
Federated Identity Provider	**Identity Federation Diagram** An organization that performs identity proofing for providers (registration) and issues electronic credentials to individuals whom they have identity proofed. The provider stores and maintains credentials on behalf of the user, and provides the interfaces necessary to authenticate the provider and assert authentication information to the federation operator, when required.
Federated Identity Service	**Future State** Identity Federation - the means of linking a person's electronic identity and attributes, stored across multiple distinct identity management systems. The Federated Identity Service is an aggregate of multiple services and it involves components such as Federation Identity Providers, Federation Broker, and Service Providers.
Health Service Catalog	**Future State** Jurisdictional catalogue of health services that may be provided to/for/on behalf of Healthcare Clients.
Identity Provider Credential Challenge	**Identity Federation Diagram** Credentials verified using standard IDP process. ONEID/eHealth not involved in authentication of user.
Location Registry Service	**Initial / Future State** Repository identifying all health care sites where services are delivered to patients in Ontario associated with Providers and Organizations.
ONEID	**Initial State**

Components	
Name	**Description**
	To support providers not affiliated with a hospital that can issue them a user ID and password. eHealth Ontario's ONEID service acts as a province-wide identity provider, issuing electronic credentials for access to EHR applications. These applications may be hosted by eHealth Ontario or by other organizations. ONE ID is a member of the identity federation and also plays the federation operator role.
ONEID Federation Broker	**Identity Federation Diagram** The ONEID federation broker underpins the federated identity solution. It is responsible for routing the authentication request and response messages between federation partners. It is also responsible for validating provider and organizations claims contained within the authentication response messages.
Other eReferral Solutions	**Future State** Independent business applications to match referral requests with available health care resources and to manage the transfer of healthcare clients. (e.g., TC LHINs Strata, OTN's OTIX and Store-and-Forward). The solutions receive, process, and track referral requests/responses from the Providers EHR System.
Prov - Client Registry	**Initial / Future State** The client registry is the definitive source for a health care client's identity, facilitating the unique, accurate and reliable identification of individual clients and others who receive care in Ontario, across the disciplines in the health care sector.
Prov - Provider Registry	**Initial / Future State** The provider registry is the authoritative source of information about providers and health care service delivery locations for use by all EHR solutions. It facilitates the unique and accurate identification of any individual or organization that provides health services in Ontario, or who participates in the collection, use, or disclosure of PHI across the continuum of care.

4. DEFINITIONS - HIGH LEVEL LOGICAL ARCHITECTURE

Actors	
Name	Description
Referral Target Provider	**Initial / Future State** A healthcare provider or organization that receives and assesses a referral and determines if the provider's service/organization can accommodate the request. (e.g., Specialist, LTC facility). • Target providers receive requests from the CCAC and determine if the request can be provided by them. • Target providers receive requests from the delivery partners' eReferral solution and determine if the request can be provided by them.
Referral Source Provider	**Initial / Future State** A healthcare provider that prepares and submits request for services (referrals) related to a particular healthcare client: • Source providers can submit referral requests to CCAC (via CHRIS) specific to the CCAC services (i.e., referral for Home care service). • Source providers can submit referral requests to a delivery partner's eReferral system (i.e., Specialist referrals).

Class	
Name	Description
Privacy Audit - MCTP	**Future State** PHI audit trails are an important part of the EHR privacy compliance and security implementation. All transactions relating to PHI that consume EHR-related services through the eHealth Ontario HIAL segment will be logged in a centralized audit repository for privacy purposes. This repository is maintained separately from the system and other logs managed by the other EHR components

Components

Name	Description
Analytics Repository	**Initial / Future State** Provides provincial reporting capabilities for aggregated eReferral data
Application Programming Interface (API)	**Initial / Future State** Interface which enables an external application to communicate with the eReferral solution typically in the form of a web service. These services are exposed by the HIAL
Audit Data	**Initial / Future State** The Audit database stores audit and log data relating to activities within the eReferral solution. Specifically information related to eReferral access and usage. These include user and administrator activities where access to PI/PHI occurs
Auditing	**Initial / Future State** Service used to log and monitor eReferral system and user actions
Authorization	**Initial / Future State** A service which determines user permissions and eReferral access where the decision is informed by Authorization data
Authorization Data	**Initial / Future State** A Data repository within the eReferral solution to capture users' permissions, access to the eReferral functions and information and role-based access control policies.
Prov - Client Registry	**Initial / Future State** The client registry is the definitive source for a health care client's identity, facilitating the unique, accurate and reliable identification of individual clients and others who receive care in Ontario, across the disciplines in the health care sector.

Components	
Name	**Description**
Consent - CMTP	**Future State** A consent directive is defined as express instruction(s) from a health care client (or someone authorized to act on the client's behalf) to his/her HIC, regarding the collection, use, or disclosure of the client's PHI. The consent registry is a repository that stores and manages the consent directives issued or withdrawn by health care clients, with an accompanying policy store/rules engine to enable enforcement based on roles and access rules.
Data Collection	**Initial / Future State** Provide the processes and services that move and control the movement of data from a data source to a target such as imported eReferral data
Data Validation	**Initial / Future State** Service used to validate data as it is being sent or received by the eReferral solution such as GUI & API level validation of eReferral data
Document Retrieval	**Initial / Future State** Service used to retrieve attachments related to a referral from other systems such as HIS systems
EHR System	**Initial / Future State** Generic object used to represent the various electronic care systems. ONE Portal is an instance of this. E.g. DPV Reports generated by Enterprise Reporting. Electronic Health Record Systems represents any Point of Service (POS) application used by Healthcare Provider managing PHI for a patient.
Electronic Notifications	**Initial / Future State** Electronic notifications include notifications that were generated by the eReferral

Components	
Name	**Description**
	solution and may include email notifications, mobile device notifications such as SMS messages, and electronically generated fax via fax gateway. The notification component was introduced based on the OntarioMD Electronic Referral Business Requirements document from 2012 (p.20).
eReferral Data	**Initial / Future State** Stores all information to support Resource Matching queries and responses and data related to a Referral including the state of the Referral
eReferral Federation Service Provider	**Future State** Federation Service Provider provides applications, service authorization, and auditing to health care professionals. It relies on other parties for user account management and authentication (IDPs).
Provincial HIAL	**Initial / Future State** HIAL (Health Information Access Layer) services: manage secure access to the EHR and provide communication and common services while protecting privacy. They also expose all supported provincial and regional business service interfaces.
eHealth Ontario HIAL Segment	**Initial / Future State** A HIAL segment, owned by eHealth Ontario, will serve as the integration point for access to provincially owned assets (provincial registries, clinical repositories, applications, knowledge resources).
Extract, Transform, Load	**Initial / Future State** ETL provides extract, transform, and load capabilities of bulk data loading into a data warehouse or target systems. ETL allows disparate data and structures to be transformed into a single target data structure

Components	
Name	**Description**
Federation Identity Provider (IDP)	**Future State** An organization that performs identity proofing for providers (registration) and issues electronic credentials to individuals whom they have identity proofed. The provider stores and maintains credentials on behalf of the user, and provides the interfaces necessary to assert authentication information to the provider and federation operator, when required.
Form Publishing Service	**Initial / Future State** Service which provides the ability to create and modify forms based on specific referral information needs. It is highly recommended that the Form Publishing be a managed process. The Form Publishing Service component was introduced based on the OntarioMD Electronic Referral Business Requirements document from 2012 (p.33).
Form Library	**Initial / Future State** The Form Library acts as a local repository and maintains forms by provider, type, status, geographic location, version and date. It is highly recommended that the content of the Form Library be managed and the form maintenance be performed in a controlled fashion. The Form Library component was introduced based on the OntarioMD Electronic Referral Business Requirements document from 2012 (p.33).
Graphical User Interface (GUI)	**Initial / Future State** Service which allows individual users to interact with the eReferral solution
GTA HIAL Segment NEO HIAL Segment SWO HIAL Segment	**Future State** The Ontario HIAL solution is comprised of a number of distinct instances of the HIAL concept – HIAL segments – which are similar in purpose and function. Each of the three regions will implement an integration hub, including a regional HIAL segment, a regional provider portal, and local repositories of clinical data (belonging to and pertaining to that

Components	
Name	**Description**
	region alone).
Health Service Catalog	**Initial State** In the absence of the availability of a provincial Service Catalogue, the eReferral solution should maintain a health care service catalogue and provider relationships. **Future** State Non-Transfer of Care: A comprehensive catalogue providing the referral sources with the actual scope(s) of practice / sub-specialization; referral requirements; provider preferences; and fundamental details of a referral destination, such as whether a provider is accepting new patients, and if so approximate wait times; is simply not available to referral sources at this time.
Location Registry Service	**Initial / Future State** Repository identifying all health care sites where services are delivered to patients in Ontario associated with Providers and Organizations.
ONEID	**Initial State** To support providers not affiliated with a hospital that can issue them a user ID and password, such as pharmacists, dentists, dieticians, midwives, occupational therapists, psychologists, administrative staff, and sole practitioners, eHealth Ontario's ONE ID service acts as a province-wide identity provider, issuing electronic credentials for access to EHR applications. These applications may be hosted by eHealth Ontario or by other organizations. ONE ID is a member of the identity federation and also plays the federation operator role.
ONEID Federation Broker	**Future State** The ONEID federation broker underpins the federated identity solution. It is responsible for routing the authentication request and response messages between federation partners. It is also responsible for validating provider and organizations claims contained within the authentication response messages.

Components	
Name	**Description**
ONEID Security and Entitlement	**Future State** ONEID provides authentication and authorization for access to provincial systems.
Provincial Identity Providers	**Future State** Provincial identity providers are organization whose digital credentials have been trusted for accessing EHR federated services. These organizations are typically large organizations with mature business, technical and security processes. Before becoming a provincial identity provider each organization must meet the required standards published by the federation operator as well as signing all applicable policy and legal agreements.
Provincial Provider Registry	**Initial / Future State** The provider registry is the authoritative source of information about providers and health care service delivery locations for use by all EHR solutions. It facilitates the unique and accurate identification of any individual or organization that provides health services in Ontario, or who participates in the collection, use, or disclosure of PHI across the continuum of care.
Reporting	**Initial / Future State** Provides reporting capabilities for local eReferral data
Reporting Data	**Initial / Future State** The eReferral operational Data leveraged by local reporting capabilities
Resource Matching	**Initial / Future State** Helps the Source Health Care Provider determine which facilities/ providers offer the programs and services required to meet the patient/client specific needs within the identified level of care.

Components	
Name	**Description**
Terminology / Translation	**Initial State** Service which translates delivery partners terminology usage to ensure consistent data within the eReferral solution. In the absence of a provincial Terminology Service, the eReferral solution should provide functionality for terminology translation (e.g. HIS to eReferral). Alternatively Delivery Partners could follow the provincial and pan-Canadian standards in preparation for the integration with the provincial Terminology Services. Further information can be requested from: architecture@ehealthontario.on.ca
Terminology Data	**Initial State** Stores all localized terminology related to the eReferral process where the terminology is specific to the local eReferral solution
Terminology Management	**Future State** Terminology Services provide a consistent interface and set of functions to manage and use terminology for a clinical domain.
Workflow Engine	**Initial / Future State** The Workflow engine is used to manage the eReferral, perform Resource Matching, and track the progress of the referral

3.0 PRIVACY AND SECURITY FRAMEWORK APPENDIX

REQUIREMENTS FOR SECURITY PATTERN #1

1. Access Control

The eReferral solution shall develop its access control policy based on business and security requirements for access, including:

- A trusted health care relationship must exist between eReferral users (from referring HICs) and the patient validating the health care provider's identity with provincial registries;
- Identifying the application end users and operations support users, their roles and activities;
- The required access control channels and the access control service model: either provided by the delivery partners eReferral solution, regional or provincial based model;
- Restricting and controlling the allocation of access rights to the eReferral solution, based on roles/groups;
- Privileges shall be allocated to users on a need-to-know basis.

2. Access control to program source code

Access to program source code and associated items (such as designs, specifications, and testing plans) shall be strictly controlled in a central repository, with role-based access control and supporting management processes.

For an acquired solution, to avoid risks introduced by the vendor's bankruptcy or other disaster, at a minimum the contract with the vendor shall specify that the program source code is escrowed and available to the eReferral owner.

3. Availability

Business availability requirements need to be defined. The eReferral solution and its architecture shall be designed with these requirements in mind, using a redundant data centre if required.

4. Business Continuity Management

The business owner shall develop a formal business continuity plan for the eReferral solution, including any acquired third party eReferral solution provider(s), as part of creation, development, implementation and testing of the plan, more specifically:

- To ensure business continuity management, including crisis management planning (for example, a health pandemic situation like a SARS outbreak);
- Determining, documenting, and maintaining the required level of continuity for eReferral information security services.

5. Business Owner's Security Responsibilities

The Business owner and its delegated Managers shall regularly review security related processes and procedures within their area of responsibility and ensure compliance with Ontario Regulations, their organizational security policy and legal agreements with HICs.

6. Clock Synchronization

The eReferral system and all the health information systems interfacing with it shall implement time synchronization services to support tracing and reconstitution of activity timelines where required. The Time Synchronization Services must comply with the Maintain Time profile from the Integrating the Healthcare Enterprise (IHE) organization.

7. Controlled Operational and Secure Software

The referral system and its service provider shall have security operations procedures in place to control the installation of software on operational systems including physical and virtual platforms, approved software management, security test acceptance of both the system and application including security QA testing against its requirements, security patch management etc.

8. Correct and Secure Operational Procedures

All regular operating procedures, updates and changes to the eReferral solution and software packages, or underlying infrastructure services shall be properly documented, evaluated, controlled, tested, and managed. Capacity management for the eReferral solution shall be planned to meet the performance specified in an SLA.

9. Cryptographic controls and key management

Use of cryptographic controls for protection of PHI shall be developed and implemented for eReferral. The encryption algorithms and key generation implementations must comply with Federal Information Processing Standards, FIPS 140-2 level 2 or better. Where cryptographic hardware devices are used in the eReferral solution, they shall meet or exceed the tamper-resistant enclosure requirement specified in FIPS 142-2 level 3.

Policy and processes regarding use, protection and lifetime of cryptographic keys, and? PKI digital certificates shall be developed and implemented for the eReferral solution.

10. System Use, Logging analysis and Reporting

Since the eReferral system contains personal health information, it shall be provided with facilities for analyzing logs and audit trails that:

- Allow the identification of all system users who have accessed or modified a given patient's record(s) over a given period of time, and
- Allow the identification of all patients whose records have been accessed or modified by a given system user over a given period of time.

11. Equipment Security Controls

When obsolete and old systems and media are no longer required for use by the eReferral system, all media containing the PHI information, eReferral software and eReferral hardware shall be securely overwritten or else destroyed.

12. Human Resources Security

All organizations accessing, supporting and using the eReferral system shall establish and implement Human Resources Security standards and practices that include:

- Prior to employment: clear roles and responsibilities that are defined and understood by employees, volunteers, contractors and third party users; terms and conditions of employment covering security and privacy requirements (e.g., required security clearances, compliance with applicable policies, etc.); Where applicable, staff expected to access the PHI must be verified for their identity, employment history and criminal background checks.
- During employment: annual information security training shall be conducted across the organization; and more enhanced security training shall be provided to the staff with access to PHI.
- Upon termination: Termination of access rights in a timely manner and returning the company assets.

13. Information secure transfer

Design, implementation, and agreement on PHI information secure transfer between/among involved organizations (including but not limited to CCAC, CSC, or a chain of referral services) must be planned out for all types of communication channels, including but not limited to emails, system to system, fax, mail, etc. Approaches that can be considered include the use of digital certificate, encrypted SSL tunnel, VPN, encrypted attachment by AES 256 algorithm, pre-programed fax etc.

14. Information Security Policy for PHI

The health organization(s) and involved organizations providing services to the eReferral solution shall have written and approved information security policies addressing the secure management of PHI. The policy is subject to at least annual review for addressing the totality of the policy.

15. Information Classification and Notice

The eReferral system shall inform users of the high sensitivity PHI in the systems by using a practical and noticeable mechanism (e.g. at start-up or log-in) and the system shall label hardcopy output accordingly when it contains PHI.

16. Managed Technical Vulnerabilities

The eReferral solution and its supporting security operations team shall manage the technical vulnerabilities of applicable information systems and applications, including the underlying infrastructures; the Security operations team or another appropriate team shall monitor, evaluate and take appropriate measures to evaluate and reduce security risks, such as a zero day attack.

17. Network Security and Architecture

The eReferral application shall be protected by appropriate N-Tier security architecture, on physical and virtual-based platforms, supporting infrastructure and network services – these shall all be adequately managed and controlled from internal and external security threats via ingress and egress controls, and by network monitoring and security operations monitoring in real time.

18. Password Management

Password management and its policy shall be clearly communicated to users, and the allocation of secret authentication information shall be controlled in a formal process to ensure secrecy. eReferral users share in the responsibility and accountability to maintain and enforce this secrecy, including the use of secret authentication information to reset and initialize the password for access. The password is required to be strong and complex enough against attacks such as brute force and dictionary attacks, etc. This requirement applies to any alternative authentication management such as token authentication using PIN management and generated token secrets.

19. Protection against malicious mobile device code

Where appropriate, if the choice is made to develop a mobile device accessed eReferral application, the business owner's organization shall develop the health care service mobile device policy and supporting the security measures for the eReferral application (such as only allowing authorized devices with supported mobile OS, anti-virus etc.) to manage the risks introduced by using mobile devices. All the mobile users must follow such policy.

20. Protection against malware

The eReferral solution shall be protected with on-demand detection and prevention controls to protect the hosting data centre and eReferral system against malicious software (aka. malware); develop, document and test the recovery procedures to recover the systems infected with malicious software as integral part of the security incident management framework

21. Protection of audit log information

Besides the privacy requirements stated under "Privacy Audit record" in the Privacy Framework above, application and system privileged accounts (including administrator and operator), access and audit records shall be tamper-proof and stored in a centralized facility with an appropriate retention policy. The access to audit tools and audit trails shall be safeguarded to prevent misuse or compromise.

22. eReferral User Authentication

A strong authentication mechanism is required to access the eReferral system (e.g. two-factor enhanced authentication, or risk-based authentication)

23. Secure Media Handling

Organization shall establish operating procedures to protect the PHI stored on removable media. For example:

- only use authorized and approved removable media in a controlled and auditable manner;
- encrypt the media in transit over untrusted networks and when physically transferred;
- physically protect media from theft while in transit;
- Protect printed documents printed out, and system documentation.

24. Secure Retention of PHI

The eReferral solution shall ensure PHI is protected from loss via backup and/or replication to DR site with the equivalent security controls. The backup tapes stored off-premises containing PHI (including PHI monitoring and audit data) must be encrypted and retained as per the privacy requirement of retention.

25. Security Incident Management

The eReferral system shall be supported by an effective security incident management process via collaboration between/among involved organization(s) that includes:

- Responsibilities and procedures of the involved organizations.
- Addressing of a breach notification by appropriate HIC organization(s).
- Responsibilities of the HINP at the first reasonable opportunity to notify HIC(s) if PHI access is not permitted.
- The responsibility of the HINP and its third party service to support the HIC(s) with regard to security incident investigations.
- The escalation path for incidents so that crisis management and business continuity management plans can be invoked in the right circumstances and at the right time.
- Informed notification to the patient if the eReferral solution's unavailability adversely affected their care and treatment.

26. Security Requirements, agreements, and SDLC

Privacy and Security requirements shall be identified, addressed, and agreed prior to the development and/or implementation of eReferral systems for both in-house developed or acquired solutions; system requirements for information security and processes for implementing security should be integrated in the early stages of information system projects as part of the Solution Development Life Cycle.

27. Technical Compliance Review

The eReferral system shall be tested and accepted by security acceptance prior to production and later regularly reviewed through technical assessment(s) such as Vulnerability Assessments and/or Penetration Tests, to prevent the exploitation of vulnerabilities in infrastructure and application(s).

28. Uniquely identifying patient/subject of care

Any EHR Applications and Services (including eReferral) shall be able to uniquely identify the patient under care by an agreed identification method in the system and validate against the authoritative Provincial Client Registry.

29. User Identity Management

The user identity management service shall:

- Allow identified users access to system after a formal user registration process.
- Control the allocation of user secret authentication information through a formal and secure management process.
- Periodically review user registration details to ensure information completeness, accuracy, and to confirm that such access is still required; if not, a user deregistration process must be followed.
- When appropriate, the ONE ID single sign on federated identity management solution is highly recommended.

ADDITIONAL REQUIREMENTS FOR SECURITY PATTERN #2

These are above and beyond those listed for pattern #1 above.

1. Compliance, auditing and monitoring of PHI use by third party eReferral solution providers

The business owner must reserve the right to conduct audits related to PHI use and disclosure by third party service providers.

2. Contractual Agreements and Security

Third party organization(s) providing services to eReferral solutions that involve PHI information processing shall employ formal contracts that specify:

- The high sensitivity nature and value of the PHI
- The security requirements and measures to be implemented and/or complied with limitations to access to these services by third parties
- An inventory of assets for eReferral solutions (for example infrastructure services assets)
- The service levels to be achieved in the services provided – this must cover both business as usual and business continuity situations
- The arrangements for compliance auditing of the third parties
- Physical security perimeter and access control to protect PHI processing facilities
- The format and frequency of reporting to health organizations
- The penalties exacted in the event of any failure in respect of the above.
- Limitations to access to these services by third parties

3. Security of applications in outsourced development

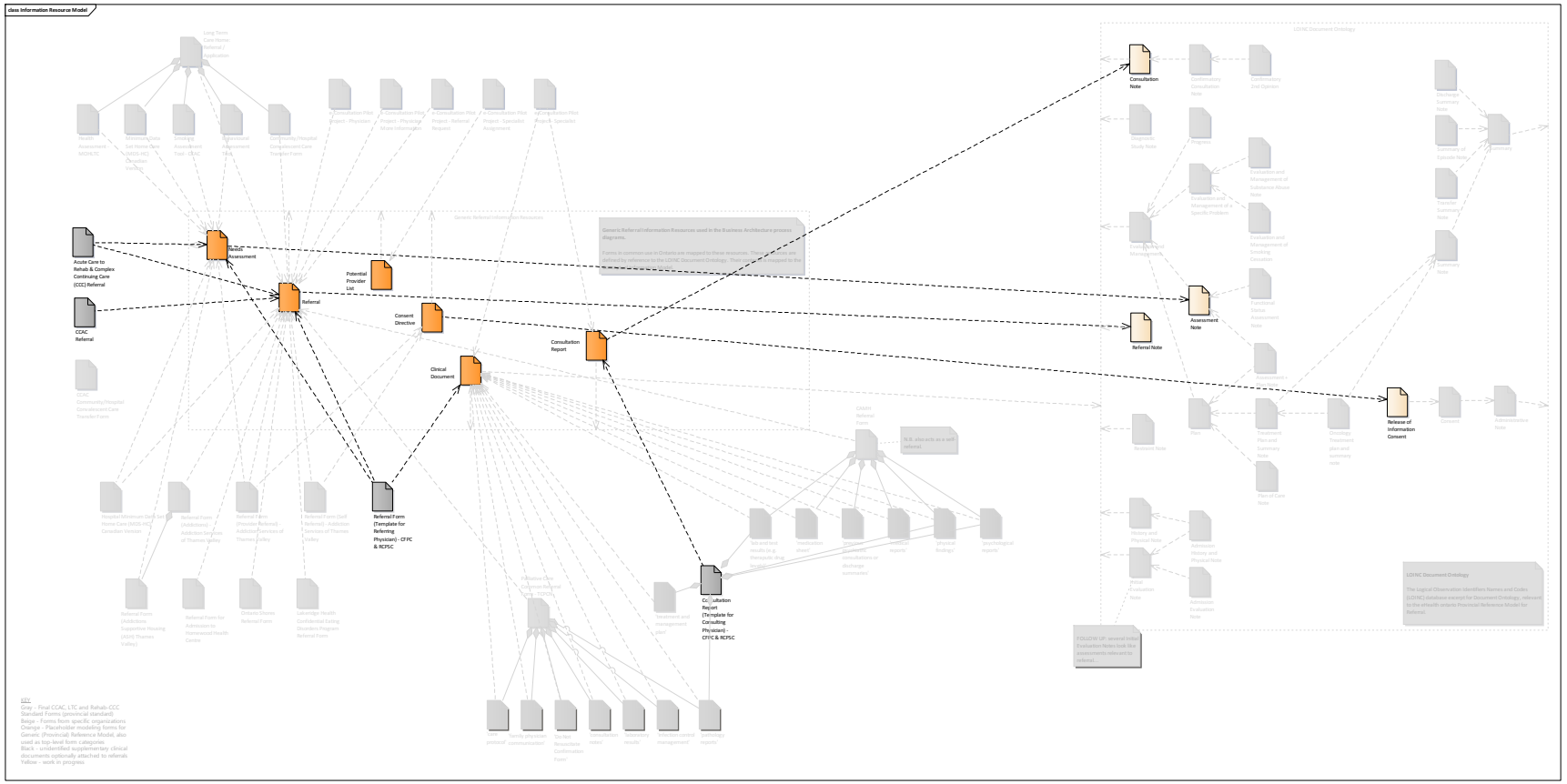
Where applicable, outsourced software development work shall be supervised and monitored by the business owner, to ensure no compromise of the security functions, by identifying the code ownership, intellectual property rights, contractual requirements and certification of the quality and accuracy of the work, escrow arrangements, rights of access for audit of the above, and finally security review and testing before installation.

4. Separations of production, development and testing environments

The eReferral solution provider shall separate (physically or virtually) the development and testing environments for the eReferral solution from its production environment. Rules for the test and promotion of software from lower environments to operational status shall be defined and documented by the organization hosting the eReferral application(s).

4.0 INFORMATION FRAMEWORK APPENDIX

4.1 INFORMATION RESOURCE MODELS

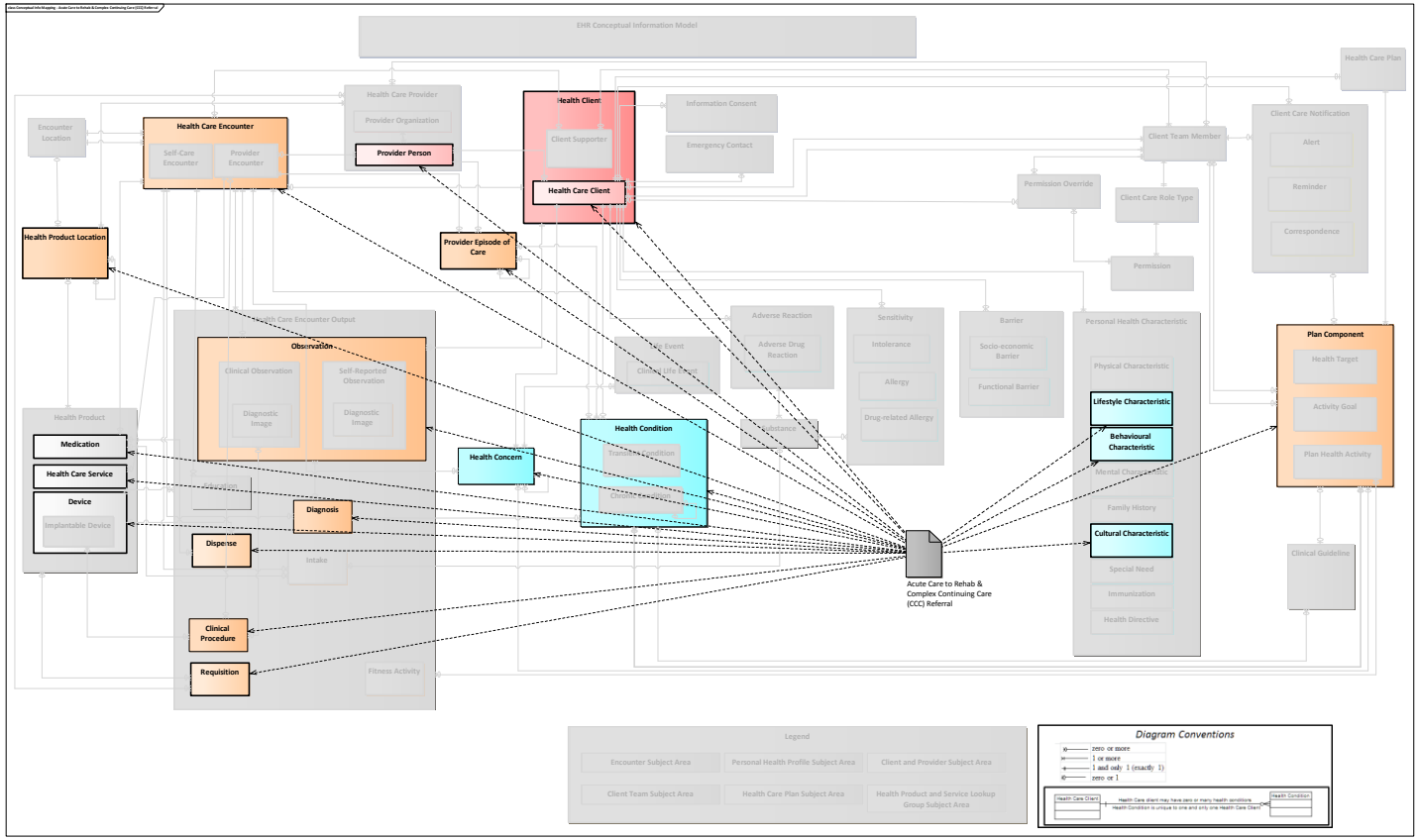


AppFig1.pdf

Appendix Figure 1 - Information Resource Model Release 1

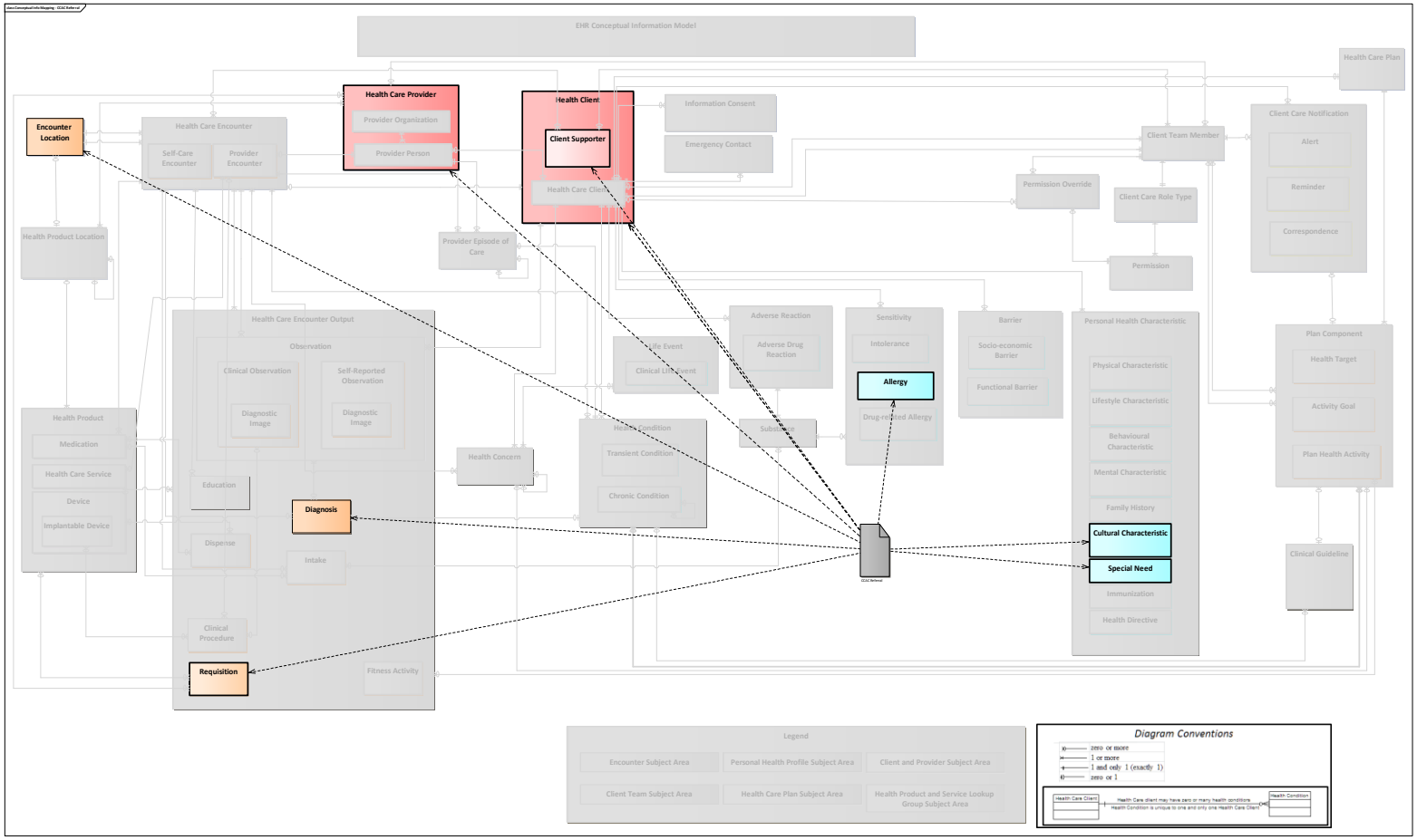
- Grey Data Objects are the specific forms in common use in Ontario
- Orange Data Objects are the generic forms used in the eReferral PRM Generic Process
- Beige Data Objects are the Ontology Model standard note, form and report types

Information Resource Content Mappings to the Conceptual Information Model.



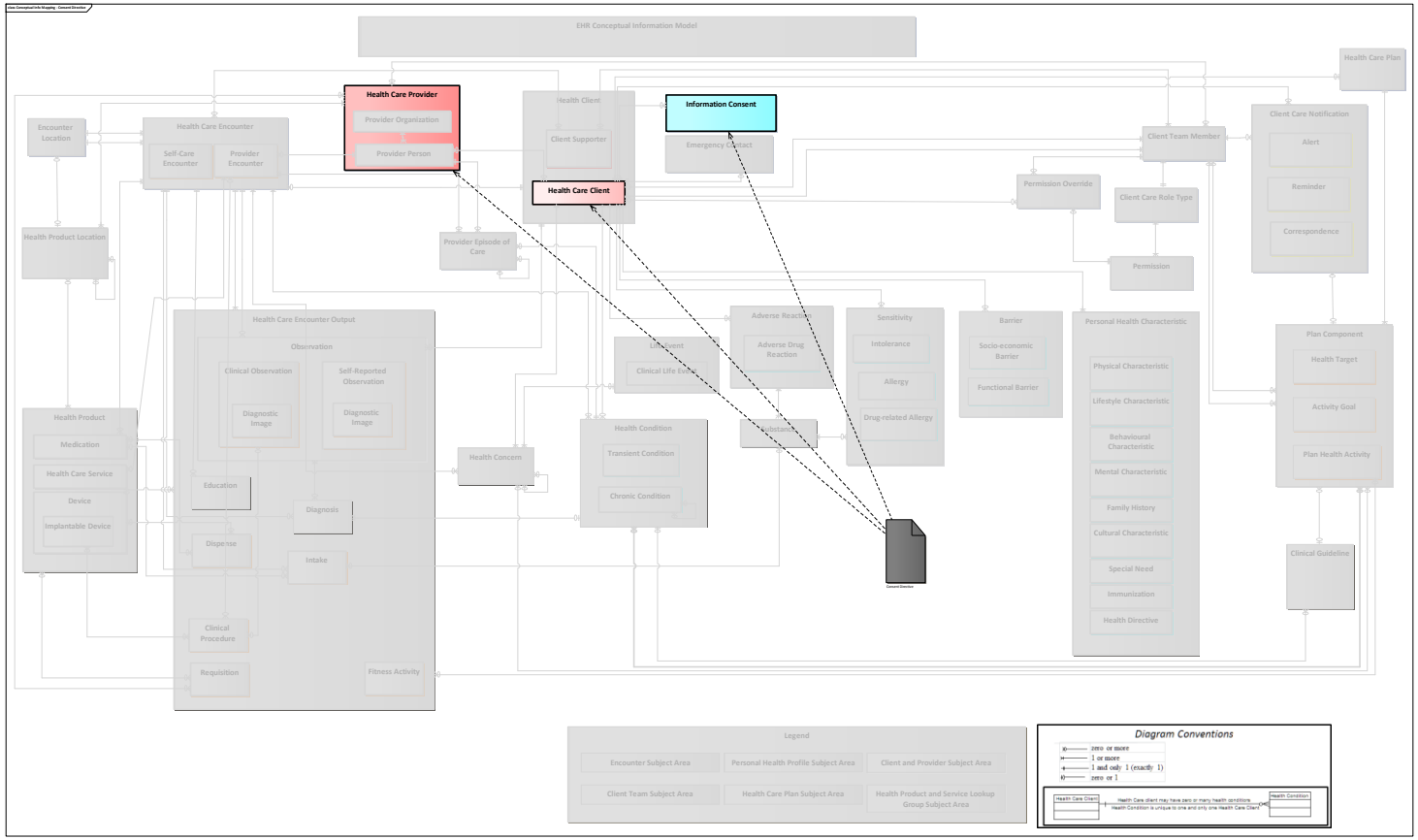
AppFig2.pdf

Appendix Figure 2 - Information Content Diagram for Acute Care to Rehab & Complex Continuing Care (CCC) Referral



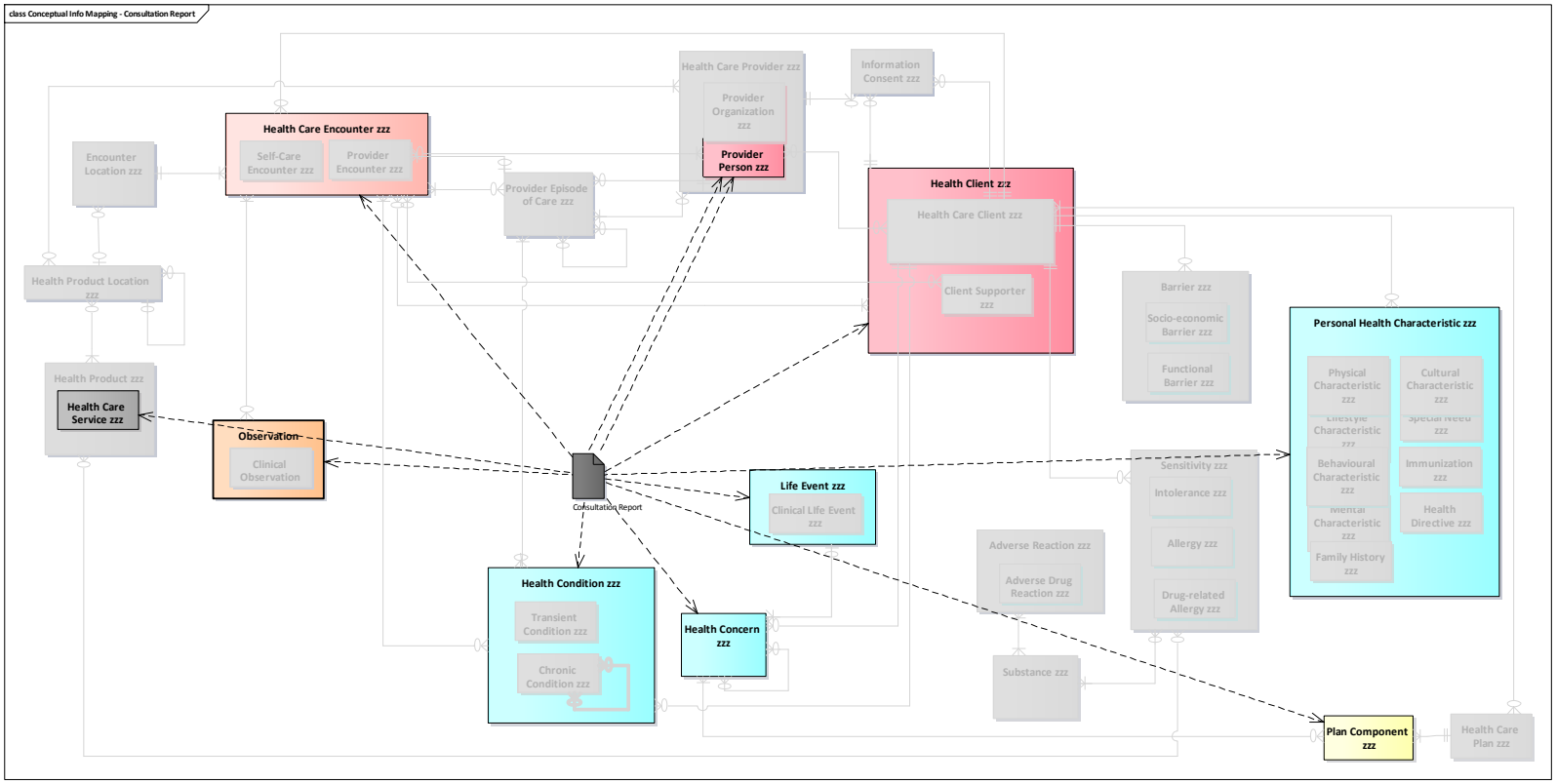
AppFig3.pdf

Appendix Figure 3 - Information Content Diagram for CCAC Referral



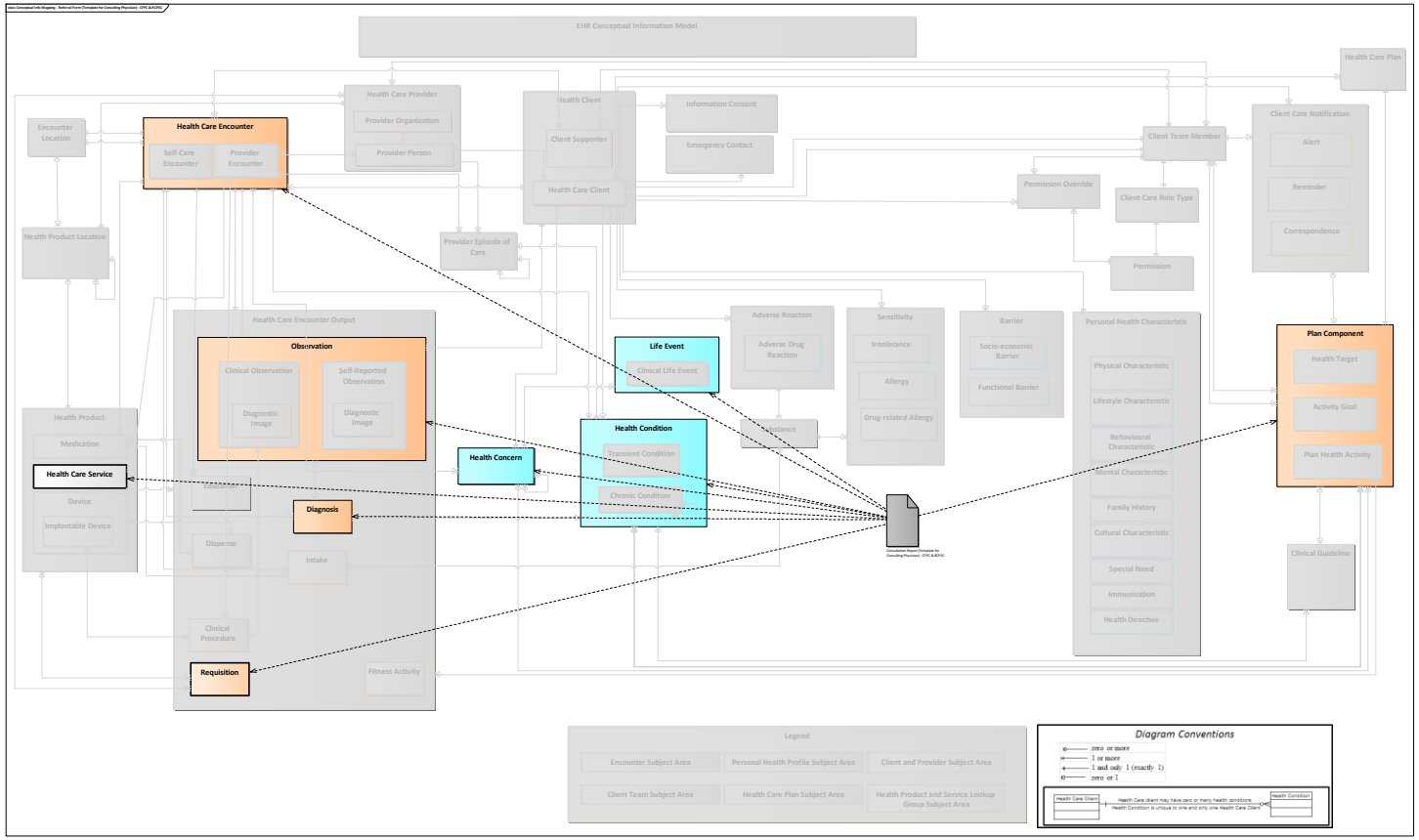
AppFig4.pdf

Appendix Figure 4 - Information Content Diagram for Referral Form (Template for Referring Physician) - CFPC & RCPSC



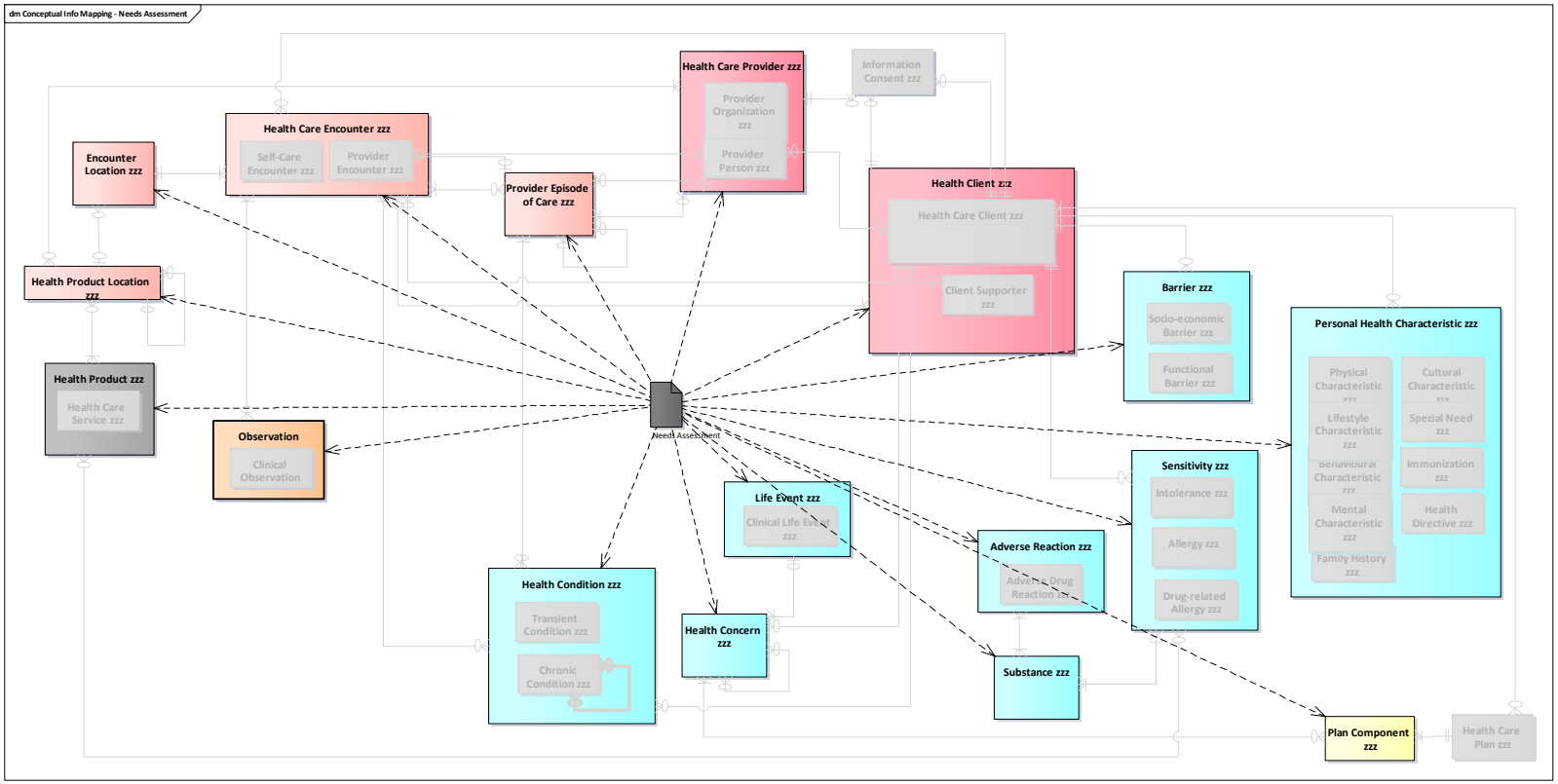
AppFig5.pdf

Appendix Figure 5 - Information Content Diagram for Consultation Report



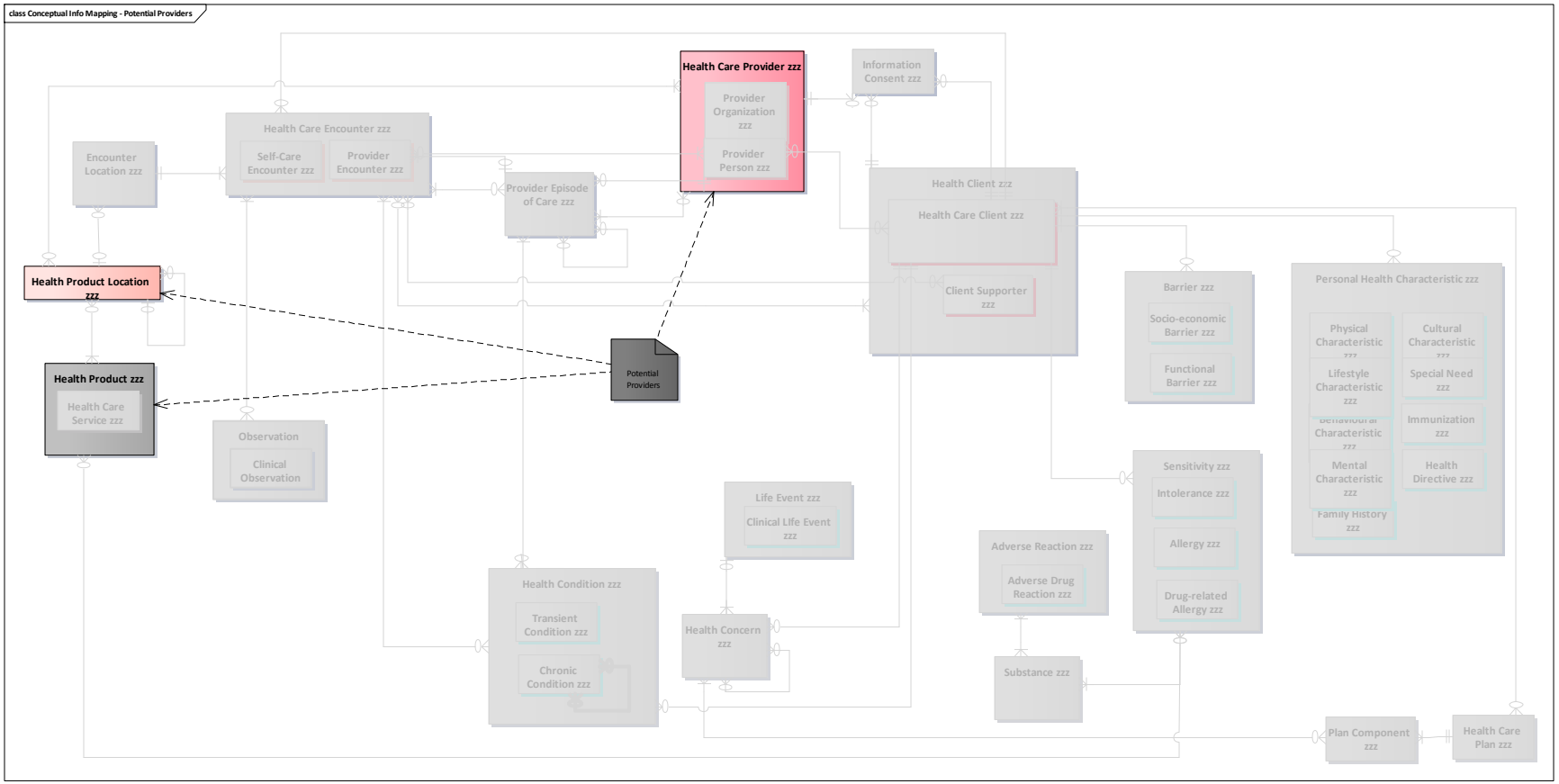
AppFig6.pdf

Appendix Figure 6 - Information Content Diagram for Consultation Report (Template for Consulting Physician) - CFPC & RCPSC



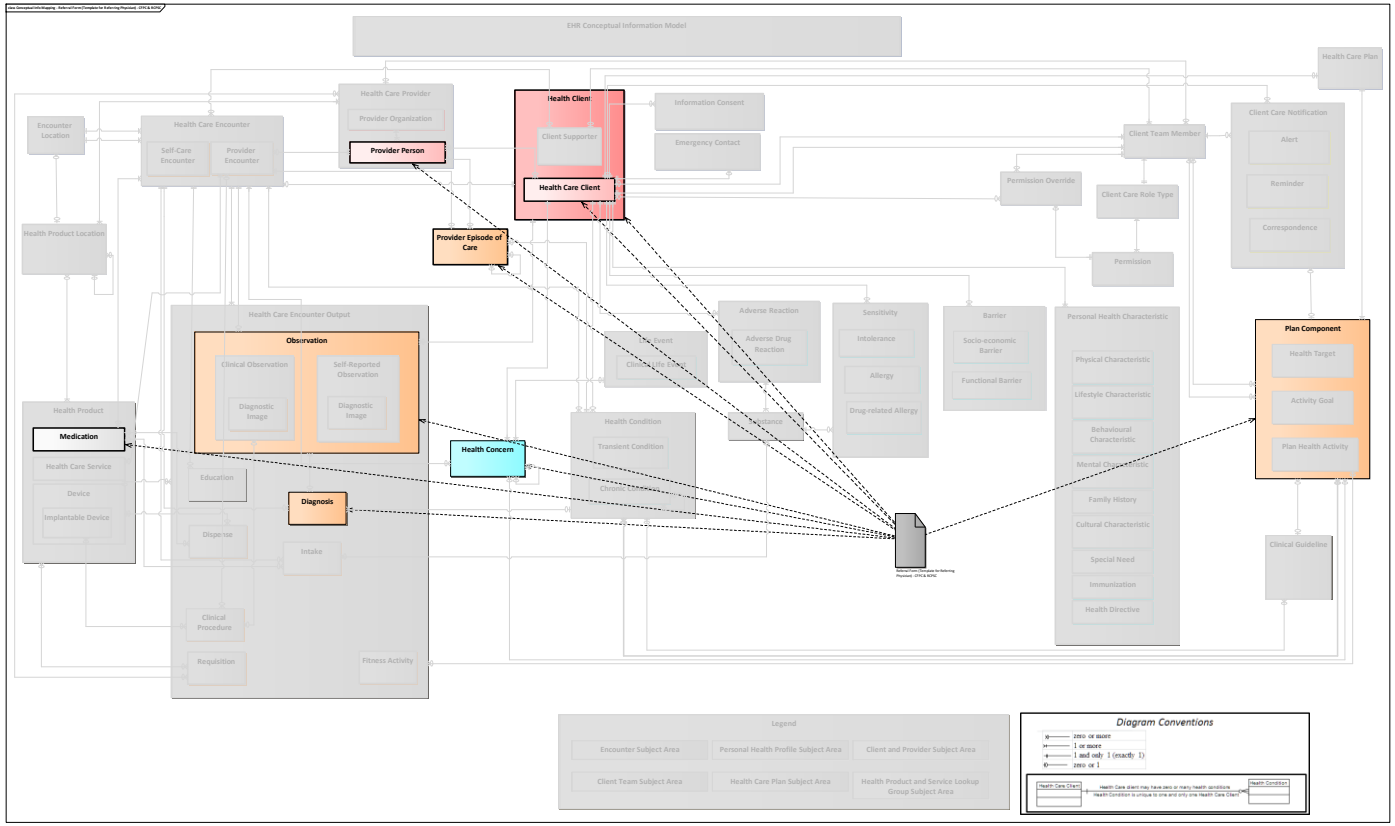
AppFig7.pdf

Appendix Figure 7 - Information Content Diagram for Needs Assessment



AppFig8.pdf

Appendix Figure 8 - Information Content Diagram: Potential Providers List



AppFig9.pdf

Appendix Figure 9 - Information Content Diagram: Referral Form (Template for Referring Physician) - CFPC & RCPSC

4.2 CONCEPTUAL INFORMATION MODEL DATA DICTIONARY

Entity - Conceptual: Observation

An act of recognizing and noting health-related information about a Health Care Client, evaluating the information, and determining health findings about the client. Observations often involve measurement or other elaborate methods of investigation, but may also be simply assertive statements, findings, symptoms, conclusions, etc.

A sub-type of Health Care Encounter Output.

Entity - Conceptual: Self-Reported Observation

An Observation made by a Health Care Client.

A sub-type of Observation.

Entity - Conceptual: Diagnostic Image

An observation in the form of a spatial representational of a physical subject suitable for visual presentation. (From HL7 v3)

A sub-type of Clinical Observation and Self-Reported Observation.

Examples of Diagnostic Image can include: Photograph, Scan, etc.

Description
an Imaging Result, identified by the accession number (a local identifier corresponding to a requisition for an imaging examination) covering the following information: - Contents of an 'imaging report' summarizing the results of a diagnostic imaging examination, structured in CDA R2 format. - imaging study - one or more series of images of a client's body, acquired through an imaging modality e.g. X-ray, MRI, Ultrasound - evidence document - an amalgam of supplementary exam documentation supporting services rendered or the findings of a diagnostic exam e.g. notes, a picture of the client or area of study - key image notes - diagnostically significant images selected from the imaging study - presentation states - radiologists' annotations and technical image metadata i.e. image rendering state

Description
(e.g. zoom, crop) supplementing images - constraining term sets (e.g. SNOMED CT, DICOM) are not regarded as conceptual entities, however a design for this data will be needed in Gate 2; note a requirement to cross reference multiple terms to constrain valid code combinations and relate terms across different term sets, and to type the relationship e.g. equivalence, replacement. Also note a requirement to store more than one term description type e.g. legal, laymen, short, alternate.

Entity - Conceptual: Diagnosis

The identification by a Provider Person of a disease or condition by scientific evaluation of physical signs, symptoms, history, lab test results, and procedures.

A sub-type of Health Care Encounter Output.

Attribute	Description
Diagnosis Type	The kind of diagnosis made, such as clinical, differential, lab, nursing and physical.

Entity - Conceptual: Clinical Observation

An Observation made by a Provider Person.

A sub-type of Observation.

Description
an Imaging Result, identified by the accession number (a local identifier corresponding to a requisition for an imaging examination) covering the following information: - Contents of an 'imaging report' summarizing the results of a diagnostic imaging examination, structured in CDA R2 format. - evidence document - supplementary exam documentation supporting services rendered or the findings of a diagnostic exam e.g. notes

Description
- presentation states - radiologists' annotations and technical image metadata i.e. image rendering state (e.g. zoom, crop) supplementing images - constraining term sets (e.g. SNOMED CT, DICOM) are not regarded as conceptual entities, however a design for this data will be needed in Gate 2; note a requirement to cross reference multiple terms to constrain valid code combinations and relate terms across different term sets, and to type the relationship e.g. equivalence, replacement. Also note a requirement to store more than one term description type e.g. legal, laymen, short, alternate.

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A sub-type of Clinical Observation and Self-Reported Observation.

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Description
alternate.

Attribute	Description
Clinical Observation Type	A code indicating the type of clinical assessment. Example of values to be coded include: Cardio stress test, ECG, Echocardiogram, etc.

Attribute	Description
Observation Collection Date/Time	Observation Collection Date and Time is the calendar date and time at which the observation was made.
Test Name	Test Name is a text string using OLIS (Ontario Lab Information System) Nomenclature mappings to identify a specific Lab test. Observation Name is the text description associated to the type of observation made.
Abnormal Result Code	This is a code used to classify the normalcy of the observation in a lab test. Examples include: L - Below low normal H - Above high normal LL - Below lower panic limits HH - Above upper panic limits N - Normal (applies to non-numeric results) A - Abnormal (applies to non-numeric results)

Attribute	Description
	AA - Very abnormal (applies to non-numeric units, analogous to panic limits for numeric units)
Lab Report	Lab Report is a statement of all lab results from a specific set of tests that were performed for a Health Care Client at a specific location and date.
Observation Class	Describes the category of Observation, e.g., lab result, diagnostic imaging result, assessment result.
Observation Value	An Observation result that is expressed numerically, or as an image.
Unit of Measure	The standard unit by which the value was taken, e.g., mmol/L, ppm, pH,

Entity - Conceptual: Adverse Reaction

Any unfavorable and unintended symptoms related to the use of a health product, health procedure, therapy, or other substance exposure, or any combination of these.

Entity - Conceptual: Adverse Drug Reaction

An Adverse Drug Reaction is a negative reaction that a Patient has after taking particular Medications, which may or may not have been caused by the medications.

A subtype of Adverse Reaction.

Attribute	Description
Adverse Reaction Description	A free-form description of the Adverse Reaction to provide further information beyond that captured by the attributes. E.g. situations where the reaction occurs, time delay before start of reaction, how long it lasts.
Offending Agent Type	The type of agent that provokes the reaction, Example of values to be

Attribute	Description
	coded include: Drug, Food, etc.

Entity - Conceptual: Barrier

A social, economic, or functional limitation that may hinder the patient's capability to self-manage his/her care.

Entity - Conceptual: Socio-economic Barrier

Social or economic limitation that may potentially hinder the patient's capability to self-manage the care plan, e.g., customs or beliefs forbidding certain treatments

A sub-type of Barrier.

Entity - Conceptual: Functional Barrier

A patient's physical or mental condition that might affect their ability to self-manage the care plan (e.g. blindness).

A sub-type of Barrier.

Entity - Conceptual: Client Care Notification

A communication to appropriate Client Team members and/or the Health Care Client, to inform them about something that has happened, should happen, or will happen. Notifications are created to help manage outstanding planned activities, issues or communications that arise from monitoring the Health Care Plan.

Entity - Conceptual: Reminder

A prompt to perform a planned activity.

A sub-type of Client Care Notification.

Entity - Conceptual: Correspondence

A communication relating to the health of, or the provision of health care to, the patient, e.g. "patient is advised to reduce alcohol consumption."

A sub-type of Client Care Notification.

Entity - Conceptual: Alert

A notification to advise of any deviation from a health care Plan Component, to assist in:

- the management of issues that arise from the Patient Care Plan such as outstanding planned activities, or
- the achievement of Activity Goals or Health Targets.

A sub-type of Client Care Notification.

Attribute	Description
Acknowledged By	The identification of the person who acknowledged receipt of the alert.
Criticality	The degree of importance of the alert. Examples: Critical, High, Medium, Low, etc.

Attribute	Description
Notification Type	The subject type of the Notification. Examples: Missed Eye Exam, Glucose Level above Target, Book Eye Exam, etc.
Notification Date	Date on which the Notification was issued.
Notification Details	A description of significant information pertaining to the Notification.

ENTITY - CONCEPTUAL: CLIENT CARE ROLE TYPE

A type of role that provides a type of care to a Health Care Client, e.g. dietary advisor, primary care provider.

Attribute	Description
Role Type	The role assumed by the team member in the planning, management and monitoring of the patient care plan. Examples: Most responsible provider, Emergency contact, Foot examiner, Eye examiner, etc.

Entity - Conceptual: Client Team Member

The role that a specific Health Care Provider or Client Supporter is assigned, to facilitate care for a Health Care Client.

Attribute	Description
Effective Date	The date on which the Team Member Role takes effect.
End Date	The date on which the Team Member Roles ceases to take effect.
Membership Date	Date on which the person was invited to become a team member.
Receive Correspondence Indicator	An indicator when set to "Yes" indicates that the individual wishes to receive program specific information.

Entity - Conceptual: Clinical Guideline

A standardized clinical target, the achievement of which would be an indication that the respective Health Care Client has reached a satisfactory state with respect to a specific Health Condition, such as diabetes or asthma.

Attribute	Description
Guideline Type	The type of guideline, e.g., Juvenile diabetes guideline, Diabetes guideline for aboriginal population, clinical best practices, etc.
Recommended Range Lower Limits	The lower range limit recommended for the care element.
Recommended Range Upper Limits	The upper range limit recommended for the care element.
Units of Measure	The standard unit by which the value was taken. Examples: Lb, Kg, Meter, Centimetre, Inch, etc.
Frequencies	The amount of time between repetitions of the event

Attribute	Description
Care Elements	Name of the item to be measured, e.g. blood pressure, or tracked, e.g. foot examinations.

Entity - Conceptual: Emergency Contact

A person to be contacted in the event of a medical emergency involving the Health Care Client.

Entity - Conceptual: Encounter Location

A place at which health services have been provided in a Health Care Encounter. It is a geographic or virtual address of the place at which the encounter occurred. It may also be temporary (e.g. flu shot clinic in a mall), mobile (e.g., ambulance, mobile lab), or in the field (e.g., car, accident site).

Attribute	Description
Location Address	TBD
Location Geo-Coordinates	Identifies an absolute location using coordinates based on a standard coordinate system.
Location Name	TBD

Entity - Conceptual: Health Care Encounter

An event occurring at a given time and place, where one or more services or products are provided to assess, maintain or improve the health of the Health Care Client. The service or product could be from a Health Care Provider, or self-provided.

Entity - Conceptual: Self-Care Encounter

An encounter where care is self-provided, e.g. glucometer reading, treatment of a wound, non-prescription medication.

A sub-type of Health Care Encounter.

Entity - Conceptual: Provider Encounter

An encounter where a Health Care Provider is involved. This could be unplanned (e.g. ER visit) or planned (e.g. doctor's appointment).

A sub-type of Health Care Encounter.

Care Event

	Description
Care Event	An imaging test booked for the future or occurred in the past.
Attribute	Description
Encounter Date	The date of the patient's contact with a provider.
Encounter Type	A code that indicates the type of encounter. Example of values to be coded include: Inpatient, Outpatient, Emergency, ambulatory, etc.

Entity - Conceptual: Health Care Encounter Output

Something produced as a result of a Health Care Encounter. Any number of outputs can be provided as a result of the same encounter, and the output can be provided after the encounter is over.

Entity - Conceptual: Fitness Activity

An activity that will prevent a health problem, or improve or maintain the patient's physical or mental condition and may help to meet a patient's lifestyle or clinical care target (e.g. exercise, meditation).

A sub-type of Health Care Encounter Output.

Attribute	Description
Activity Type	A code that describes the type of exercise performed. Example of values to be coded include: walking, swimming, yoga, etc.
Duration	The length of time the activity (e.g., exercise) lasted.

Attribute	Description
Intensity	A code that describes the exertion level of the exercise. Example of values to be coded include: High impact, Low impact, etc.

Entity - Conceptual: Intake

The administering of a substance into the body that is key to the management of a Health Care Client's condition(s), e.g. daily consumption of food items, beverages, and oral medication or injected medication.

A sub-type of Health Care Encounter Output.

Substance Administration

Attribute	Description
Intake Type	The type of intake, e.g., medication, nutrition.
Meal Type	The type of meal for the nutrition record. Examples Breakfast, Lunch, Dinner, etc.
Substance Type	The type of substance taken. Examples: cigarette, alcohol, insulin, food,
Time	Date and time at which the intake occurred.

Entity - Conceptual: Requisition

A request for a Health Product, fulfilled by providers such as:

- medical laboratories in areas such as chemistry, serology, haematology, microbiology, histology, anatomic pathology, cytology and virology, or
- diagnostic imaging laboratories in areas such as X-rays, MRIs, ultrasounds, and radiology, or
- providers of Health Care Products, such as pharmacists, where the request may take the form of a prescription, or
- health care specialists, for clinical care or evaluation that requires expertise outside the domain of the referring provider, including community services such as home care, genetic profiling, and stress testing.

A sub-type of Health Care Encounter Output.

Entity - Conceptual: Referral

A requisition for provider care.

Attribute	Description
Instructions	Indicates a minimum amount of time that must occur between dispenses. Helps the prescriber ensure that the patient does not ever receive more than the appropriate amount of medication in a particular timeframe.
Notes	N/A
Order Date	The date the product was ordered for the patient
Requisition Type	Type of requisition, e.g. referral, for medication, device, etc.

Entity - Conceptual: Clinical Procedure

A clinical activity whose immediate and primary outcome is the alteration of the physical or psychological condition of the subject. Surgery is a primary example of physical alteration, but less invasive procedures such as physiotherapy, massage, or blood donation would also apply. A psychotherapy session would be an example of altering a psychological condition.

A sub-type of Health Care Encounter Output.

Description
Imaging Procedure as encoded by SNOMED CT. Body Site, Modality and Laterality as encoded by DICOM. - constraining term sets (e.g. SNOMED CT, DICOM) are not regarded as conceptual entities, however a design for this data will be needed in Gate 2; note a requirement to cross reference multiple terms to constrain valid code combinations and relate terms across different term sets, and to type the relationship e.g. equivalence, replacement. Also note a requirement to store more than one term description type e.g. legal, laymen, short,

Description
alternate.

Entity - Conceptual: Dispense

The provision of a Device or Medication by a Provider to a Health Care Client.

A sub-type of Health Care Encounter Output.

Attribute	Description
Dispense Pickup Date	The date the dispense product was received by the patient.
Dispense Type	The type of dispensing event that is performed. Examples include: Trial Fill, Completion of Trial, Partial Fill, Emergency Fill, Samples, etc.
Instructions	Information about taking the medication, such as frequency and amounts.
Drug Lot	Medication that was produced in the same manufacturing process with the same batches of ingredients.
Prescription Dispensed Quantity	The number of units of the medication or device provided.

Entity - Conceptual: Education

Informing the client about health related activities such as managing a chronic disease, improving state of health, behavior modification, and use of Health Products.

A sub-type of Health Care Encounter Output.

Entity - Conceptual: Health Care Plan

An integrated care plan to manage the optimal health of a patient, authored by the patient and/or provider(s), to address preventative measures or existing health conditions experienced by the patient. It contains patient-

centered activities and targets that are based on best practice guidelines and are monitored by Client Team Members on a regular basis.

Attribute	Description
Notes	Textual information containing significant information to be shared with team members regarding the plan.
Overall Objective	The overall objective of the integrated care plan that is determined jointly by the patient and the provider(s) (e.g., to improve quality of life and not to prolong life). This guides the establishment of suitable Plan Components for the patient (e.g., use of pharmaceutical therapy vs. invasive procedures).

Entity - Conceptual: Health Care Provider

A person or an organization that provides health care or other health-related services or products.

Description
- can play a provider role - identified by a Unique Provider Identifier (UPI) - has contact methods e.g. email address, telephone numbers

Entity - Conceptual: Provider Person

A person that provides health care or other health-related services or products. May be regulated or non-regulated.

Privacy/Security Considerations: almost all Providers' role-based information is public. Psychologists are an exception, as they do not publish contact information publicly as of 2014.

A sub-type of Health Care Provider.

Description
- may have multiple ID's and ID sources e.g. a license number from a health care provider college, an ID

Description
number issued by a hospital - when a provider person is a health care client, the two identities are maintained independently - has a role type e.g. physician, registered nurse

Attribute	Description
Unique Provider Identifier	The Unique Provider Identifier is a number assigned by eHealth to uniquely identify each Provider.
Name	TBD
Birth Date	TBD
Death Date	TBD
Service Languages	Languages used in the provision of service.
Professions	Areas of practice qualified for.

Entity - Conceptual: Provider Organization

An organization that provides health care or other health-related services or products.

A sub-type of Health Care Provider.

Description
- has an agreement covering organization registered federated user - has a role type e.g. hospital, diagnostic imaging clinic

Attribute	Description
Organization Name	TBD

Entity - Conceptual: Health Client

An individual who is a recipient of / is eligible to receive / is acting on behalf of / supporting those receiving health care in Ontario.

Entity - Conceptual: Health Care Client

A person who:

- is eligible to receive health care services in Ontario, or
- has received or is receiving health care services in the province of Ontario (i.e. a patient).

A sub-type of Health Client.

Description
May have a health card. Current view is health card is out of eHO scope but health number, card version, card type, card status, and issue & expiry dates are required. May have multiple ID's and authoritative ID sources. Has demographic characteristics: name, gender, date of birth, language (preferred?), registration status (?). Has contact methods e.g. addresses, email addresses, telephone numbers

Attribute	Description
Administrative Gender	Patient gender type, e.g. Male, Female, undisclosed.
Adopted Indicator	Indicates whether the client was adopted.

Attribute	Description
Birth Date	Date and time of birth.
Death Date	Date and time of death.
Health Number	A number uniquely identifying a client.
Military Status	Indicator of service in the military, past or present.
Official Name	Official Name is the Legal Name of the Health Care Client. Alias - registered name, legal name
Preferred Name	The name that the Health Care Client is known to prefer to be used.
Receive Correspondence Indicator	An indicator when set to "Yes" indicates that patient wishes to receive program specific information.

Entity - Conceptual: Client Supporter

A friend or family member of the Health Care Client**, or a** trusted person, who is authorized by the client to participate either directly or indirectly in the client's health care.

A sub-type of Health Client.

Attribute	Description
Name	TBD

Entity - Conceptual: Health Concern

An issue that prompts an encounter with a Health Care Provider, such as:

- A health symptom or complaint experienced by the patient, e.g. headaches, back pain, or
- a health need expressed by the patient, e.g., continuing good health., or

- a requirement by a third party to establish the patient's health state, e.g. for life insurance, pilot licensing, job application or retention.

Attribute	Description
Health Concern Description	A textual description of the reason for having a Health Care Encounter.
Start Date	The date on which the concern or related Life Event manifested.

Entity - Conceptual: Health Condition

A health state that persists over time and tends to require intervention or management and is, therefore, distinguished from an observation made at a point in time. A health condition can "morph" over time, changing in nature or acuity, splitting or merging. “Health condition” is a broad term that includes all diseases and disorders, specifically to denote any illness, injury, disease, or complications from existing health conditions or treatment.

Entity - Conceptual: Transient Condition

A Health Condition from which the Health Care Client is expected to recover.

A subtype of Health Condition.

Entity - Conceptual: Chronic Condition

A patient's long-lasting or recurrent medical condition that may require a long period of supervision, observation or care, e.g., diabetes, hypertension, asthma.

A subtype of Health Condition.

Attribute	Description
Description	A description of the nature and extent of the medical condition.
Confirmation Date	Date on which the Health Condition was clinically confirmed.
End Date	Date on which the Health Condition was clinically determined to no longer exist.

Entity - Conceptual: Health Product

Material (i.e. medication or devices), or a service, provided for the treatment, mitigation, cure or prevention of disease or injury.

Entity - Conceptual: Device

Materials and equipment intended to be supplied, implanted or used by a patient for the treatment, mitigation, cure or prevention of a medical condition or disease, e.g. insulin syringe, contact lens, pacemaker, artificial hip, casts, splints, crutches, wheelchairs, walkers.

A sub-type of Health Product.

Entity - Conceptual: Implantable Device

A Device that is implanted in a patient's body.

A sub-type of Device.

Attribute	Description
Device Type	The type of medical device, e.g., Glucometer, Blood pressure monitor,
Manufacturer Name	TBD

Entity - Conceptual: Health Care Service

The offering and fulfillment of a specific type of health outcome by a provider to its clients, where each provisioning may require a range of interactions and touch points over time. Examples: surgery, pediatrics, obstetrics, acupuncture, chiropractic, massage.

Attribute	Description
Health Care Service Type	The type of assessment, consultation or treatment provided by the service, e.g., Foot exam, Neurological Exam, Monofilament Test, Retinal Exam, Nutrition Counselling, Exercise Counselling, Smoking Cessation Counselling, Stress Counselling, Alcohol Counselling, Other Counselling, etc.
Service Delivery Standard	Expected turnaround time for service delivery, e.g., time from when a

Attribute	Description
	lab receives a specimen to when results are available.

Entity - Conceptual: Medication

A substance intended for use in the treatment, mitigation, cure or prevention of disease. Includes prescription drugs, herbal medicine, vitamins, minerals, Chinese medicine, and other over the counter medicines.

A sub-type of Health Product.

Attribute	Description
Drug Identification Number	TBD
Drug Name	The name of the drug product, as assigned by its manufacturer. May or may not be unique. May include an indication of the strength and/or form of the product. E.g. Lipitor 10 mg tablets.
Manufacturer Name	TBD
Medication Class	The therapeutic class of the dispensed drug product.
Pharmaceutical Form	The format in which the drug product is supplied. For example, tablet, capsule, liquid, tablet (extended release), drops, solution, syrup, elixir, lotion.
Administration Route	The means by which the dispensed drug is to be administered to the patient.

Attribute	Description
Product Name	The name assigned to a Health Product.

Entity - Conceptual: Health Product Location

A place at which health products are available. It is a geographic or virtual address of the place at which encounters have occurred, or may occur. It may also be temporary (e.g. flu shot clinic in a mall), mobile (e.g., ambulance, mobile lab), or in the field (e.g., car, accident site).

Entity - Conceptual: Information Consent

A directive received from a Health Care Client for the purpose of restricting or authorizing access to or sharing of Personal Health Information (PHI) by health information custodians (implied consent directive), or authorizing non-HICs to access PHI (explicit consent directive).

Attribute	Description
Consent Status	An indicator when set to "Yes" indicates that the provider has received consent from the patient to participate in the Diabetes Registry.
Directive Type	Directive Type (e.g., implicit, explicit)
Effective Date	TBD
End Date	TBD

Entity - Conceptual: Life Event

An incident or occurrence involving the Health Care Client that causes a Health Concern to arise for that client, e.g., accident, exposure to hazardous materials, travel to countries where immunization is advised.

Entity - Conceptual: Clinical Life Event

A life event that has clinical significance, e.g. birth, death.

Entity - Conceptual: Permission

A pre-defined rule that specifies an action that a Client Care Role is authorized to execute, e.g., the Primary Care Provider ("most responsible provider") role can enroll patients to care programs, and the "family member" role can view the patient's care plan.

Attribute	Description

Attribute	Description
Permission Domain	The domain to which the access authorization pertains, e.g. component within a patient care plan such as nutrition.
Permission Type	The action that a Role is authorized to execute. Examples: Add, Update, View, etc.

Entity - Conceptual: Permission Override

The customization of a generic permission privilege that is inherited by the team member in assuming a role. It may be the restriction or relaxation of a permission type pre-defined for the role. For example, normally the "Dietician" role can only view (not update) the patient's diary. A patient may grant special permission to their dietician to enable him/her to update the nutritional intake portion of their diary.

Client Team Member

Attribute	Description
Override Permission Type	A permission type that overrides the one pre-defined for the Role in Permission, e.g. Add, Update, View, No Access.
Override Start Date	The date on which the permission override takes effect.
Override End Date	The date on which the permission override ceases to be in effect.

Entity - Conceptual: Personal Health Characteristic

A physical, social, environmental, occupational, or lifestyle factor particular to a patient that may affect his/her health and/or the provision of their health care.

Entity - Conceptual: Lifestyle Characteristic

A recurring behaviour, or trait related to the way a person lives that is relevant to their health, e.g. recreational drug use, smoking, physical activity, occupational activities, recreational activities.

A sub-type of Personal Health Characteristic.

Attribute	Description
Current Smoking Status Indicator	An indicator when set to "Yes" indicates that the patient is a current smoker as identified by the provider during a patient encounter.
Marital Status	TBD
Sexual Preference	Indicates the preferred gender(s) of the client's sex partners.

Entity - Conceptual: Immunization

An application of a technique (e.g. vaccination), that induces immune resistance to a specific disease by exposing the individual to an antigen in order to raise the level of antibodies to that antigen.

Attribute	Description
Immunization Agent	A generic classification of a manufactured vaccine. It is a code based on the standard coding scheme.
Immunization Status	A code that describes the state of an inoculation. Example of values to be coded include: Received vaccine, Refused vaccine, Procedure, etc.

Entity - Conceptual: Mental Characteristic

A mental aspect of a person of which assessments are made.

A sub-type of Personal Health Characteristic.

Entity - Conceptual: Special Need

A need for measures to be taken that are outside the norm when providing health care, e.g., language translation, mobility assistance.

A sub-type of Personal Health Characteristic.

Entity - Conceptual: Physical Characteristic

A physical aspect of a person of which measurements are taken (e.g. age, gender).

A sub-type of Personal Health Characteristic.

Attribute	Description
Clinical Gender	TBD

Entity - Conceptual: Cultural Characteristic

A self-reported characteristic such as ethnicity, race, religion, educational level, and language.

Attribute	Description
Ethnicity Type	A code indicating the type of self-declared ethnicity. Example of values to be coded include: Chinese, Cuban, East Indian, English, French, Hispanic, Inuit, Lebanese, Metis, North American Indian, Scottish, etc.

Entity - Conceptual: Behavioural Characteristic

An aspect of the way the Health Care Client behaves that is relevant to provision of care, e.g. "patient prone to violent behaviour".

A sub-type of Personal Health Characteristic.

Entity - Conceptual: Family History

Knowledge of pertinent relatives having chronic conditions such as diabetes, heart disease, and cancer.

A sub-type of Personal Health Characteristic.

Attribute	Description
Family History Item Type	A code that describes the type of historical item. Values to be coded include: Health Problem, Procedure, Risk Factor, etc.
Family Relationship Type	A code indicating the type of first degree relative with the same chronic condition. Example of values to be coded include: mother, father, sister, etc.

Entity - Conceptual: Health Finances

Ability of Health Care Client to afford user-paid care. Especially important during Transfer of Care referral to long-term care facilities.

Entity - Conceptual: Health Directive

An instruction to be followed regarding health care provided by the Health Care Client, e.g. "Do not resuscitate".

A sub-type of Personal Health Characteristic.

Attribute	Description
Unit Of Measure	The standard unit by which the value was taken. Example of values to be coded include: Lb, Kg, Meter, Centimetre, Inch, etc.
Value	A value of the patient health characteristic.

Entity - Conceptual: Plan Component

A part of a Health Care Plan, authored by the patient and/or provider(s), that is:

- a set of related activities that will be performed by the patient to assist with their Health Care Plan (e.g. disease monitoring, education/training, exercise, food intake, medication, treatment, regular examinations), or
- a goal for those activities (e.g. monitoring blood glucose on a daily basis, intake of less than 1500 calories per day), or
- A target with respect to a Health Condition or Personal Health Characteristic, e.g. non-smoker.

Entity - Conceptual: Activity Goal

A goal set by the provider and/or patient to be achieved, which contributes to improving or maintaining the patient's condition, (e.g. stress reduction, increased fitness, decreased smoking).

A sub-type of Plan Component.

Attribute	Description
Goal Description	Describes the Activity Goal.

Entity - Conceptual: Health Target

A desired state of a Health Condition or Personal Health Characteristic of a patient that can be measured by clinical tests (e.g., fasting blood glucose level less than 6, provider-assessed weight less than 130 lbs., non-smoker).

Attribute	Description
Care Element Type	A code that identifies the care element to which the patient care plan item pertains. Example of values to be coded include: Weight, Glucose Level, Foot Care, Eye Care, etc.
Change from Guideline Reason	A code explaining why the patient care plan varies from the guidelines. Example of values to be coded include: Patient's request, Patient's barrier to self-management, Patient's functional limitation, Family's request, etc.
On Target Indicator	An indicator when set to "Yes" indicates that the patient is on target for the measured care plan activity (e.g. glucose reading is within range, weight is improving). An Alert may be triggered if the on target indicator is set to "No".
Review Date	The date on which a snapshot of clinically relevant information was reviewed to determine if a patient was on or off target.
Review Notes	Additional textual information that may be used to annotate the review, when performed by a provider, or the verification of the review.
Target Date	Date by which the patient plans to reach the target state.
Target Range Lower Limit	The lower target range limit associated with the care element.
Target Range Upper Limit	The upper target range limit associated with the care element.
Target State	An absolute result targeted by the patient, e.g., target weight of 130 lbs. vs. a target weight range of 125 to 135 lbs.

Attribute	Description
Unit of Measure	The standard unit by which the value was taken. Example of values to be coded include: Lb, Kg, Meter, Centimetre, Inch, etc.

Entity - Conceptual: Plan Health Activity

An activity that the patient will perform for health reasons.

Attribute	Description
Activity Type	The type of activity to be performed. Examples: Exercise, Stress management therapy, Pharmaceutical therapy, Eye exam, Foot exam, Retinal exam, etc.
Notes	Significant information pertaining to the activity.
Duration	The length of time the activity is to be performed.
Frequency	Indicates how often the activity is targeted to be performed. Examples: Monthly, Annually, Semi-annually, etc.

Attribute	Description
Component Type	Indicates that the Plan Component is clinical vs. patient self-care.
Create Date	Date on which the Plan Component was created.

Entity - Conceptual: Provider Episode of Care

A time interval during which a series of Health Care Encounters are conducted to address one Health Condition by the same Provider Person. An episode of care starts with the very first contact with the provider for the health issue and it ends after the last encounter with the provider for the Health Condition. A hospital stay is represented by a Provider Episode of Care for the admitting doctor.

Entity - Conceptual: Sensitivity

The state, condition, or quality of reacting or being sensitive to an external stimulus, e.g. environment, substance.

Entity - Conceptual: Intolerance

An adverse sensitivity to a substance caused by a mechanism other than an immunologic over-response.

A sub-type of Sensitivity.

Entity - Conceptual: Drug-related Allergy

An allergy to a particular Medication, which can be caused by the active ingredient, the filler or the production method, (e.g. an allergy to eggs precludes use of vaccines which were incubated using eggs).

A subtype of Allergy.

Entity - Conceptual: Allergy

An immediate or delayed immune reaction caused by exposure to an antigen (allergen). This includes allergies to drug components, i.e., active ingredients and fillers. Examples of non-drug allergies are bee stings, foods, and pollen.

A sub-type of Sensitivity.

Attribute	Description
Certainty	The degree of confidence that the reaction was actually caused by the suspected substance.
Refuted Indicator	An indication that a sensitivity to a Substance has been proven clinically not to exist.
Sensitivity Status	An indication as to whether an allergy/intolerance is 'ACTIVE' or 'COMPLETE' (indicating no longer active).
Severity Level	The degree to which the client reacts to the offending substance, e.g., Mild, Severe, Life-Threatening, etc.

Entity - Conceptual: Substance

A substance capable of producing a hypersensitivity reaction.

Attribute	Description
Name	Term by which the substance is referred.

4.3 LOGICAL DATA MODEL DATA DICTIONARY

Entity - Logical: Performer TBD

Entity - Logical: Person TBD

Entity - Logical: Patient Organization Role TBD

Entity - Logical: Patient Role

A person that receives health care services from a provider.

Attribute	Description
Patient Identifier	Denotes the unique identifier(s) of the patient who is the subject of the medical record. At least one identifier of the patient must be specified; thus, it is mandatory
Patient Address	Denotes the address(s) of the patient who is the subject of the medical record.
Patient Phones And Emails	Denotes the phones and/or email(s) of the patient who is the subject of the medical record.

Entity - Logical: Place

A physical place or site with its containing structure.

Attribute	Description
Place Name	TBD
Address	TBD

Entity - Logical: Provider Provision

Attribute	Description
Team member Role	TBD
Team member Timeframe	TBD

Entity - Logical: Referenced Content

Lists attachments to the document.

Attribute	Description
Referenced Content Body	Contains the contents of a specific attachment to the document.
Referenced Content Title	Indicates the title of the attachment that is being transmitted with the content

Entity - Logical: Principal Care Provision TBD

Entity - Logical: Procedure

Attribute	Description
Effective Time	TBD
Status	TBD

Attribute	Description
Priority Code	TBD
Human Language	TBD
Procedure Method	TBD
Approach Site Code	TBD
Target Site Code	TBD

Entity - Logical: Organization Parentage

Attribute	Description
Effective Time	TBD

Entity - Logical: Organizational Contact

Represents the contact information of the callback person.

Attribute	Description
Callback Organizational Name	The name by which the callback contact person is known and referenced.
Callback Organizational Phone And Emails	Represents the phones and/or emails for the callback contact person.

Entity - Logical: Order

Attribute	Description

Attribute	Description
Order ID	TBD
Order Type	TBD
Order Priority	TBD

Entity - Logical: Organization

Identifies the organization on whose behalf the action is performed.

Used for determining responsibility and potentially confirming permissions.

Entity - Logical: Guardian Organization

Attribute	Description
Guardian Organization ID	A unique identifier for the organization Allows the organization to be referenced when determining privileges and for drill-downs to retrieve additional information. Because of its importance, the attribute is mandatory.
Guardian Organization Name	Identifies the name of the organization Allows for human recognition of the organization as well as confirmation of the identifier. As a result, the attribute is mandatory.
Guardian Organization Phones And Emails	Represents the phones and/or emails for the organization.
Guardian Organization Address	Represents the contact addresses for the organization.

Entity - Logical: Custodian Organization

Attribute	Description

Attribute	Description
Custodian Organization ID	A unique identifier for the organization Allows the organization to be referenced when determining privileges and for drill-downs to retrieve additional information. Because of its importance, the attribute is mandatory.
Custodian Organization Name	Identifies the name of the organization Allows for human recognition of the organization as well as confirmation of the identifier. As a result, the attribute is mandatory.
Custodian Organization Phones And Emails	Represents the phones and/or emails for the organization.
Custodian Organization Address	Represents the contact addresses for the organization.

Attribute	Description
Organization ID	A unique identifier for the organization Allows the organization to be referenced when determining privileges and for drill-downs to retrieve additional information. Because of its importance, the attribute is mandatory.
Organization Name	Identifies the name of the organization Allows for human recognition of the organization as well as confirmation of the identifier. As a result, the attribute is mandatory.
Organization Phones And Emails	Represents the phones and/or emails for the organization.
Organization Addresses	Represents the contact addresses for the organization.

Attribute	Description
Organization Industry Class	Indicates the industry categorization that the organization belongs.

Entity - Logical: Participation

Attribute	Description
Participation Type	TBD
Participation Function	The type of function or activity performed by the participant
Participation Period	The date and time that the participation began and ended.

Entity - Logical: Patient Care Provision Request

Discrete information about the requested service for which the referral document is being written.

Attribute	Description
Referral Fulfillment Request ID	The unique identified associated with a referral fulfillment request
Referral Type	Identifies the type or category of referral represented by this record.
Referral Status	This identifies the current state of the referral fulfillment request. Key states are: - new...the referral fulfillment request has been created but there are no responses - active...the referral fulfillment request has been created and there is at least one response - complete...the referral fulfillment request has been created and a provider has agreed to fulfill the request.
Referral Requested By Time Period	Indicates the time period for which the care provision is requested
Referral Priority	The priority of the referral fulfillment request

Attribute	Description
	TBD

Entity - Logical: Patient Observation

Attribute	Description
Patient Observation Identifier	TBD
Patient Observation Code	TBD
Patient Observation Value	TBD

Entity - Logical: Patient

Entity - Logical: Language Communication

Attribute	Description
Patient Language	TBD
Language Communication Mode	TBD
Language Proficiency	TBD
Preferred Language Indicator	TBD

Attribute	Description
Patient ID	Denotes the unique identifier(s) of the patient who is the subject of the medical record. At least one identifier of the patient must be specified; thus, it is mandatory

Attribute	Description
Patient Name	The name by which the patient is known to the underlying client registry application Used, with other patient identity attributes, to confirm patient identity This element is 'populated' because the patient's name is necessary for positive identification of the patient in the jurisdictional client registry; however in some circumstances it may not exist in the registry (e.g. newborn).
Patient Gender	Indicates the gender (sex) of the patient as known by the client registry. Complex genetic genders are handled as observations if they are considered relevant. Used to confirm patient identity. The element is mandatory because the patient's gender is necessary for positive identification of the patient in the jurisdictional client registry and should always be known.
Patient Date Of Birth	Indicates the date on which the patient was born, as known by the client registry Used to confirm patient identity. This element is 'populated' because the patient's birth date is necessary for positive identification of the patient in the jurisdictional client registry. However, there may be circumstances where the date of birth is not known to the registry.
Patient Marital Status	TBD
Patient Education Level	TBD
Patient Religion	TBD

Attribute	Description
Patient Race	TBD
Patient Ethnicity	TBD
Patient Addresses	Denotes the address(s) of the patient who is the subject of the medical record.

Entity - Logical: Patient Care Provision Proposal

Attribute	Description
Referral Fulfillment Proposal ID	TBD
Patient Observation Code	TBD
Referral Fulfillment Proposal Status	TBD
Proposed Care Provision Start Date	TBD

ENTITY - LOGICAL: SERVICE EVENT

Attribute	Description
Service ID	TBD
Service Event Type	TBD
Service Event Date	TBD

Entity - Logical: Structured Body

The Structured Body class represents a CDA document body that is comprised of one or more document sections.

The Structured Body class is associated with one or more Section classes through a component relationship.

Attribute	Description
Confidentiality Code	Indicates the appropriate control on disclosure of information in the document Body. If valued, it overrides the disclosure controls established at the document header.
Body Language	Specifies the primary human language the document body is represented in. If valued, it overrides the language requirement established at the document header.

Entity - Logical: Service Criterion

Provides information about criterion related to the service component that needs to be highlighted to referral destinations.

Attribute	Description
Service Criterion Code	A code that describes the service criteria
Service Criterion Text	Textual description of the service criteria
Service Criterion Value	The "value" portion of the service criterion code/value pair. Provides contextual information that is dependent of the code noted in the Service Criterion code attribute

Entity - Logical: Service Delivery Location

An identification of a service location (or facility) where health service has been or can be delivered. E.g. Pharmacy, Medical Clinic, Hospital

Also used to capture non-dedicated facilities such as "side of the road". This CMET is intended for circumstances that the desired service delivery location is not in the registry

Rationale

Used for tracking service delivery responsibility, to provide contact information for follow-up and for statistical analysis. Also important for indicating where paper records can be located.

Entity - Logical: Subject Person

Represents the demographic information about the person in the subject role.

Attribute	Description
Name	The name by which the Subject Person is known and referenced.
Administrative Gender	The gender of the Subject Person
Birth Time	The date on which the Subject Person was born.

Entity - Logical: Transportation Event

Attribute	Description
Transportation Mode	TBD
Transportation Description	TBD

Entity - Logical: Substance Administration

Entity - Logical: Supply

Attribute	Description
Quantity	TBD

Attribute	Description
Expected Use Time	TBD

Entity - Logical: Referral Constraint

Attribute	Description
Referral Constraint Code	TBD
Referral Constraint Description	TBD
Referral Constraint Value	TBD

Entity - Logical: Referral Criterion

Provides information about criterion related to the referral fulfillment request that needs to be highlighted to referral destinations.

For care transfer, this is the place to specify criterion such as: - accommodation type - estimated length of service; - estimated costs, - frequency, etc.

Place to specify criterion such as accommodation type, estimated length of service, estimated costs, frequency, etc.

Attribute	Description
Referral Criterion Code	A code that describes the referral criteria
Referral Criterion Text	Textual description of the referral criteria
Referral Criterion Value	The "value" portion of the referral criterion code/value pair. Provides contextual information that is dependent of the code noted in the Referral Criterion code attribute

Entity - Logical: Referral Additional Information

Attribute	Description
Additional Information ID	TBD
Additional Information	TBD
Additional Information Status	TBD

Entity - Logical: Referral Additional Information Request

Attribute	Description
Additional Information Request ID	TBD
Additional Information Question	TBD

Entity - Logical: Related Entity

Provides pertinent information about the informant who is source of the information in the document.

Attribute	Description
Personal Relationship Role Type	Used to specify the nature of the relationship between the informant and the patient. E.g. a parent, a spouse, an unrelated friend or a guy on the street. The relationship between the informant and the patient needs to be described to help the receiver of the clinical document understand the information in the document.
Personal Relationship Address	Denotes the contact address of the informant
Personal Relationship Phones And Emails	Denotes the contact telecoms (phones and/or emails) of the informant.
Personal Relationship Effective	The date and time when the personal relationship between the

Attribute	Description
Time	informant and the patient was established.
Personal Relationship Name	TBD

Entity - Logical: Request

Attribute	Description
Requested Service	Describe the service component

Entity - Logical: Section

Document sections can nest, can override context propagated from the header and can contain narrative and CDA entries.

Attribute	Description
Section Type	The code specifying the particular kind of section (e.g. Chief Complaint, Review of Systems, Assessment). The value set is drawn from LOINC, and has a CWE coding strength.
Section Title	Represents the label of a section. If valued, it is to be rendered as part of the narrative content of the clinical document body.
Section Content	Used to store narrative to be rendered. Also referred to as the CDA Narrative Block
Section Masking Indicator	Indicates the appropriate control on disclosure of information in the document section. Overrides the value propagated from Structured Body
Section Language	Specifies the primary human language the document section is represented in.

Attribute	Description
	Overrides the value propagated from Structured Body.

Entity - Logical: Related Subject

Provides pertinent information about the related person who is subject of the information in this section/entry of the document.

Attribute	Description
Personal Relationship Role Type	Used to specify the nature of the relationship between the subject and the patient. E.g. a son, a daughter, a family member.
Related Subject Address	Denotes the contact address of the subject, most often the same as the patient.
Related Subject Phones And Emails	Denotes the contact telecoms (phones and/emails) of the subject; most often the same as the patient.
Awareness Code	From the 'subject' Participation association in REPC_MT210001ON - Referral Record - Clinical note

Entity - Logical: Repository Reference

Links to external sites, folders, documents that can be referenced from within the document.

Attribute	Description
Reference Record Link	Specific URL, document ID, or other identifiers that point to pertinent information outside of the document.

Entity - Logical: Observation Request

Entity - Logical: Callback Person

Attribute	Description

Attribute	Description
Callback Contact Person Names	TBD
Callback Contact Person Phones And Emails	TBD

Entity - Logical: Care Event

Entity - Logical: Authoring Device

Represents information about the device that compiled/composed and transmitted the referral document. This is usually either triggered by an event or time schedule.

Attribute	Description
Manufacturer Mode Name	The name assigned to a particular hardware model.
Software Name	The name assigned to a particular application instance.

Entity - Logical: Birthplace

Relates a place as the location where a living subject (the patient) was born.

Entity - Logical: Clinical Document

Represents a particular health-related document pertaining to a single patient.

Allows the capture of patient health data in an encapsulated, contextualized manner with capability of displaying rendered content and communication between simple systems.

Attribute	Description
Clinical Document ID	Unique identifier for the clinical document.
Document Category	The code specifies the particular type of document. E.g. care transfer referral note, care referral note, cardiology care referral note.

Attribute	Description
Document Title	A human-readable label for this particular document.
Clinical Document Status	Indicates the clinical document status as defined by the HL7 state machine. For example, a clinical document with a status of 'active' could be interpreted as being an interim or in-progress document.
Document Creation Date Time	TBD
Document Masking Indicator	Indicates the appropriate control on disclosure of information in the document. Confidentiality is a required contextual component of CDA, where the value expressed in the header holds true for the entire document, unless overridden by a nested value.
Document Set ID	Represents an identifier that is common all document revisions.
Document Version	An integer value used to version successive replacement documents.
Document Language	Specified the primary human language the document is represented in.
Data Entry Date	Represents the date and time when the dictated note was transformed into text.

Entity - Logical: Consenter Person

Attribute	Description
Consenter Name	TBD

Entity - Logical: Contact Party TBD

Entity - Logical: Consent

References the consents associated with this document.

This Consent class represents informed consents and medico-legal transactions.

Attribute	Description
Consent ID	Unique identifier assigned to a specific record of consent.
Consent Type	Indicates the types of consent associated with the content of the document. Examples of the type of consent include: - a consent to perform the related Service Event; - a consent for the information contained in the document to be released to a third party
Status Code	TBD
Consent Period	TBD

Entity - Logical: Consenter or Witnessing Agent TBD

Entity - Logical: Act Proposal

Attribute	Description
Proposed Service	TBD

Entity - Logical: Annotation

Attribute	Description
Note Text	TBD
Status Code	TBD

Entity - Logical: Assigned Author

An author is a person in the role of an assigned author (Assigned Author class).

The entity playing the role is a person (assigned Author Choice Person class) or a device (assigned AuthorChoice.AuthoringDevice class).

The entity scoping the role is an organization (represented Organization.Organization class), and is the organization from which the document originates.

Attribute	Description
Author Identifier	TBD
Author Role Type	TBD
Author Role Address	Denotes the contact address of the provider person or the device in the document author role.
Author Phone And Address	Denotes the contact phone and emails of the provider person or the device in the document author role.
Author Priority	This indicates the priority of the author(s) in cases where there are multiple authors for the document.
Time	Represents the data and time when the document was authored by human or machined.
Attested Indicator	

Entity - Logical: Assigned Person TBD

Entity - Logical: Associated Entity

An Associated Entity plays the role of a supporting person or organization, being an individual or an organization with a relationship to the patient.

A supporting person who is playing multiple roles would be recorded in multiple participants (e.g., emergency contact and next-of-kin)

Attribute	Description
Associated Entity Identifier	TBD
Associated Entity Role Code	TBD
Associated Entity Address	TBD
Associated Entity Phones And Emails	TBD

Entity - Logical: Assigned Custodian TBD

Entity - Logical: Assigned Entity

An assigned entity is a person assigned to the role by the scoping organization.

The entity playing the role is a person (Person class). The entity scoping the role is an organization (Organization class).

Critical to tracking responsibility and performing follow-up. The supports both licensed providers as well as non-licensed providers such as technicians, receptionists, etc.

The authenticator identifies a participant or participants who attested to the accuracy of the information in the document.

Entity - Logical: Health Care Provider

Attribute	Description
License Number	TBD

Entity - Logical: Authenticator

An assigned entity is a person assigned to the role by the scoping organization.

The entity playing the role is a person (Person class). The entity scoping the role is an organization (Organization class).

Critical to tracking responsibility and performing follow-up. The supports both licensed providers as well as non-licensed providers such as technicians, receptionists, etc.

Entity - Logical: Legal Authenticator

An assigned entity is a person assigned to the role by the scoping organization.

The entity playing the role is a person (Person class). The entity scoping the role is an organization (Organization class).

Critical to tracking responsibility and performing follow-up. The supports both licensed providers as well as non-licensed providers such as technicians, receptionists, etc.

Attribute	Description
Verification Date	Indicates the date and time of authentication.
Signature Code	A code indicating that a signature has been obtained and is on file.

Attribute	Description
Signature Code	Coded value indicating that a signature has been affixed and is on file.

Attribute	Description
Healthcare Worker Identifier	Unique identifier of the person involved in the action. Allows unique identification of the person which can be critical for authentication, permissions, drill-down and traceability and is therefore mandatory.

Attribute	Description
Healthcare Worker Name	TBD
Healthcare Worker Type	Indicates the "kind" of healthcare participant, such as "physician", "dentist", "lab technician", "receptionist", etc. Provides context around the actions of the participant and is therefore mandatory.
Healthcare Worker Address	TBD
Healthcare Worker Phone And Emails	This is the most commonly used piece of contact information and is returned here to avoid unnecessary queries of the provider registry.

Entity - Logical: Informant

The informant element describes the source of the information in a medical document.

Assigned health care providers may be a source of information when a document is created. (e.g., a nurse's aide who provides information about a recent significant health care event that occurred within an acute care facility.) In these cases, the assigned Entity element is used.

When the informant is a personal relation, that informant is represented in the related Entity element. The code element of the related Entity describes the relationship between the informant and the patient. The relationship between the informant and the patient needs to be described to help the receiver of the clinical document understand the information in the document.

Entity - Logical: Intended Recipient

Information about the intended recipient.

Where the intended recipient can be a 'Person', the playing entity is a Person.

Where the intended recipient is an Organization, the IntendedRecipient.classCode is fixed to "ASSIGNED"

Attribute	Description

Attribute	Description
Intended Recipient Identifiers	Unique identifier for a person or organization, as an intended recipient of the document. Many identifiers may be specified as necessary.
Intended Recipient Addresses	Designates the address of the intended recipient for the document.
Intended Recipient Phones And Emails	Designates the phones and emails of the intended recipient for the document

Entity - Logical: Health Document Attachment

Attribute	Description
Attachment Identifier	TBD
Attachment Type	TBD
Attachment Content	TBD

Entity - Logical: Indication

Entity - Logical: Non-XML Body

Attribute	Description
Non XML Body Masking Indicator	TBD
Non XML Body Language	TBD

Entity - Logical: Observation Media

Attribute	Description

Attribute	Description
Human Language	TBD
Value	TBD

Entity - Logical: Observation Range

Attribute	Description
Observation Range Code	TBD
Observation Range Text	TBD
Observation Range Value	TBD

Entity - Logical: Observation

Attribute	Description
Clinical Observation Document Type	TBD
Status	TBD
Clinical Observation Document Time Range	TBD
Referral Priority	TBD

Entity - Logical: Observation Event

Attribute	Description

Attribute	Description
Patient Observation Identifier	TBD
Patient Observation Code	TBD
Patient Observation Value	TBD

Entity - Logical: Document Organizer Event TBD

Entity - Logical: Document Parentage

The Parent Document represents the source of a document revision, addenda, or transformation.

Attribute	Description
Replaces Record ID	Unique identifier for the clinical document
Clinical Report Document Type	The code specifies the particular type of document. e.g. care transfer referral note, care referral note, cardiology care referral note
Header Content	Used to indicate the MIME type of the related document. It is not to be used to embed the related document.
Document Set ID	Represents an identifier that is common across all document revisions. All documents in a chain of replacements have the same ClinicalDocument.setId and are distinguished by an incremented ClinicalDocument.versionNumber.
Version Number	An integer value used to version successive replacement documents. All documents in a chain of replacements have the same ClinicalDocument.setId and are distinguished by an incremented ClinicalDocument.versionNumber

Entity - Logical: Data Entry

Attribute	Description
Data Entry Date	TBD

Entity - Logical: Device TBD

Entity - Logical: Assigned Device

Represents information about the device that compiled/composed and transmitted the referral document. This is usually either triggered by an event or time schedule.

Attribute	Description
Application ID	TBD

Attribute	Description
Application Name	TBD

Entity - Logical: Encompassing Encounter

Attribute	Description
Act Care Event Type	TBD
Encounter Date	TBD
Encounter Discharge Disposition	TBD

Entity - Logical: Guardian Person

Attribute	Description
Guardian Name	TBD

Entity - Logical: Health Care Facility

Attribute	Description
Health Care Facility ID	TBD
Service Delivery Location Type	TBD

Entity - Logical: Encounter TBD

Entity - Logical: Guardian

An entity (person or organization) that has been nominated and/or duly appointed to make decisions on behalf of the patient.

A guardian of the person may also be called a personal guardian or conservator of the person.

Attribute	Description
Guardian ID	TBD
Guardian Type	TBD
Guardian Address	TBD
Guardian Phones And Emails	TBD