

eHealth Ontario

Connectivity Strategy for Ehealth in Ontario

Version: 1.0

EXECUTIVE SUMMARY	1
INTRODUCTION	2
DESIGN	3
KEY DESIGN PATTERNS.....	3
<i>Single Sign-On, Identity Federation, and Context Sharing</i>	3
<i>Systems of Authority</i>	4
CONTRIBUTING EHR INFORMATION	5
<i>Direct Feeds</i>	5
<i>Aggregated Feeds</i>	5
<i>HIAL-Assisted Feeds</i>	5
CONSUMING EHR INFORMATION.....	5
<i>POS-EHR Service Integration</i>	5
<i>POS-Portal Integration</i>	5
<i>Provincial Portal Integration</i>	6
<i>Targeted Delivery to Point of Service (POS) Systems</i>	6
<i>Notifications</i>	6
SERVICE ORIENTED ARCHITECTURE.....	7
STANDARDS-BASED CONNECTIVITY.....	7
PROVINCIAL INTEGRATION MODEL (PIM) VIEWS	7
PROVINCIAL CONNECTIVITY OVERVIEW.....	9
<i>Future State</i>	10
<i>Current State</i>	12
<i>Transition</i>	12
CLINICAL DOMAINS.....	14
LABORATORY	14
<i>Future State</i>	15
<i>Current state</i>	16
<i>Transition</i>	16
MEDICATION	17
<i>Future State</i>	18
<i>Current State</i>	19
<i>Transition</i>	19
DIAGNOSTIC IMAGING.....	21
<i>Future State</i>	22
<i>Current State</i>	23
<i>Transition</i>	23
CARE SETTINGS	25
ACUTE AND AMBULATORY CARE.....	25
<i>Future State</i>	26
<i>Current State</i>	27
<i>Transition</i>	27
PRIMARY AND SECONDARY CARE.....	29
<i>Future State</i>	30

<i>Current State</i>	31
<i>Transition</i>	31
COMMUNITY CARE	33
<i>Future State</i>	34
<i>Current State</i>	35
<i>Transition</i>	35
PROVINCIAL EHR INTEGRATION ASSETS	36
PROVINCIAL HIAL	36
<i>Future State</i>	38
<i>Current State</i>	41
<i>Transition</i>	42
PROVINCIAL CLIENT REGISTRY (PCR)	42
<i>Future State</i>	43
<i>Current State</i>	44
<i>Transition</i>	44
PROVINCIAL PROVIDER REGISTRY (PPR).....	45
<i>Future State</i>	46
<i>Current State</i>	47
<i>Transition</i>	47
PORTALS AND VIEWERS.....	48
<i>Future State</i>	50
<i>Current State</i>	53
<i>Transition</i>	54
ONE ID	54
<i>Future State</i>	56
<i>Current State</i>	57
<i>Transition</i>	60
AUDIT	60
<i>Future State</i>	61
<i>Current State</i>	62
<i>Transition</i>	63
CONSENT	63
<i>Future State</i>	64
<i>Current State</i>	65
<i>Transition</i>	66
PROVINCIALY INTEGRATED EHEALTH SERVICES	67
ONTARIO ASSOCIATION OF COMMUNITY CARE ACCESS CENTRES (OACCAC).....	67
<i>Future State</i>	68
<i>Current State</i>	69
<i>Transition</i>	69
CANCER CARE ONTARIO (CCO)	69
<i>Future State</i>	71
<i>Current State</i>	72
<i>Transition</i>	72
ONTARIO TELEMEDICINE NETWORK (OTN)	72

<i>Future State</i>	74
<i>Current State</i>	75
<i>Transition</i>	75
ENVIRONMENTAL CONDITIONS FOR SUCCESS	77
ACCEPTANCE OF THE CONNECTIVITY STRATEGY	77
EFFECTIVE GOVERNANCE.....	77
AN OPEN PROVINCIAL EHR PLATFORM.....	78
PROVINCIAL eSAFETY MANAGEMENT.....	79
HEALTH CARE CLIENT IDENTITY MANAGEMENT STRATEGY.....	81
REGULATIONS AND AGREEMENTS.....	81
EVOLVING NEEDS AND EMERGING OPPORTUNITIES	82
MHEALTH AND CONSUMER eHEALTH	82
USING EHR DATA FOR HEALTH SYSTEM AND CLINICAL DECISION SUPPORT.....	82
DATA SHARING AGREEMENTS AND INFORMATION FLOW CONTROLS.....	83
INTERDEPENDENT REGISTRIES.....	84
<i>Service Delivery Location</i>	84
<i>Provider EMR Rostering</i>	84
COGNITIVE COMPUTING.....	84
CONCLUSION	86
APPENDIX A: ACRONYMS	87
APPENDIX B: SOA POLICIES	90
APPENDIX C: PIM DIAGRAMS	92
TABLE 1 – PROVINCIAL INTEGRATION MODEL ACTORS	92
TABLE 2 – PROVINCIAL INTEGRATION MODEL SYSTEMS	92
PIM VIEW LEGEND	110
FULL SIZE PIM VIEWS	111

EXECUTIVE SUMMARY

Ontario's ehealth connectivity strategy describes how health care information will be connected to create a safe, cost-effective, provincially integrated electronic health record (EHR). It identifies the strategic health information technology (HIT) assets that are key to the future state of the EHR, and describes the approach to connecting them, capitalizing on health care industry trending and health informatics standards and provincially-approved specifications. Designed to inform EHR investment and integration decisions, the strategy's primary theme is how local, regional, and provincial HIT solutions need to integrate with provincial EHR integration assets. It defines requirements for contributing and consuming EHR information, and examines some of the environmental conditions that will help realize the future state.

Current and future states of connectivity are described for clinical domains (labs, medication, diagnostic imaging) and care settings (acute and ambulatory, primary and secondary, and community care), as well as the activities required to integrate them with provincial EHR integration assets. Transition activities may involve implementing interim solutions to ease migration, and deciding which HIT assets will become authoritative for an EHR data set or function. The strategy also examines current and future states of key EHR integration assets, such as the provincial health information access layer (HIAL), registries and repositories, as well as audit and consent solutions. It outlines provincially integrated ehealth services offered by the Ontario Association of CCACs, Cancer Care Ontario, and the Ontario Telemedicine Network, both in terms of connectivity and the opportunity to leverage them as EHR integration assets. Finally, the strategy looks forward to challenges and opportunities emerging from both clinical and commercial sectors, as well as elements of the evolution of provincial EHR connectivity.

In future, health care providers and clients will be empowered by comprehensive health care information and advanced point of service systems, and protected by solutions such as the HIAL and provincial registries and repositories, which ensure their safety and privacy.

INTRODUCTION

Health care in Ontario is provided in a variety of settings across organizational boundaries such as primary, acute, ambulatory, and community care. At the centre of the health care landscape are the clients, who may need to traverse these health care settings to access a wide range of providers.

To provide continuity in an individual's care journey, providers need access to information collected by other organizations as well as to share information with the other providers supporting the client. Organizations are working to digitize health records within their domains, but information is not always complete, nor is it always available in a timely fashion to the next care provider along the journey, and it may not be captured in a consistent or standardized method.

As the provincial EHR integrator, eHealth Ontario has the mandate, to give providers access to health care information collected in the process of care. The connectivity strategy defines the path to connecting a client's health information to his/her care team. Ontario's approach is to leverage investments made to date, and to provide a blueprint and plan for connecting information across multiple organizations to form a comprehensive view of the health record, regardless of source.

One of the strategy's central goals is providing context and reference information to inform local, LHIN, regional, and provincial investment and integration decisions. Its design reflects a deep empathy for systems integrators across the province who are tasked with connecting POS systems and HIT assets to provincial EHR services, and for health service providers who have made capital investments in HIT that they need to leverage. The strategy enables EHR connectivity by prioritizing consistency and reuse and capitalizing on health care industry trending, health informatics standards and common specifications, leading to an efficient, effective, and safe provincial EHR.

One important component is the **Ehealth solutions asset inventory**, which lists ehealth assets that stakeholders can combine with local assets to address their own health care challenges. This online inventory divides assets into two categories: strategic assets – those aligned with Ontario's ehealth blueprint, which represent the future of the EHR; and tactical assets – those currently required to enable EHR adoption, but which may not be part of the future EHR. Each asset solves specific challenges related to aggregating and sharing health care client information.

A helpful companion document – **the Requirements for point of service procurements** – is a business tool for planners and decision makers. It contains requirements and evaluation information supporting procurements, which can be copied and pasted directly into requests for proposals. It also provides practical connectivity guidance to stakeholders.

The connectivity strategy is based on the **Ehealth blueprint**; together they present the reference architecture for Ontario's EHR. The blueprint describes the components required for the future state EHR. The strategy outlines the steps required to go from the current to the future state.

DESIGN

Broad-based EHR integration and adoption in Ontario will be achieved through leveraging open industry standards and specifications and by avoiding proprietary vendor interoperability specifications. Key design patterns and service oriented architecture will help to build a future state EHR which leverages investment, capitalizes on success, and shortens the time required to achieve broad-based adoption of the provincial EHR and ehealth services.

Details relating to the applicable standards and specifications and their implementations are available at the [eHealth Ontario Architecture, Standards, and Planning](#) website.

KEY DESIGN PATTERNS

The connectivity described in the future state (and some current states) PIM views reflect proven design patterns that have evolved over time and are based on Ontario's ehealth blueprint, the Canada Health Infoway EHR blueprint, established industry practices, evolving industry trends, and eHealth Ontario's experience in integrating HIT assets. These design patterns offer flexibility in integrating HIT assets, since systems integration involves choosing the approach that best suits business needs, given the constraints of the integration scenario.

SINGLE SIGN-ON, IDENTITY FEDERATION, AND CONTEXT SHARING

All solutions discussed in the connectivity strategy require some form of logon or authentication when being accessed by users or other systems. Authentication is used by a solution to determine the level of access (authorization) permitted to the connecting user, and the information that is accessed. Authentication and authorization are fundamental prerequisites to protecting patient information and securing EHR solutions.

Single sign-on (SSO) and identity federation are concepts that make it easy for health care providers to securely access EHR information. Given the fundamental need to protect patient privacy and ensure information security, EHR systems require providers to supply usernames, passwords and often other information whenever they launch an EHR viewer, application, or otherwise access EHR information.

Single sign-on provides the ability to leverage authentication across many solutions, which means that once users have logged on to their POS system with their username and password, no subsequent logons are required. Identity federation is a form of single sign-on, but on a provincial scale, where a single logon provides access to all solutions participating in the provincial federation. From a systems integration perspective, identity federation is a single hub-spoke model where each identity provider and each service provider trusts (and is trusted by) a federation operator that brokers authentication.

Context sharing, which complements single sign-on, is the ability to specify a patient when launching an EHR viewer (e.g. ClinicalConnect™, clinical data viewer (CDV), ONE Portal). When users view a health care client's record in their POS system, they can launch an EHR viewer to see a holistic provincial view of the client without searching for him or her, as this information has already been provided through context sharing.

Details on single sign-on, identity federation, and context sharing are provided in the provincial EHR integration assets/ONE ID section.

SYSTEMS OF AUTHORITY

Systems of authority are the EHR's reference systems: the provincial registries and repositories that are considered authoritative for EHR content and the 'sources of truth' for provincially shared EHR information. EHR information originates in systems of record, which are the POS systems where health information is captured electronically and then shared with systems of authority (provincial EHR). Ontario laboratories information system (OLIS), diagnostic image repositories (DI-rs) and drug repositories are examples of provincial systems of authorities, for labs, diagnostic imaging and drugs.

CLINICAL REPOSITORIES

EHR repositories allow effective and efficient sharing of information through a central repository, rather than having individual systems across the province queried every time a client's EHR is accessed. Clinical repositories aggregate lab, medication, diagnostic imaging, and other clinical information essential into a comprehensive EHR. This consolidation of information enables consistent EHR availability, data representation and quality, integration and access, and the enforcement of privacy and security policies. However, while a single repository for all data sets may represent the optimal IT investment, practicalities relating to governance, stewardship, and integration currently mean that provision must be made for handling multiple repositories at the same time as seeking opportunities for consolidation.

While some repositories are single-instance, such as labs and medication, there are advantages to having multiple instances of others. With diagnostic imaging, for example, multiple regional repositories are the practical approach, due to the logistical challenges that can arise from replicating large image files. Multi-instance repositories use an index to bind them together so they appear as a single instance to clients and providers. This approach is useful in preparing for the transition to a consolidated, single repository, as it allows for balancing the timely delivery of clinical value with total cost of ownership and optimization of information technology assets.

The provincial integration model (PIM) views depict a single clinical data repository (CDR) as a repository for EHR datasets originating in acute, primary, and community care settings – an idealized future state where IT investments are fully optimized (i.e. a single physical CDR). Due to practical considerations relating to data governance and quality, data stewardship, project delivery, and opportunity for turn-key solutions, the connectivity strategy makes architectural provision for multiple physical CDR repositories that are logically presented as a single CDR via an XDS index. This approach is used extensively in other jurisdictions, and is an implementation detail transparent to providers and clients. While it is clear that the CDR hosting acute and ambulatory care information will utilize an integration layer (the HIAL procured as part of the cGTA backend solution), it is not clear that this layer is required to support primary and community care CDR transactions. The provincial CDR depicted in the primary and community views therefore does not include this integration layer.

EHR REGISTRIES

EHR registries are also a consolidation of EHR-related information, designed to support EHR transactions by linking information such as a record to a client, a provider to a license number, or a provider to a client. As with repositories, registries enable EHR consistency; consistent linking of clients to their records, and consistent management of provider information.

CONTRIBUTING EHR INFORMATION

DIRECT FEEDS

Provincial EHR services such as registries and repositories are designed to receive feeds directly from POS systems. This includes client identity feeds from hospital admit discharge transfer (ADT) systems to the provincial client registry; laboratory information system (LIS) feeds to OLIS; diagnostic imaging report feeds from regional DI-rs; and clinical documents from hospital information system (HIS) feeds to a clinical data repository (CDR). While these appear to be direct connections from a POS perspective, all transactions with provincial EHR services are secured by the HIAL.

AGGREGATED FEEDS

Aggregation is a common pattern for contributing EHR information to provincial EHR registries and repositories. In these patterns, regionally-based integration software is used to transform content from legacy to contemporary formats, and/or consolidate legacy system feeds for delivery to provincial EHR services. These aggregators may be purpose-built to suit a particular clinical information integration need, or used for more general EHR integration purposes. An example is OLIS integration points; these are technologies that received lab reports from a number of partner lab information systems, and consolidate and modify their format for input to OLIS.

HIAL-ASSISTED FEEDS

Similar to aggregated feeds, regional HIAL segments transform content from legacy to contemporary formats and/or consolidate legacy system feeds for delivery to provincial EHR services. The creation of regional HIAL segments is driven by regional integration needs, and is a joint decision between the region and eHealth Ontario.

See the **provincial HIAL** section for details regarding regional HIAL segments, their architecture, and their intended purposes.

CONSUMING EHR INFORMATION

POS-EHR SERVICE INTEGRATION

Each provincial ehealth service is designed to be machine-consumable. This means that health care clients and providers can view EHR information on demand from within the system of their preference, provided that the system has the technical ability and authorization to do so. In these cases, POS systems need to connect to each EHR service individually in order to build a full view of the provincial EHR. Where such native integration is not feasible (e.g. with legacy or commercial off-the-shelf (COTS) based POS systems), EHR viewers and portals supplement POS systems to provide a complete view of a health care client's EHR.

POS-PORTAL INTEGRATION

Although providers prefer to work exclusively in a single POS application, there are a growing number of portals that they need to access in order to provide care. While the EHR architecture makes provision for providers working exclusively in their POS systems, the vast majority of clinical information systems are not designed for such integration. For the foreseeable future it is therefore necessary to rely upon web portals to ensure that all

providers have access to provincial EHR information. While health service providers can log directly onto these portals and viewers to access EHR information, direct integration with their POS systems is often preferred.

In such cases, when providers are viewing a health care client's information from within their POS systems and want to view provincial EHR information that is only available through a portal, they can do so by launching the portal view of this information without additional log on or re-specifying the health care client. This capability is called single sign-on and context sharing, and is enabled by both the POS system and the portal integrating with ONE ID. It is further described in the **ONE ID** section.

PROVINCIAL PORTAL INTEGRATION

Although each portal can be launched directly from a web browser or POS system, the profusion of URLs and web applications required to build a complete view of the EHR will significantly hinder adoption and usability. To mitigate this profusion of access points, an aggregator will be created from which all portals containing EHR information can be accessed.

This provincial portal provides a unified point of access to all the EHR portals and viewers available to a health care provider without requiring additional logon. This capability will be provided through the Ontario Network for eHealth (ONE) Portal, using ONE ID and its federation partners as the authentication provider and context sharing enabler.

TARGETED DELIVERY TO POINT OF SERVICE (POS) SYSTEMS

Due to regulatory requirements, EHR information is often required to be delivered directly to a POS system. This means that some EHR records, such as hospital discharge summaries, are delivered directly to a provider's POS system based on provider-defined subscription information and provider identity information in the EHR record. Capabilities required to support this pattern include subscriptions and notifications (see the **provincial HIAL** section), and interdependent registries (see the **evolving needs and emerging opportunities** section).

NOTIFICATIONS

Notifications are messages sent to health care provider POS systems indicating that new health care client clinical information is available. The subscription service allows providers to specify which notifications they would like to receive, and where they would like the notifications to be delivered. Notifications are distinct from clinical alerts or broadcasts, and simply involve the delivery of information that the care provider has subscribed to.

Providers subscribe to a topic such as new lab results for a set of health care clients, and then notifications are sent to the provider's POS system as soon as such information is available. This allows care providers to control the information that flows in and out of their practice, giving them the ability to subscribe to more information for some health care clients on their roster than others. Where supported by agreements and the enforcement of privacy and security policies, notifications may contain the new clinical information itself (PHI). Subscription and notification capabilities are described in the **provincial HIAL** section.

Notifications also includes eNotifications, which are messages to providers indicating that a health care client in their care has been admitted or discharged from a specific care setting.

SERVICE ORIENTED ARCHITECTURE

Service oriented architecture (SOA) is a contemporary, well-established approach to distributed systems design. It allows for flexibility and agility, and promotes the reuse of technology investments. The consistency that SOA practices brings to the development of ehealth services improves technical service adoption, as it greatly assists systems integrators in finding and connecting to services.

In the future, it will be easy for a systems integrator to find EHR services of interest, and download the tooling, specifications, samples, and implementation guides necessary for connecting to these services. Services written according to SOA policies will be interoperable with other services written to these policies. Investments made in building an EHR solution can be leveraged, enabling the ‘assembly’ of new solutions built upon reuse of existing services. See the **provincial HIAL** section for details related to the service registry and SOA policies.

STANDARDS-BASED CONNECTIVITY

At the heart of EHR connectivity is interoperability; the ability of IT systems to exchange information (functional interoperability), while preserving and understanding the meaning of the information being exchanged (semantic interoperability). In order for information to be exchanged between two systems, they need to use the same technical specifications: these can either be proprietary (e.g. the same vendor software is used by both systems) or open (supported by many vendor software products). While proprietary specifications are often easier to implement, provincial interoperability of HIT is only feasible through deliberate selection and use of appropriate open standards.

While custom or proprietary specifications can shorten time to market, they do not lead to broad-based interoperability. This is due to issues of scalability and extensibility, implementation and maintenance costs, procurement policy and vendor access to market, and/or incompatibility with existing/legacy HIT investments. And while integration technologies such as the HIAL can provide some level of interoperability among specifications, they do not alleviate the need for POS systems to provide the relevant specific information required for overall interoperability.

PROVINCIAL INTEGRATION MODEL (PIM) VIEWS

Managing and communicating the complexity of EHR systems integration at a provincial level requires specialized software and a visualization approach that makes it accessible to a broad range of audiences. Enterprise architecture modelling tools have been used to generate views for the connectivity strategy from a single, comprehensive PIM. When changes are made to one PIM view, the others are automatically updated based on defined relationships and dependencies.

The connectivity strategy PIM views illustrate the flow of information from systems that capture and author health information through integration systems, shared storage locations, and delivery mechanisms, to consuming systems accessed by clinicians and clients. In systems integration terms, PIMs are known as conceptual data flow diagrams.

The PIM views are consistently formatted, with clients, clinicians, and their POS systems and viewers at the top, intermediary systems in the middle, and clinical domain repositories and source systems at the bottom.

The strategy explains each concept once only. The PIM views therefore do not show all flows in all views. For example, all data flows to and from provincial EHR assets such as the provincial client and provider registries and

are mediated by the HIAL. This message is conveyed in the provincial integration overview PIM, but not in the other PIMs. Similarly, the care settings PIM views do not show how lab data flows into these settings, as this is explained in the lab PIM views.

PROVINCIAL CONNECTIVITY OVERVIEW

Summary of Provincial EHR Connectivity	
Current State	Future State
<ul style="list-style-type: none"> • Most assets use local client and provider registries, without integration with the provincial registries. This prevents reliable connection of clinical information to form a shared, provincial EHR • Most assets use local privacy and security controls, leading to inconsistent enforcement of policy among solutions • Delivery of EHR content is diverse and fragmented 	<ul style="list-style-type: none"> • Ubiquitous use of provincial client and provider registries safely and reliably link information to form a provincial EHR • The provincial HIAL is used to consistently enforce privacy and security policies • The EHR data set, representing the longitudinal client record, is comprehensive, and uses consistent mechanisms to deliver EHR information
Transition	
<ul style="list-style-type: none"> • The South West Ontario (cSWO), Greater Toronto Area (connectingGTA), and Northern & Eastern Ontario (cNEO) connecting projects deliver clinical value while positioning assets and stakeholders for transition to future state • Transition to future state is executed on a case-by-case basis based on application schedules, resource availability and provincial, regional, and clinical priorities 	
Strategic Assets	<ul style="list-style-type: none"> • Provincial clinical data viewer (CDV) • Provincial EHR integration assets (HIAL, the provincial client registry (PCR), the provincial provider registry (PPR), ONE ID, audit, consent, terminology standards and services) • Clinical domain repositories (clinical data repository (CDR), OLIS, diagnostic imaging repository)
<ul style="list-style-type: none"> • ClinicalConnect™ viewer • Panorama • Comprehensive drug profile repository (CDPR) 	
Key Milestones	<ul style="list-style-type: none"> • Integration with provincial assets including: <ul style="list-style-type: none"> ○ CDR general availability ○ HIAL subscription and notification ○ ONE ID single sign on /federation ○ Hospitals and CCAC's in all regions contribute to the CDR ○ cNEO shares CDV with connectingGTA ○ Integration with provincial registries ○ Integration with provincial repositories and the CDPR ○ cSWO ClinicalConnect™ viewer to access CDR via HIAL ○ eReferral provincial reference model (PRM) and standards package is updated and published ○ Integration with the DI provincial image viewer ○ ONE Portal hosting the Ontario drug benefit program portlet for additional users (e.g. pharmacies) ○ Transition from HNS to the CDPR • EMR integration including: <ul style="list-style-type: none"> ○ Access to provincial repositories ○ HIAL interfaces supporting the exchange of EHR information between POS systems (e.g. EMRs) and provincial registries and repositories ○ Access to provincial registries ○ ONE ID single sign on /federation ○ Updated EMR specifications to contribute and access registries and repositories

FUTURE STATE

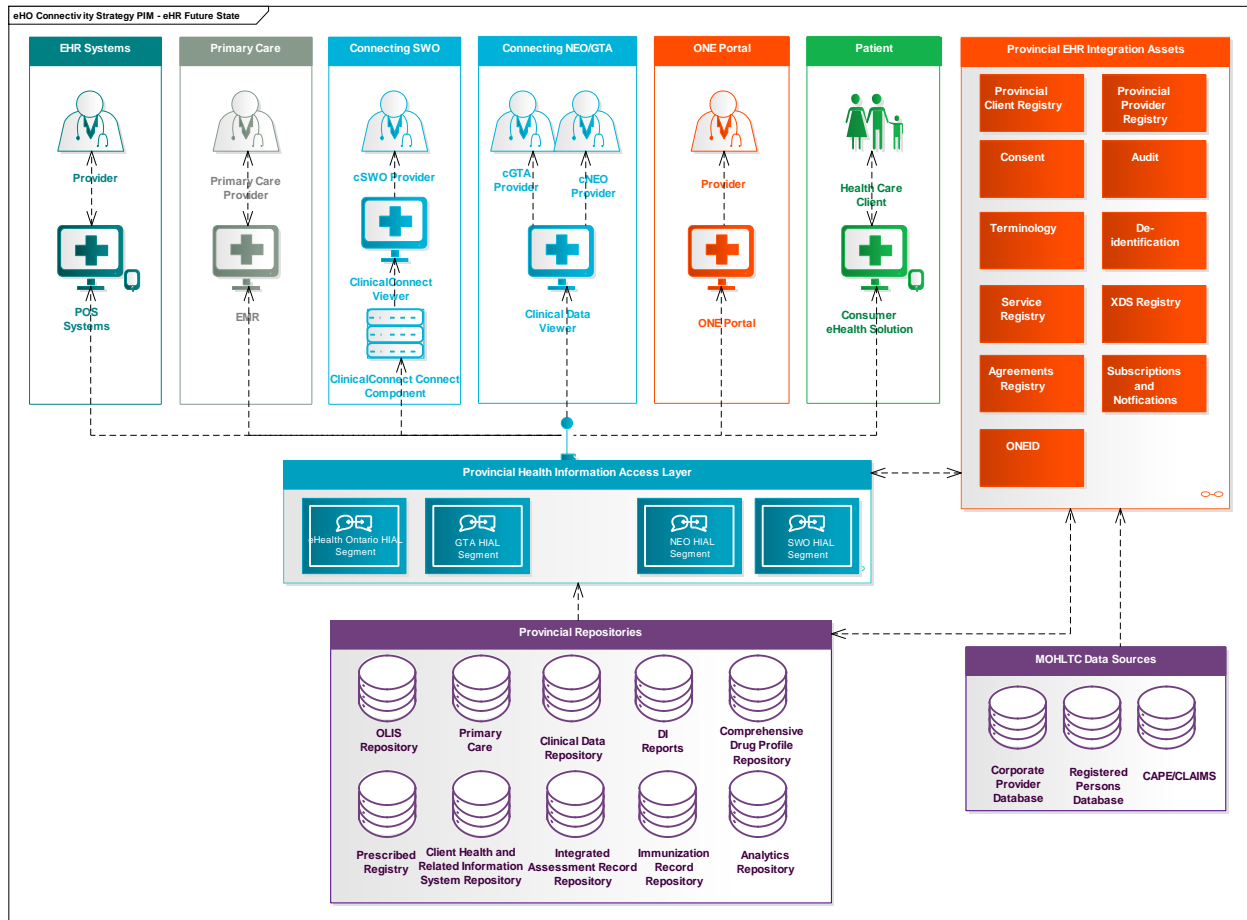


Figure 1: Future state EHR assets and how EHR information is viewed

In future, clients and providers will be informed through timely access to all relevant clinical information, empowered by advanced POS systems and protected by solutions that ensure their safety and privacy. The future state architecture describes how local, regional, and provincial investments will connect to enable the best, safest, and most cost-effective health care for Ontarians.

The HIAL is a collection of technologies that orchestrates provincial EHR transactions. It reduces total cost of ownership; essential integration capabilities and privacy and security controls are built once in the HIAL, avoiding the cost of building and managing these capabilities and controls on each clinical domain repository. All clinical information travelling in or out of provincial clinical repositories is protected by the HIAL.

Provincial clinical repositories are the databases that store clinical information for the purpose of sharing with clients and their providers. Hosting this information in provincial repositories is the most strategic approach to ensuring its availability, quality, and privacy. This will alleviate the need for clinical systems that generate EHR information to implement the capabilities and controls required for sharing this information, leading to a much more manageable and cost-effective EHR. While not all EHR information will need to reside in central repositories, drug, lab, diagnostic imaging, and other key EHR information can be shared through provincial clinical repositories

accessible through the HIAL. Analytics repositories contain copies of EHR datasets for analysis, isolating clinical repositories from resource-intensive, deep analysis of EHR data for primary and health system uses.

Each provincial EHR integration asset solves a specific set of problems related to aggregating and sharing client clinical information:

- The client registry links a client's identity across all locations in which they receive care. This is crucial to ensuring safety, that all relevant information is attached to a client's EHR, and that information from one client isn't erroneously attached to another's EHR.
- The provider and consent registries ensure a client's need for privacy is honoured regardless of the setting from which a provider is accessing the EHR. The provider registry also enables electronic referral and coordination of care.
- Terminology services validate data quality and normalize clinical terms, improving primary and secondary use of clinical information as well as patient safety.
- ONE ID, the agreements registry, and privacy audit services support privacy and security by allowing only appropriate EHR transactions while logging all access attempts. ONE ID also supports clinician workflow and adoption through single sign-on to the provincial EHR.
- The service oriented architecture connects POS systems to the EHR, helping integrators discover relevant EHR services and information, and providing the information required to access these services and information.
- Subscription and notification services allow clinicians to be notified when new relevant information is available, improving clinician workflow and efficiency, and accelerating the delivery of care.
- On a per-request basis, de-identification services prepare copies of EHR datasets for health system and research use; ensuring that personal health information has been masked or substituted appropriately for each specific analytical purpose.

EHR information is accessed through the channel that best suits clinician workflow. Users in the SWO region will use ClinicalConnect™ which has enjoyed high adoption among SWO clinicians, as their EHR viewer. GTA and NEO users will use the clinical data viewer (CDV), a solution designed by clinicians for clinicians. The province may migrate to a single viewer over time. Ultimately the vision is for providers and clients to consume EHR information through the POS system of their choice.

The future state of provincial EHR connectivity will provide the following outcomes:

- Improved client care by making all relevant clinical information available to all those who need it, including providers, clients and their families
- Improved client safety, through integration with provincial assets such as the provincial client registry, terminology services, and HIAL
- Improved client privacy through provincial level authentication, authorization, audit logging, and enforcement of consent directives
- A sustainable provincial EHR that leverages public investments
- Enabling of information interoperability through normative terms, common standards, and practices

CURRENT STATE

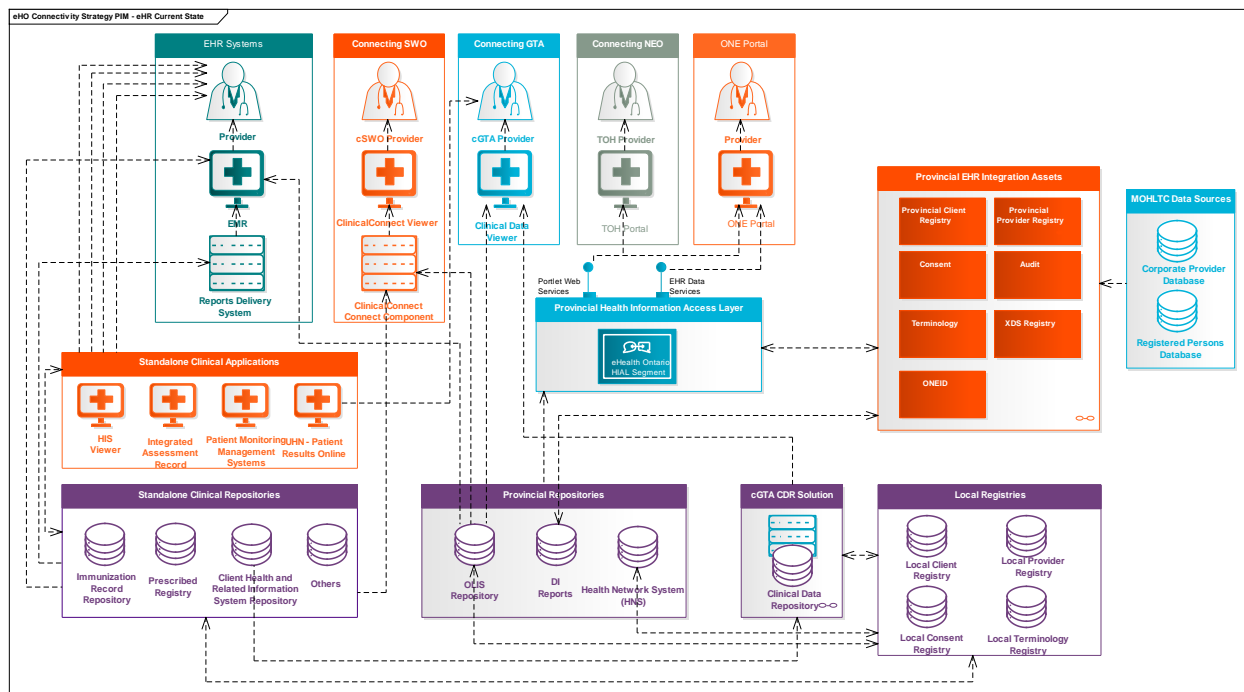


Figure 2: Current state EHR assets and how EHR information is viewed. Note that many solutions aren't integrated with provincial assets, resulting in a fragmented view of health care client information, inconsistent enforcement of privacy and security controls, and duplication of capability and management cost.

Today, almost all provincial clinical applications and repositories use their own client registry, which is not integrated with the provincial client registry. This effectively prevents the data within each of these applications and repositories from being linked together to form a provincial EHR view of client information. In order for all records to be safely and reliably linked to a client, all applications and repositories need to use the same source of authority for identity information – the provincial client registry. This means either integrating local client registries with the provincial client registry, or using the provincial client registry in lieu of a local registry.

Similarly, these applications and repositories don't use the provincial provider registry, which prevents uniform enforcement of consent directives and authorization. Solutions can either integrate their local provider registries with the provincial provider registry, or use the provincial registry in lieu of a local registry.

Each application and repository not using the provincial HIAL must maintain its own privacy and security controls, without consistency from one solution to the next. They also have to provide and operate many integration capabilities, and are not leveraging provincial terminology services.

Each application is also typically tightly coupled with its own viewer and not integrated with ONE ID. This means that for each clinical area of interest, a clinician needs to log onto a separate portal/application, with a separate username and password. This approach offers an untenable workflow and leads to poor security practices and hampered adoption.

TRANSITION

Transitioning from the current state to the target state will be addressed on an application-by-application basis based on application schedules and resources availability. Early in the transition phase, ClinicalConnect™ and the

clinical data viewer should transition to leveraging provincial EHR integration assets such as the provincial client registry, provider registry, consent, terminology. In general, as HIT assets are refreshed, they should be replaced by systems that align with the Ontario ehealth blueprint and connectivity strategy, so they are capable of integrating with provincial eHealth services.

Integrating existing applications with ehealth services will typically be project-driven, changing application code, configuration, location (relative to the HIAL), and/or data to take advantage of provincial ehealth services. In some cases, this can be relatively simple – such as replicating provincial client and provider data to clinical systems – yet yield significant benefits. Much benefit can also be derived by placing applications behind the provincial HIAL and benefiting from its integration capabilities and privacy and security controls.

Currently, many provider organizations provide admit, discharge, transfer (ADT) feeds to multiple entities for multiple purposes. To ease transition to future state, all ADT requirements can be consolidated such that organizations only need to send one ADT feed to the provincial HIAL, which will in turn appropriately parse and distribute ADT feeds as required.

CLINICAL DOMAINS

LABORATORY

Summary of Laboratory - EHR Connectivity	
Current State	Future State
<ul style="list-style-type: none"> • OLIS has been connected to all major community and public health labs, most hospital labs, and continues to grow . • Due to the timing of provincial EHR integration assets, OLIS uses its own client and provider registries and security and privacy controls 	<ul style="list-style-type: none"> • All lab reports from hospital, community, and public labs are available to clients and providers through various channels • OLIS is integrated with provincial EHR integration assets, including the HIAL, client and provider registries, terminology standards and services, audit, and consent
<i>Transition</i>	
<ul style="list-style-type: none"> • Onboarding of new labs and EMRs to OLIS notifications interfaces continues • All OLIS legacy and new clients migrate to using the provincial HIAL to access OLIS • OLIS is pursuing a phased approach to transitioning to provincial assets. The method and sequencing of transition is being determined by the OLIS and HIAL planning teams 	
Strategic Assets	<ul style="list-style-type: none"> • OLIS
<ul style="list-style-type: none"> • Provincial EHR integration assets (HIAL, provincial registries, ONE ID, audit, consent, terminology) 	
Key Milestones	<ul style="list-style-type: none"> • Integration with provincial client registry • Integration with provincial provider registry • Integration with provincial audit solution • Integration with provincial consent solution • Migration of all OLIS legacy and new clients to use the provincial HIAL to access OLIS • OLIS integration with HIAL/registries • HIAL subscription and notification availability to send notifications to EHR systems

FUTURE STATE

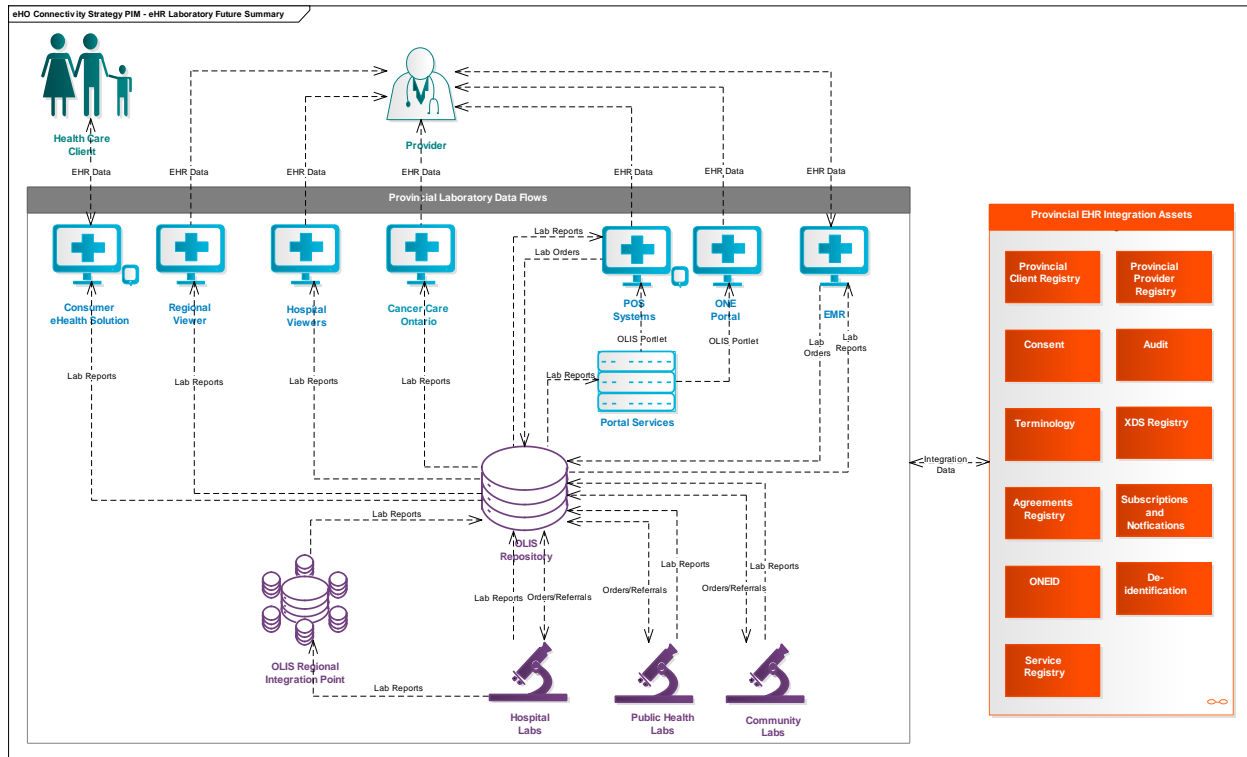


Figure 3: Future State information flows for OLIS repository

In future, OLIS will make all lab reports from hospital, community, and public labs available to clients and providers. EMRs and other EHR systems will be able to electronically submit lab orders through OLIS, and OLIS will be able to route lab order referrals. OLIS will continue to support query and targeted delivery of reports, as well as subscription-based notification of lab reports.

OLIS will be fully integrated with provincial ehealth assets such as the HIAL, client, provider, and user registries. This means OLIS will be linking client records to client identities using the same system of authority (provincial client registry) as other provincial EHR systems, leading to consistent longitudinal client records. Integration with provincial services minimizes total cost of ownership by leveraging the management of common privacy audit logging, consent, provider identity, and terminology services. By integrating with the HIAL, OLIS stakeholders benefit from uniform enforcement of privacy and security policies.

Several provider-managed OLIS regional integration points aggregate feeds from legacy lab systems to OLIS, relieving the legacy labs of the requirement of conforming to the provincial lab specification.

CURRENT STATE

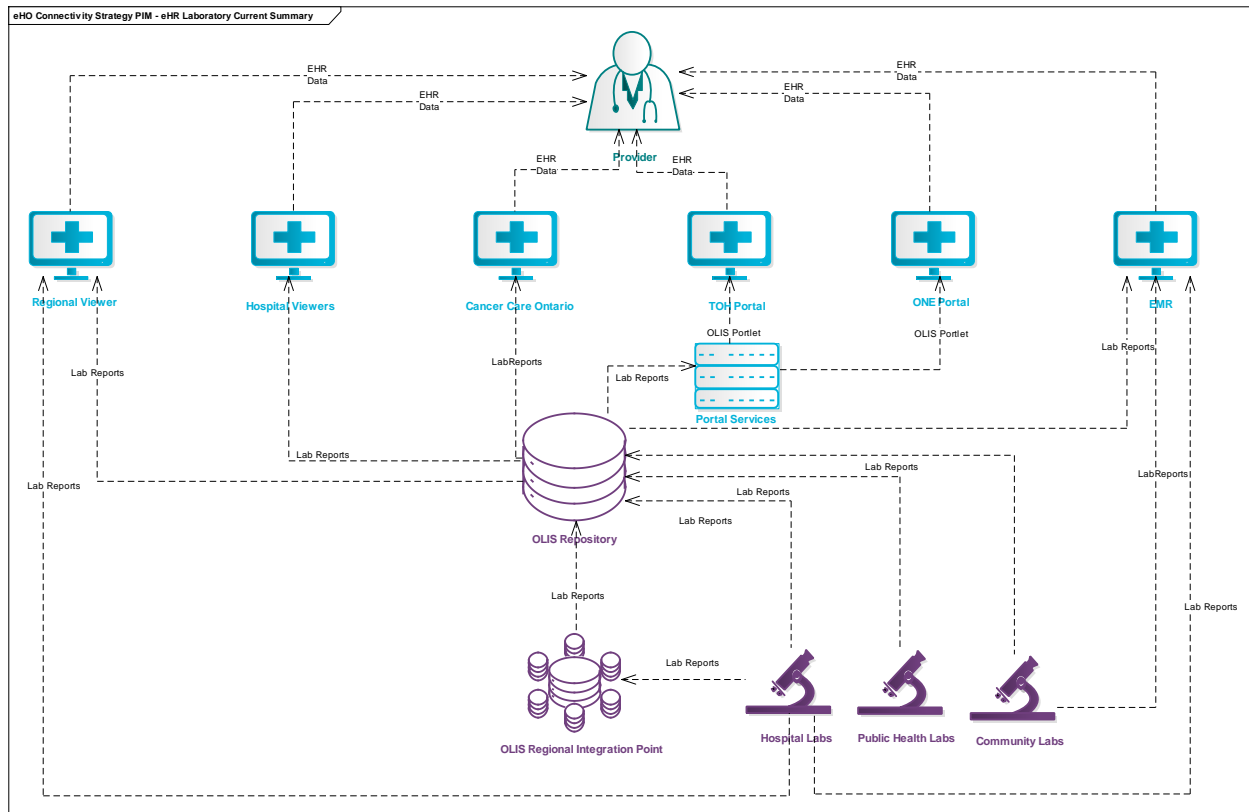


Figure 4: Current State information flows for OLIS repository

OLIS has been deployed to all major community and public labs, and continues to deploy to hospital labs, but at present it is not integrated with provincial assets such as the registries and HIAL. Active projects are currently looking into integrating OLIS with provincial entities and aligning it with the health blueprint, minimizing impact to clients and utilizing investments made on integrating regional entities. OLIS is a mature product offering, so the current state closely resembles the future state.

TRANSITION

Transition for OLIS is primarily about integration with the HIAL, provincial registries and common services. EMR systems must be extended to support the submission of electronic lab orders to OLIS; the delivery of lab results to EMR systems must transition to using HIAL-based notifications. Significant work and stakeholder involvement is required in this area to standardize requisitions, specimen and order tracking to ensure the solution works with existing lab order processing systems.

OLIS is pursuing a phased approach to transitioning to provincial assets, exposing OLIS interfaces to the HIAL, then integrating OLIS with provincial assets.

MEDICATION

Summary of Medication - EHR Connectivity	
Current State	Future State
<ul style="list-style-type: none"> The ministry's health network system (HNS) is the current medication dispense information repository and contains Ontario drug benefit (ODB) claims data and narcotic dispenses. Only claims data is available for viewing Medication information is currently available at 245 hospital sites (emergency departments, admitting, clinics, in-patient departments, pharmacies) and 20 community health centre (CHC) sites, through ONE Portal's drug profile viewer (DPV) Medication information is currently available to a subset of clinicians at The Ottawa Hospital through the ODB Portlet 	<ul style="list-style-type: none"> Medication dispense information (all people, all drugs) is part of the provincial EHR Medication dispense information repository is in the Comprehensive Drug Profile Repository, phase 1 of the MOHLTC Comprehensive Drug Profile Strategy (CDPS), and contains all relevant pharmacy drug dispense information Primary care providers send prescriptions electronically to pharmacies, phase 2 of the CDPS Provincial medication dispense information is available to providers and clients
Transition	
<ul style="list-style-type: none"> HNS data is made generally available to EHR portals and viewers (connectingGTA, cNEO, cSWO) through the provincial HIAL and ONE Portal. MOHLTC progressively extends the HNS dataset Legislation is required to include narcotics dispenses in the EHR dataset EMR electronic transfer of prescriptions pilot leverages provincial EHR integration assets (HIAL, provincial registries, ONE ID, terminology standards and services) EMR ETP solution is expanded across the province 	
Strategic Assets	
<ul style="list-style-type: none"> Provincial EHR integration assets (HIAL, provincial registries, ONE ID, ONE Portal, audit, consent, terminology) 	<ul style="list-style-type: none"> HNS Pharmacy acquirer host solutions
Key Milestones	
<ul style="list-style-type: none"> MOHLTC approval of expanding HNS data set to include all drugs, all people HNS expansion of data set and implementation of the Comprehensive Drug Profile Repository (CDPR) Access to CDPR via CDV and ClinicalConnectTM Legislation changes to include narcotics ONE Portal hosting of ODB Portlet for additional users (e.g. pharmacies) Prescriber systems send prescriptions to pharmacy systems 	

FUTURE STATE

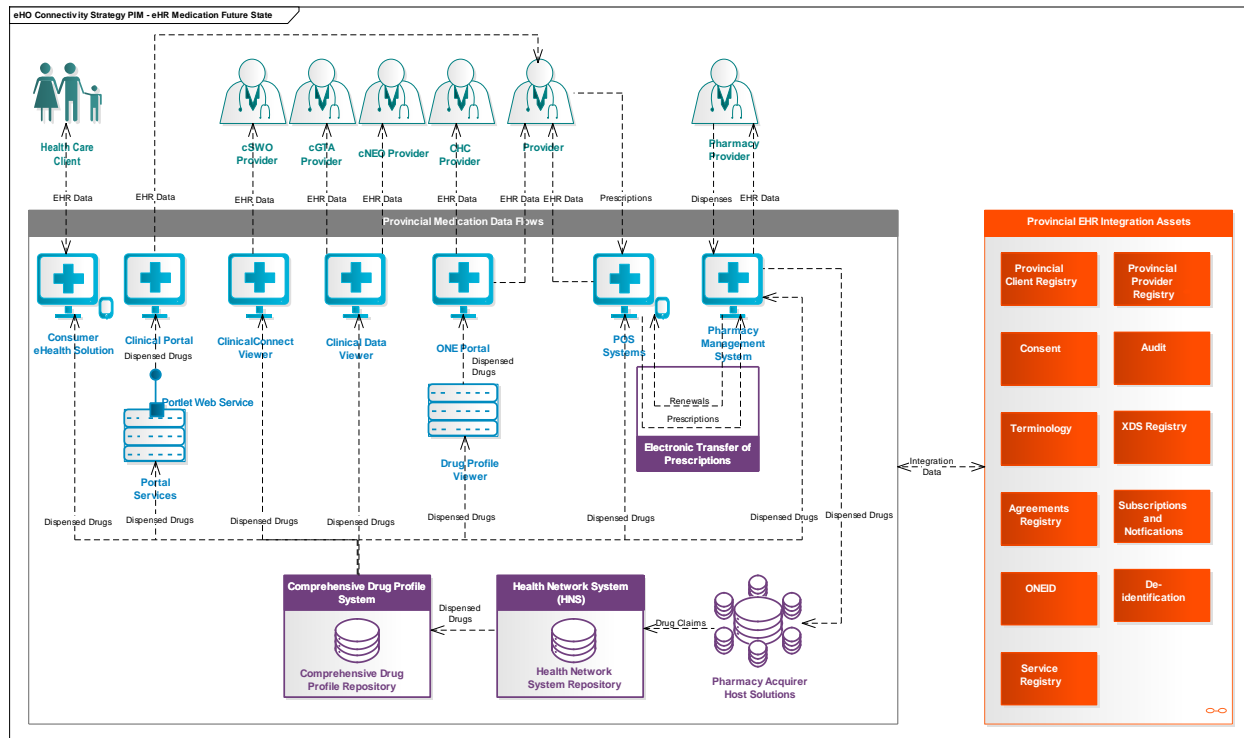


Figure 5: Future state drug system information flows

The future state view extends the functionality of the health network system (HNS) to include all dispense data from pharmacies in the comprehensive drug profile repository, phase 1 of the Ministry of Health and Long-Term Care (MOHLTC) Comprehensive Drug Profile Strategy (CDPS). This approach focuses on creating a replicated version of the existing HNS data, providing access via the HIAL and leveraging existing EHR assets as part of the solution. Pharmacies currently have integration to the HNS system through acquirer host solutions, and the future state view anticipates continued use of this integration model. Regional and provincial clinical viewers will also have access to this richer drug profile data, to improve clinical decision-making and collaboration, client safety, and reduce the incidence of adverse drug events.

The future state introduces the electronic transfer of prescriptions from prescriber systems to pharmacies via the HIAL, reducing prescription errors, fraud, and drug abuse. Leveraging the Ontario EHR infrastructure guarantees a secure model that can generate, authorize and transmit prescriptions electronically. The HIAL plays a primary role in ensuring these benefits along with leveraging a provider registry to authenticate and authorize providers in processing electronic prescriptions.

CURRENT STATE

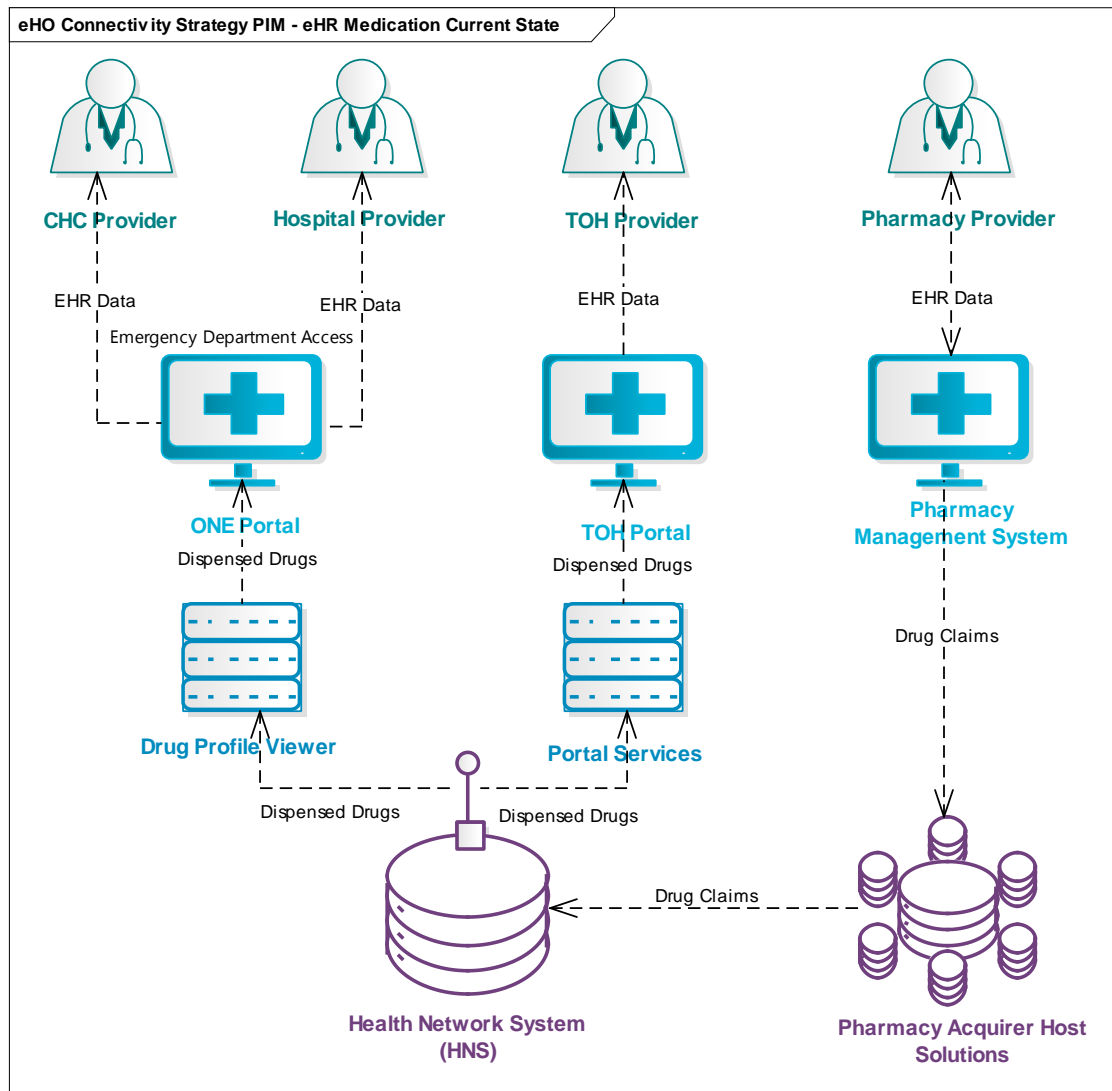


Figure 6: Current state drug system information flows

Drug dispense data provided by the MOHLTC health network system (HNS) is currently available to all hospital emergency room departments through the DPV. It is also available to the Ottawa Hospital's MyTOH portal through the Ontario drug benefit program portlet.

Currently, MOHLTC's HNS system includes only Ontario drug benefits claims-related data, covering a subset of clients (typically seniors and others qualifying for government-insured prescription benefits), and a subset of data (e.g. dosage information is not currently available), as hospital and other prescribing systems are not registering dispenses with HNS.

TRANSITION

EMRs and other POS systems that manage medications for clients will begin submitting electronic prescriptions directly to the pharmacies, via the HIAL. The current HNS data set will be expanded to include dosage information and additional dispense information from pharmacies. The required MOHLTC approval is pending.

ClinicalConnect™ (cSWO) and the CDV (connectingGTA, cNEO) will connect to the provincial HIAL in order to retrieve and display HNS data. Throughout transition, the dispensed drug web service, the drug portlet service, and the drug profile viewer will continue to be accessible, providing flexible provider access to medication dispense information.

DIAGNOSTIC IMAGING

Summary of Diagnostic Imaging - EHR Connectivity	
<p>Current State</p> <ul style="list-style-type: none"> • DI reports are published to the provincial DI-repository (DI-r) from all four DI-rs • Access to provincial DI reports is available via ONE Portal; onboarding of providers is ongoing • Access to regional DI reports is available through regional connecting project viewers (ClinicalConnect™, CDV/CDR) and DI-r provided viewers • Regional foreign exam management (FEM) capability is available for a limited subset of hospitals • Hospitals send head scans to ENITS where they are accessed by on-call neurosurgeons 	<p>Future State</p> <ul style="list-style-type: none"> • Provincial DI reports and images are available to providers and clients through multiple access channels including ONE Portal and the regional connecting project viewers • DI reports are delivered to EMRs and other systems via subscription-based HIAL mechanisms • Provincial FEM capability is available to all hospitals
<p>Transition</p> <ul style="list-style-type: none"> • The provincial DI viewer enables provincial viewing of images • The provincial DI viewer is exposed via ONE Portal • Connecting projects transition from using regional assets as a source of DI reports to using the provincial DI-r as the system of authority for DI reports • Connecting projects provide image display capability through integration with the provincial image viewer or the viewer web services interface 	
<p>Strategic Assets</p> <ul style="list-style-type: none"> • Provincial DI document repository and index (DI common services) • Provincial EHR integration assets (HIAL, provincial registries, ONE ID, audit, consent, terminology) 	<ul style="list-style-type: none"> • Picture archiving and communication systems (PACS) and regional DI-rs • ONE Portal • Provincial image viewer
<p>Key Milestones</p> <ul style="list-style-type: none"> • Publication of image manifests from the DI-rs to the provincial DI-r • DI common services integration with provincial audit • Availability of provincial image viewer • Publication of DI reports from the provincial DI document repository to EMRs • Integration of ClinicalConnect™ with provincial DI common services available (for reports only) • Transition the connectingGTA solution from collecting and presenting DI reports and manifests, to integrating with provincial DI common services • Completion of FEM pilot between the GTA West and HDIRS DI-rs • Availability of HIAL subscription and notification for delivery of DI reports to EHR systems • DI common services integration with provincial consent 	

FUTURE STATE

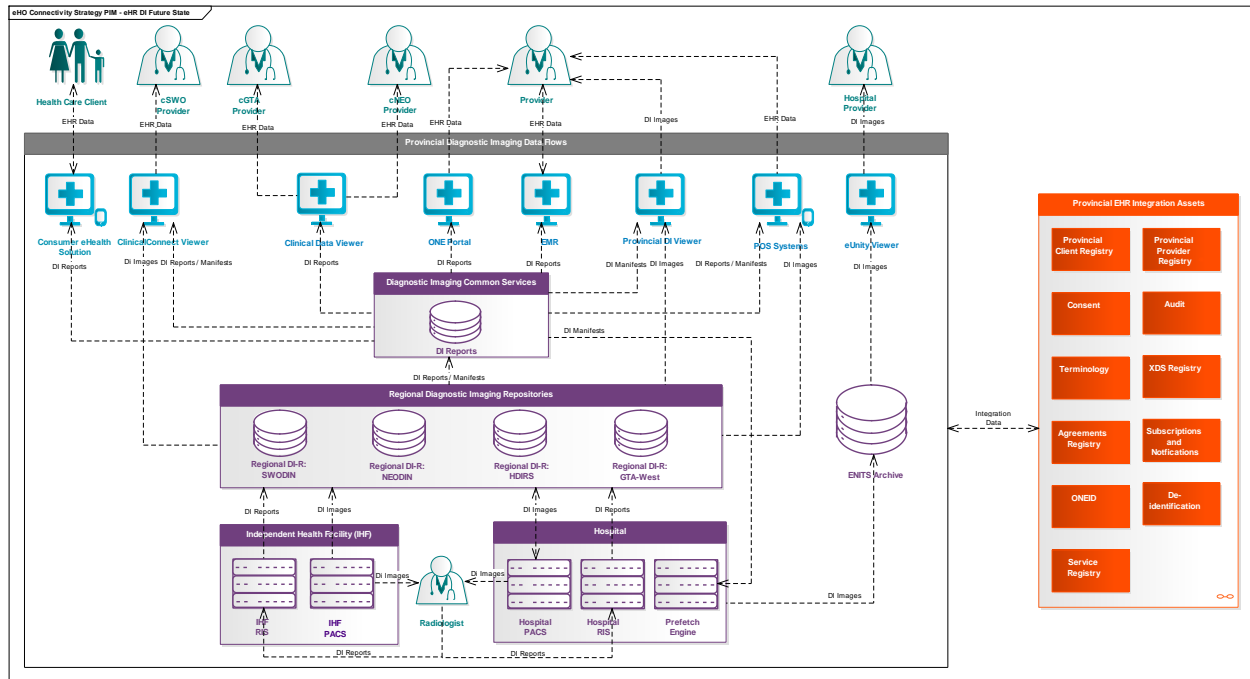


Figure 7: Future state information flows for Diagnostic Imaging

In future, DI reports and images from across the province will be accessible through ClinicalConnect™, CDV, ONE Portal, the DI viewer application, and point of service systems (including EMRs). These channels will access reports and images from DI common services, which is the system of authority for province-wide sharing of DI reports and images.

Reports will be delivered to EMR systems by HIAL-based notification, based on physician subscriptions to this information, but not images. POS systems that need to view images will integrate with the provincial DI viewer, or its underlying system interface.

FEM capabilities will enable radiologists to import prior diagnostic imaging studies acquired from any hospital across the province into their local PACS system. This functionality is key to ensuring radiologists are able to utilize their specialized tools for viewing these images.

CURRENT STATE

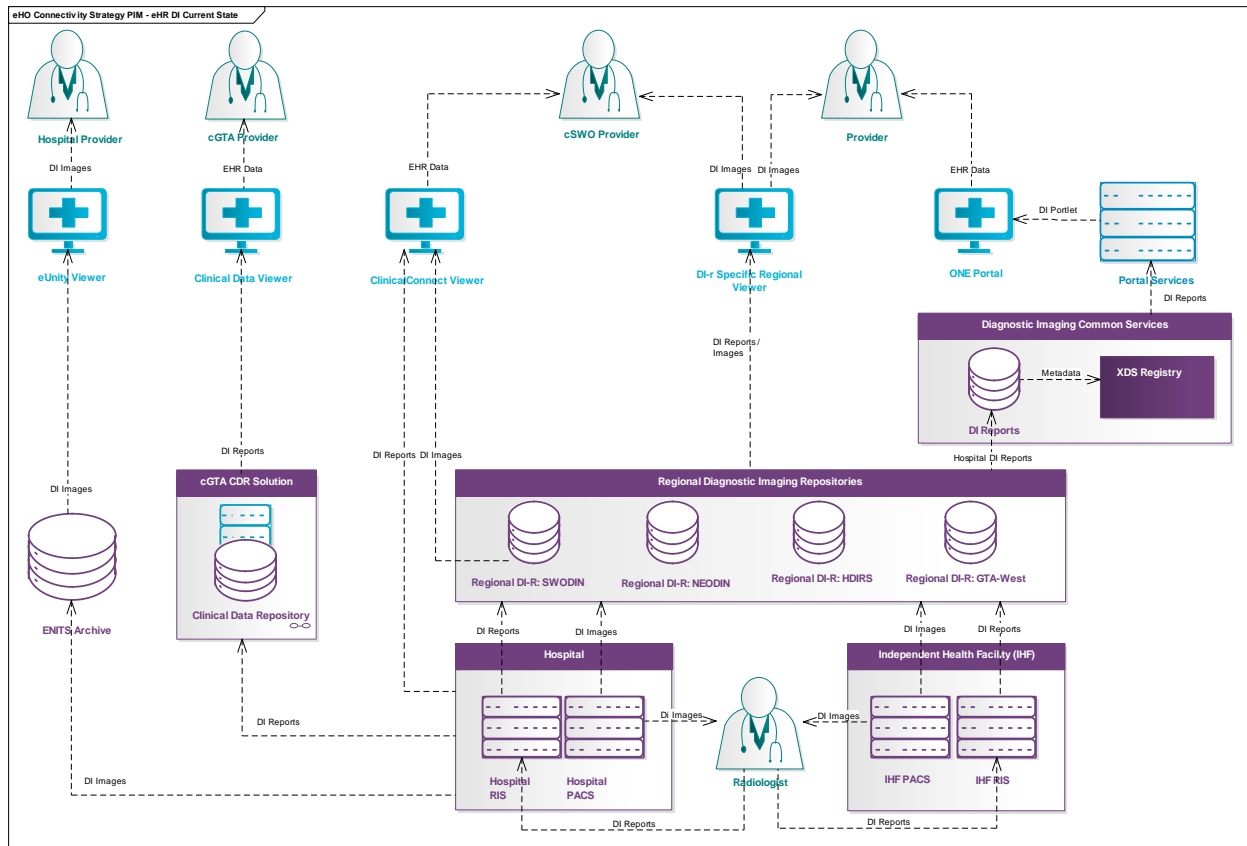


Figure 8: Current state information flows for Diagnostic Imaging

DI common services currently provide access to DI reports to a growing list of providers (rollout continues). eHealth Ontario is procuring a standalone image viewer to enable province-wide sharing of diagnostic images for consultation purposes.

The connectingGTA project is currently collecting DI reports from hospitals, storing them in the CDR, and presenting them to connectingGTA users through the CDV. The ClinicalConnect™ viewer displays DI reports (along with the corresponding images) from the southern and western Ontario DI (SWODIN) DI-r, as well as other relevant EHR information. Each regional DI-r (NEODIN, SWODIN, HDIRS, GTA West) provides a viewer for sharing reports and images from within its region. Referring hospitals send head scan images to ENITS where they can be accessed and viewed by on-call neurosurgeons.

TRANSITION

The transition phase for DI common services includes providing image viewing capability, opening new access channels, and modifying the existing EHR viewer solutions to utilize the provincial services instead of the current regional only DI content.

Image viewing capability will be available through a new provincial DI imaging viewer component that will be integrated into the existing ONE Portal and clinical data viewers. Additional EHR viewers, such as ClinicalConnect™ or EMRs, may choose to utilize this new image viewer component or directly access the images through the provided services.

New access channels will be opened to provide reports to EMRs and to facilitate importing of imaging studies acquired anywhere in the province into local PACS systems through FEM functionality. DI reports will be made available to EMRs through both a subscription-based HIAL delivery mechanism (push) as well as through current on demand queries (pull).

The ClinicalConnect™ viewer will be migrated to start pulling DI-related data from DI CS instead of obtaining them directly from the regional hospitals. Similarly, the CDV solution will move away from storing DI reports in the CDR itself and instead use the DI CS for all DI-related content.

CARE SETTINGS

ACUTE AND AMBULATORY CARE

Summary of Acute/Ambulatory Care EHR Connectivity	
Current State	Future State
<ul style="list-style-type: none"> Varying approaches are in place for sharing clinical data and documents that originate in acute and ambulatory care settings Delivery of hospital reports to EMRs is provided by various solutions (hospital report manager (HRM), southwest physician office interface to regional EMR (SPIRE), physician office integration (POI), timely discharge information summary (TDIS)). Many EMRs are not connected to any hospital report delivery solution CDR content is available to a small pilot group as part of the cGTA project CDR and ClinicalConnect™ utilize local client and provider registries, with no integration with provincial registries 	<ul style="list-style-type: none"> Transfer of care data and documents from acute and ambulatory care settings are shared via the provincial CDR CDR content is available in all regions All hospital reports are delivered via subscription-based HIAL mechanisms Clinical data and documents are available to clients (consumer ehealth solution strategy TBD) The connectingGTA HIAL is embedded within the provincial CDR, and is used for CDR purposes only CDR and ClinicalConnect™ are integrated with provincial EHR integration assets, specifically provincial client and provider registries
<i>Transition</i>	
<ul style="list-style-type: none"> CDR is integrated with ONE ID Report delivery mechanisms migrate from SPIRE, POI and TDIS to HRM over time Hospitals in connectingGTA contribute to the CDR connectingGTA CDR is promoted to the provincial CDR, presented via the provincial HIAL, and integrated with provincial client and provider registries, as well as audit, consent, and CDR index (XDS document registry) Provincial provider registry extended to support unregulated providers and provider identity resolution Hospitals in all regions integrate with PCR and PPR Hospitals in all regions contribute to the CDR cSWO ClinicalConnect™ viewer used to access CDR cNEO uses the cGTA viewer to access CDR CDR-specific assets are rationalized and replaced by provincial versions over time (terminology standards and services, audit, consent) HRM business functionality transitions to subscription-based HIAL delivery mechanisms for delivery of hospital reports from the provincial CDR to EMRs EMR specifications are updated to enable provincial CDR integration All hospital reports are delivered via subscription-based HIAL mechanisms 	
Strategic Assets <ul style="list-style-type: none"> Provincial CDR Provincial EHR integration assets (HIAL, provincial registries, ONE ID, audit, consent, terminology standards and services) 	<ul style="list-style-type: none"> CDV ClinicalConnect™ viewer
Key Milestones	

- CDR general availability
- CDR integration with provincial EHR integration assets (PCR, PPR, audit, consent, terminology, XDS registry)
- HIAL subscription and notification availability
- Hospital integration with provincial client and provider registries
- Hospitals in all regions contribute to the CDR
- ONE ID SSO/federation in place
- cSWO ClinicalConnect™ viewer accesses CDR via the HIAL
- cNEO shares CDV with cGTA
- EMR specifications are updated to access the provincial CDR

FUTURE STATE

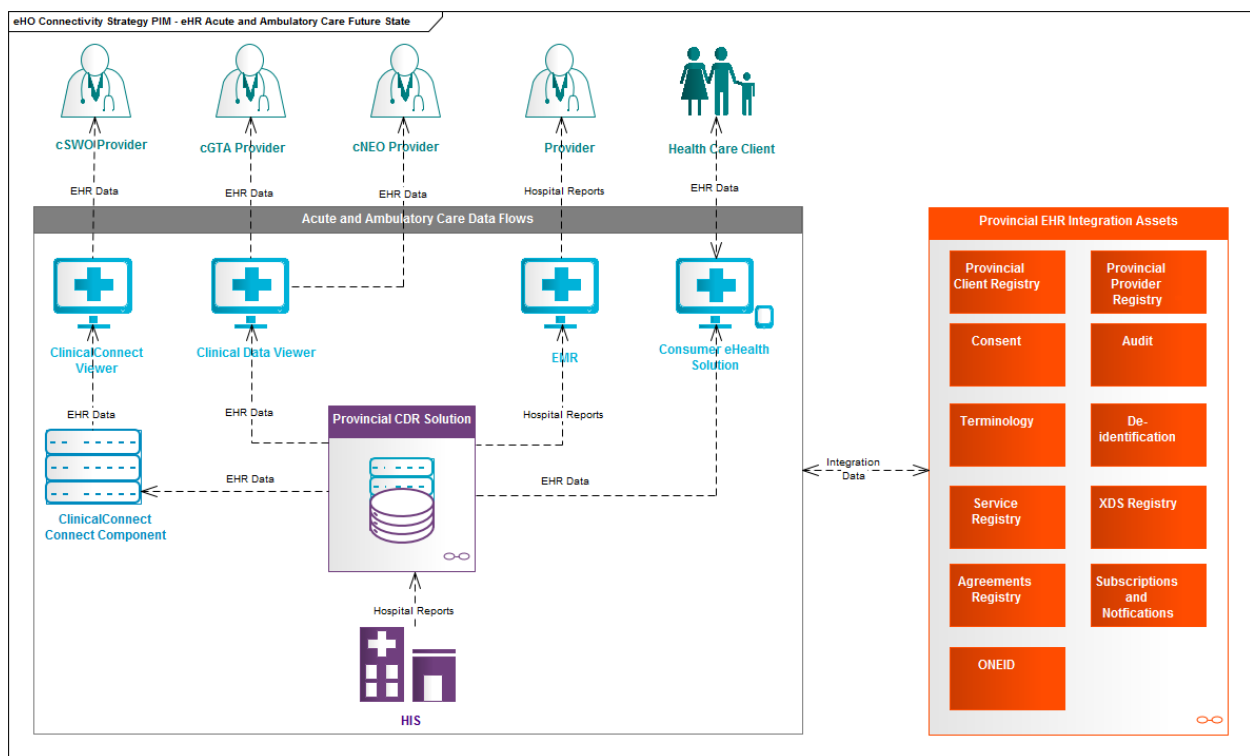


Figure 9: Future state of Acute and Ambulatory Care System information flow

In future, a single CDR will be used for the exchange of data generated in an acute care setting. Transfer of care data generated by hospital information systems will be sent to the CDR where it will remain indefinitely, forming the basis of the future provincial EHR. Access to the clinical data repository will be provided by the clinical data viewer, ClinicalConnect™, and point of service systems via response to queries. Compared with point to point connectivity among hospital information systems, this is the simpler, more consistent, and lower-cost solution, and it is more scalable than solutions that retrieve data from hospital information systems as they are required.

By decoupling viewers from the repository, providers and clients can use the viewer(s) that best suit their needs and preferences. Clients and their informal care providers will be informed and engaged through access to acute care data via various consumer ehealth solutions.

CURRENT STATE

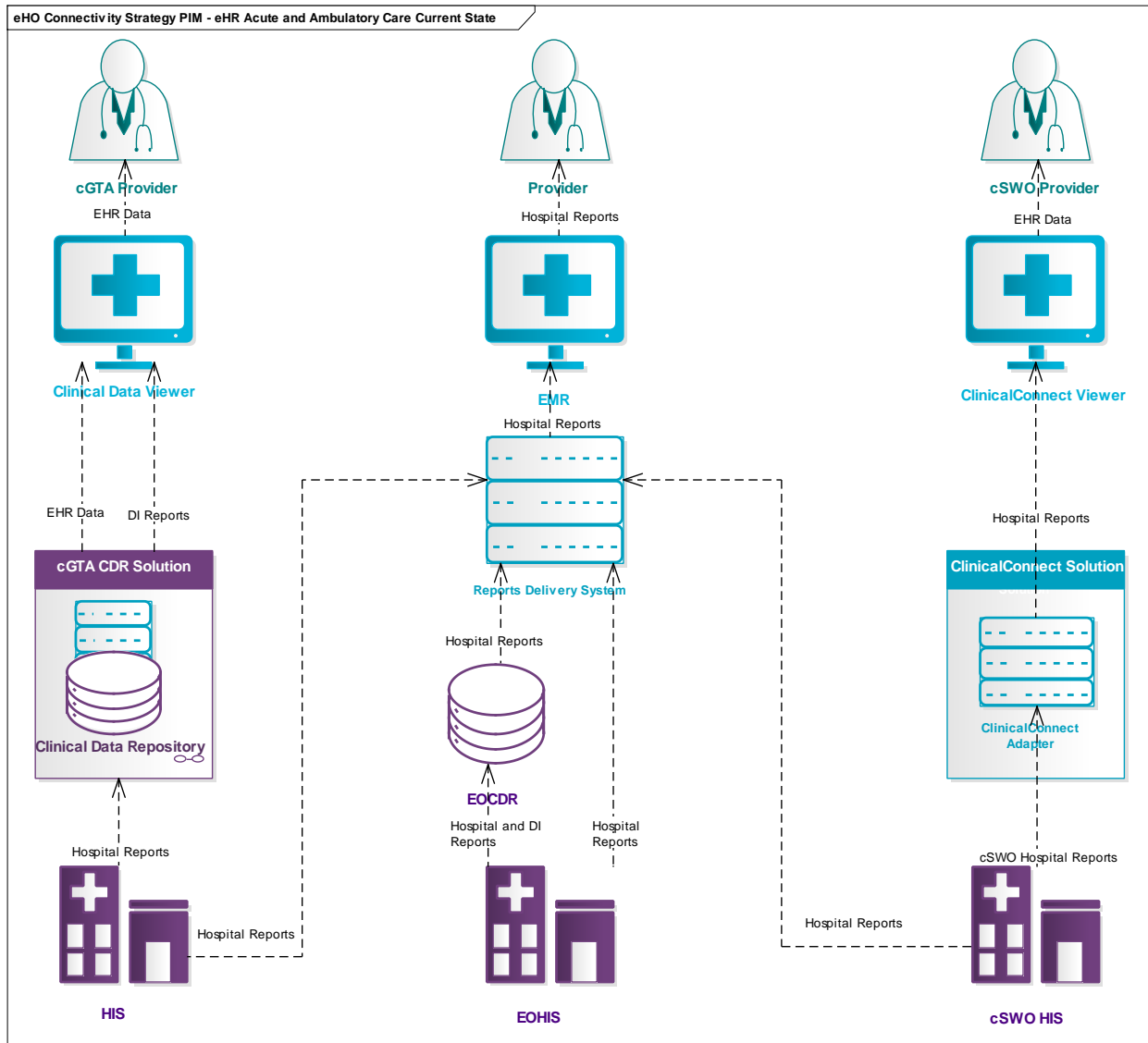


Figure 10: Current state of Acute and Ambulatory Care System information flow

Currently there is a fragmented view of data originating in acute care settings, as the connecting projects continue to onboard hospital data feeds. The three regional solutions (ClinicalConnect™, connectingGTA, cNEO) are only partially deployed; connecting projects continue to onboard providers as consumers of information.

TRANSITION

Integration between regional solutions will be required until all hospitals in Ontario are contributing acute care information to the CDR. In SWO, ClinicalConnect™ will add the CDR as a data source (such as adding another hospital information system), and expose CDR data to SWO users within the ClinicalConnect™ viewer.

The connectingGTA solution will transition from using regional assets to using provincial EHR integration assets, but it is essential that CDR services are exposed on the provincial HIAL prior to this transition to minimize impact to hospitals and other stakeholders. Similarly, the onboarding of future contributors to the CDR will coincide with

their onboarding to the provincial client and provider registries, to minimize impact as the CDR is transitioned to provincial registries. Integration will be required between the connectingGTA registries and the provincial registries to keep information in sync until the CDR is fully transitioned.

ClinicalConnect™ must integrate with the provincial client and provider registries for consistent provincial client and provider identity resolution.

Functional enhancements to the provincial provider registry, such as provider identity linking and support for unregulated providers, are required for the CDR to be of provincial scope.

Report delivery mechanisms will migrate from SPIRE, POI and TDIS to HRM over time. HRM business functionality will transition to subscription-based HIAL delivery mechanisms for delivery of hospital reports from the provincial CDR to EMRs. This will require rationalizing existing hospitals reporting tools to the provincial standards, and having the HIAL notification mechanism deliver reports to EMRs via the existing reports delivery mechanism.

The CDR will need to integrate with the provincial CDR index (XDS document registry) in support of a longitudinal view of clinical documents across repositories until CDR repository consolidation is achieved. An updated EMR specification will be provided to access the provincial CDR.

PRIMARY AND SECONDARY CARE

Summary of Primary and Secondary Care - EHR Connectivity

Current State	Future State
<ul style="list-style-type: none"> • Primary care data is not part of the provincial EHR • Pregnancy, birth, and childcare data are manually sent to Ontario's better outcomes registry and network (BORN) • Hospital reports are delivered to EMRs through several types of report delivery systems. Many EMRs are not connected for hospital reports delivery • A small number of EMRs which conform to provincial EMR specifications receive lab reports from OLIS • Lab reports are delivered to some physicians through the direct connectivity between EMRs and private and hospital labs 	<ul style="list-style-type: none"> • The primary care portion of EHR data resides in the provincial CDR • Immunization data resides in Panorama • EMRs submit lab orders to OLIS • EMRs send electronic prescriptions to pharmacies • HIAL services enable the electronic delivery of primary care data from EMRs to health system use and prescribed registries such as BORN, CPCSSN and EMRALD • All hospital and lab reports are delivered to EMRs via subscription-based HIAL mechanisms • eReferral between primary and secondary providers is enabled
<i>Transition</i>	
<ul style="list-style-type: none"> • A project to pass relevant EMR data to BORN via the provincial HIAL and ONE ID establishes EMR connectivity for general EMR-EHR connectivity. HIAL connectivity will be leveraged for passing EMR data to CDR and other health systems use repositories • The provincial CDR is established and integrated with the CDR index (XDS document registry), provincial client and provider registries, HIAL, consent, and audit • EMR integration with ONE ID (SSO with context) and other provincial EHR integration assets (HIAL/CDR) eases transition • EMRs and eReferral solutions throughout the province conform to the eReferral provincial reference model • The CDV document viewer for cGTA and cNEO can access the CDR • The ClinicalConnect™ viewer can access the CDR • eNotifications is expanded between hospitals, CHRIS and EMRs • Panorama integrates with provincial EHR integration assets such as the provincial client and provider registries • Report delivery mechanisms migrate from SPIRE, POI and TDIS to HRM • HRM business functionality transitions to subscription-based HIAL delivery mechanisms for delivery of hospital reports from the provincial CDR to EMRs • Pilot projects address EMR data quality contributing to the primary care CDR • EMR specifications are updated to access and contribute to the primary care CDR 	
<i>Strategic Assets</i>	
<ul style="list-style-type: none"> • Provincial CDR (index and repositories) • Provincial EHR integration assets (HIAL, provincial registries, ONE ID, audit, consent, terminology) 	<ul style="list-style-type: none"> • Panorama • EMRs • eReferral provincial reference model
<i>Key Milestones</i>	

- General BORN/HIAL connectivity
- Provincial eNotifications specifications and eReferral provincial reference model in place
- HIAL subscription and notification available
- Primary care CDR (transition) repository is integrated
- EMR specifications are updated to access and contribute to the provincial CDR
- ONE ID SSO/federation available
- Panorama is integrated with provincial EHR integration assets

FUTURE STATE

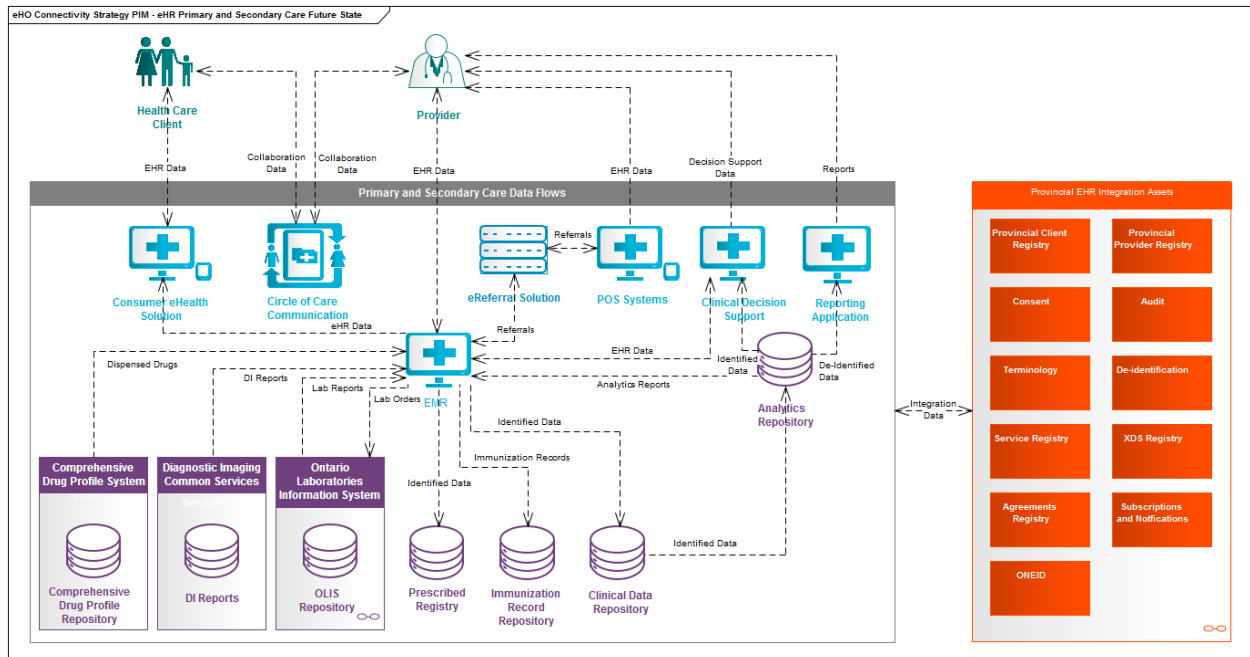


Figure 11: Future state Primary and Secondary Care information flow

In future, EMR systems will remain at the centre of the primary care domain, but will have extensive integration with other systems. They will send documents and data to the provincial CDR, as well as prescribed registries such as BORN, the immunization registry (Panorama), and OLIS.

EMRs will access the CDR and provincial clinical repositories (OLIS, DI, CDPR) via system integration/query response, and will receive data from other systems such as the acute care CDR using the subscription and notification service. EMRs and eReferral solutions conforming to the eReferral provincial reference model will enable electronic referrals between primary and secondary care providers.

While providers will continue to manage information relating to their clients using their EMRs, they will also have access to clinical decision support solutions as well as business intelligence and advanced analytics that deal with both identified and de-identified data. The Ontario Medical Association (OMA) is leading the EMR data for analytics and clinical decision support strategy.

Providers will be able to interact with clients using 'client team' applications.

CURRENT STATE

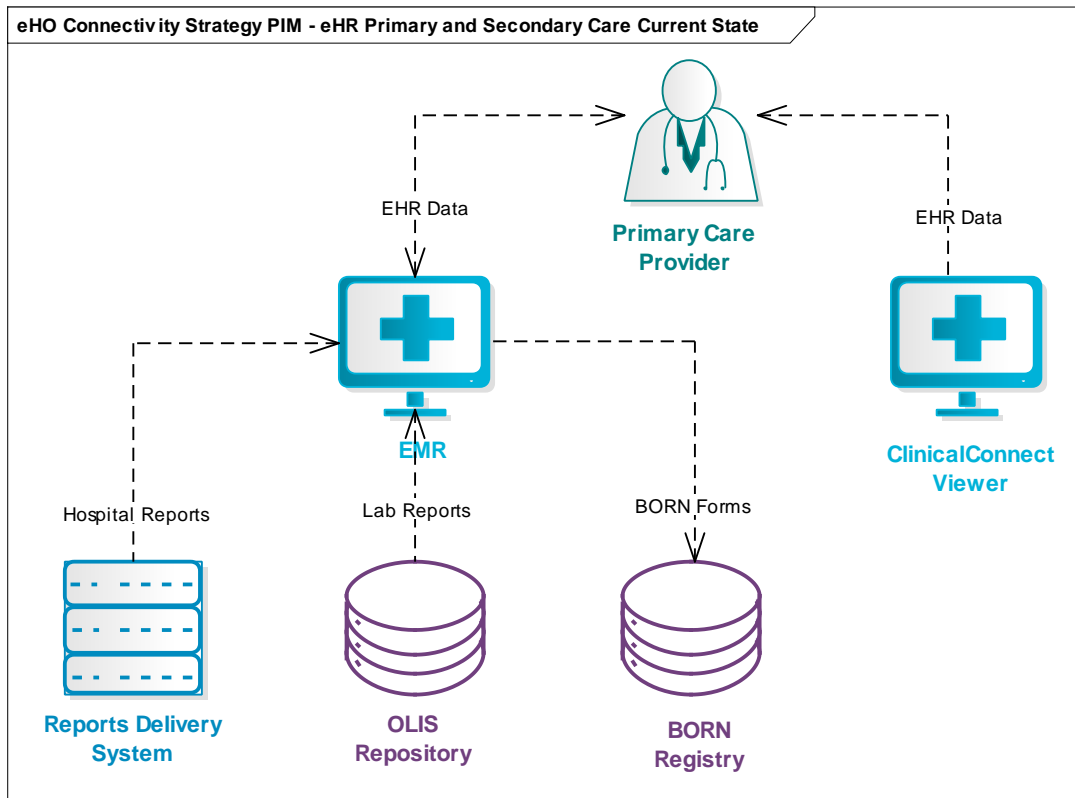


Figure 12: Current state Primary and Secondary Care information flow

Primary care providers currently access data through their stand-alone EMRs, few of which receive hospital reports electronically. Acute care hospital reports including discharge summaries and diagnostic imaging are delivered via report delivery systems such as OMD's HRM, and lab results are pulled directly from the OLIS repository. While EMRs conforming to current provincial EMR specifications are capable of receiving reports directly from OLIS, not all of them are doing so; these connections continue to be made. Some solutions, such as ICES electronic medical record administrative data linked database (EMRALD), the Canadian primary care sentinel surveillance network (CPCSSN) and BORN, enable limited transfer of EMR data to external systems.

TRANSITION

EMR systems will transition from receiving reports directly from HRM and OLIS to using subscription-based HIAL mechanisms to receive data from the repositories. An updated EMR specification will be provided to access and feed the provincial CDR.

HRM will be deployed to EMRs not yet receiving hospital reports electronically. This will deliver clinical value and prepare EMRs for the transition to subscription-based HIAL delivery mechanisms when they become available. eNotifications expansion between hospitals, CHRIS and EMRs will occur first, followed by the publishing of a provincial eNotifications specification.

Report delivery mechanisms migrate from SPIRE, POI and TDIS to HRM over time. HRM business functionality transitions from the current implementation to subscription-based HIAL delivery mechanisms for delivery of

hospital reports from the provincial CDR to EMRs. This will require upgrading existing hospital reporting tools to the provincial standards, and having the HIAL notification mechanism deliver the reports to EMRs via the existing reports delivery mechanism.

BORN and eHealth Ontario have partnered on a project to pilot sending relevant EMR data to BORN via the provincial HIAL/ONE ID, which establishes specifications for general EMR-EHR connectivity. These specifications, once proven by the pilot, will be leveraged for passing EMR data to CDR and other health systems using repositories.

As there is no intent to develop a provincial eReferral solution, province-wide electronic referral will be enabled by adoption of the eReferral provincial reference model by local and regional eReferral solutions and EMRs. There is an opportunity to leverage CHRIS to broadly enable primary to secondary care referrals.

Integration with the HIAL and other provincial EHR integration assets reduces complexity, eases transition, and is essential for EMR data to become part of the provincial EHR.

While the future state of the CDR is a single repository, due to practical needs such as data quality management and project risk and dependency, a transitional approach will be deployed to deliver timely clinical value while preparing for future consolidation. Clinical documents originating from acute/ambulatory, primary, and community settings will be housed in separate repositories on a per-care setting basis. Documents within these repositories will be accessed via a single index so that, from an external perspective, they appear as one single, consolidated repository.

COMMUNITY CARE

Summary of Community Care - EHR Connectivity	
Current State	Future State (Proposed)
<ul style="list-style-type: none"> Some CCACs are submitting CHRIS reports to the CDR CHRIS, CCT, IAR, and telehomecare solutions are not integrated with provincial EHR integration assets There are isolated pockets of eReferral solutions 	<ul style="list-style-type: none"> CHRIS, IAR, CCT and telehomecare solutions are integrated with provincial EHR integration assets Community care information is integrated with the provincial EHR via the provincial CDR Health Links leverage provincial EHR integration assets Strategic community care assets receive EHR notifications via subscription-based HIAL mechanisms Provincial-wide electronic referrals and consultations are available
Transition	
<ul style="list-style-type: none"> The provincial CDR functionality, governance, and supported data set are extended to support data originating in the community care setting. Technical extension includes integrating with CDR index (XDS document registry), provincial client and provider registries, HIAL, consent, and audit CHRIS, IAR, CCT, the drug and alcohol treatment information system are integrated with provincial EHR integration assets such as HIAL, ONE ID, CDR, provincial client and provider registries CHRIS reports are directed to the provincial CDR for sharing as part of the EHR IAR, CCT, and DATIS reports contribute to the provincial CDR repository The eReferral provincial reference model (PRM) and standards package is updated to reflect CDR integration, specifically referral and consultation reports that are typically part of the processing of a referral. The provincial reference model (PRM) provides implementation guidance for new and existing eReferral solutions (e.g. eConsult, OTIX, BASE), focused on enabling interoperability and leveraging existing EHR provincial assets CHRIS/HPG, IAR, CCT, and telehomecare solutions are accessible through ONE Portal, with SSO with health care client and provider context cNEO and connectingGTA can access the community care information in the CDR ClinicalConnect™ viewer adds the provincial CDR as a data source Provincial subscription-based HIAL delivery mechanisms are developed to deliver CDR notifications to community care solutions (strategic) 	
Strategic Assets	<ul style="list-style-type: none"> Provincial CDR (index and repositories) Provincial EHR integration assets (HIAL, provincial registries, ONE ID, audit, consent, terminology standards and services) CHRIS, IAR, CCT, DATIS and telehomecare solutions eReferral PRM and standards package Resource matching and referral business transformation initiative (RM &RBTI) standard forms
Key Milestones	<ul style="list-style-type: none"> CDR onboarding (CHRIS, IAR, CCT, DATIS reports in CDR) eReferral PRM and standards package updated CHRIS integrated with provincial registries Integration of provincial assets with Health Links

FUTURE STATE

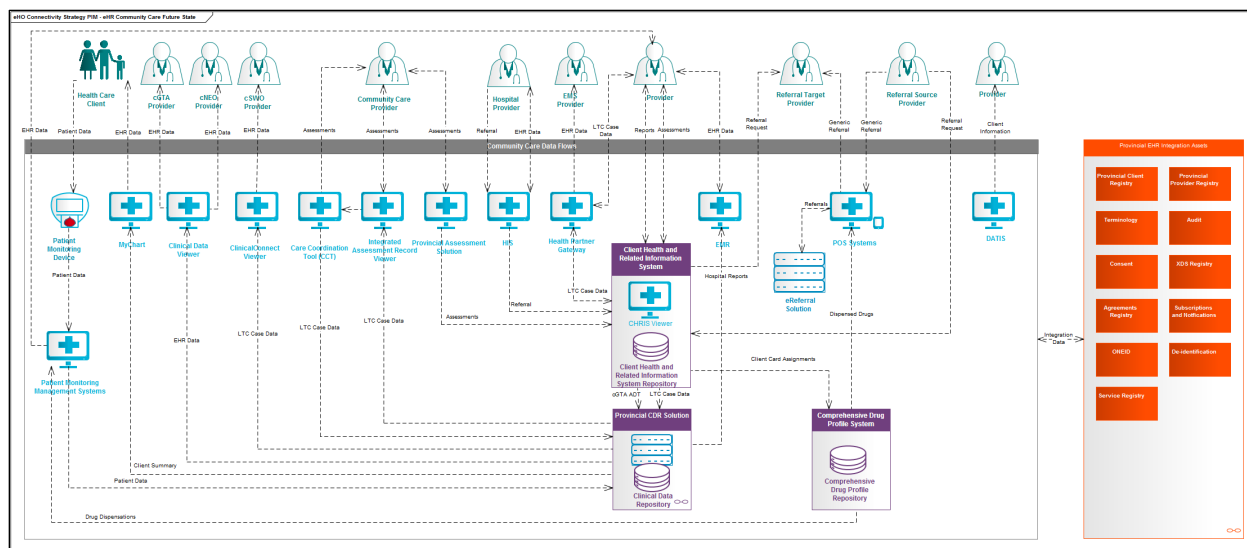


Figure 13: Future state community care information flow

Episodes of community care generate information essential to an individual’s health record and vital to the provincial EHR. The provincial EHR provides information that is vital to transition of care. Processes such as assessment, referral, transfer of care, and remote health care client monitoring often result in various types of reports that will benefit the delivery of care across all settings. Community care EHR connectivity is a proposed potential solution for integrating community care information into the provincial EHR.

In future, the Ontario EHR will be fully populated with community-based health information, and regional EHR viewers will be fully integrated with CHRIS, making the full client record available to community-based users. OACCAC assets will consolidate and share CCAC-related patient health information with the health system and the EHR via the CDR, and their scope could be expanded to share all relevant community-based patient health information, including that from CCAC-contracted service providers and suppliers, emergency medical services, community support agencies, long term care homes, hospices.

Integration of CHRIS, CCT, and IAR with provincial EHR integration assets is necessary for EHR integration, and clinician experience will be improved with these community care applications accessible through single sign-on with context.

Health Links (a MOHLTC program bringing together providers in a community, including family care providers, specialists, hospitals, long-term care, home care and other community supports) will combine provincial EHR integration assets with local assets to address unique challenges within communities.

eReferrals and eConsults (a sub-type of eReferral) are provincial in scope by virtue of broad-based adoption of the eReferral provincial reference model by eReferral solutions throughout the province. Emergency department notifications will leverage subscription-based HIAL delivery capabilities (eNotifications), notifying community care providers that clients of interest have had hospital episodes, and providing relevant information.

CURRENT STATE

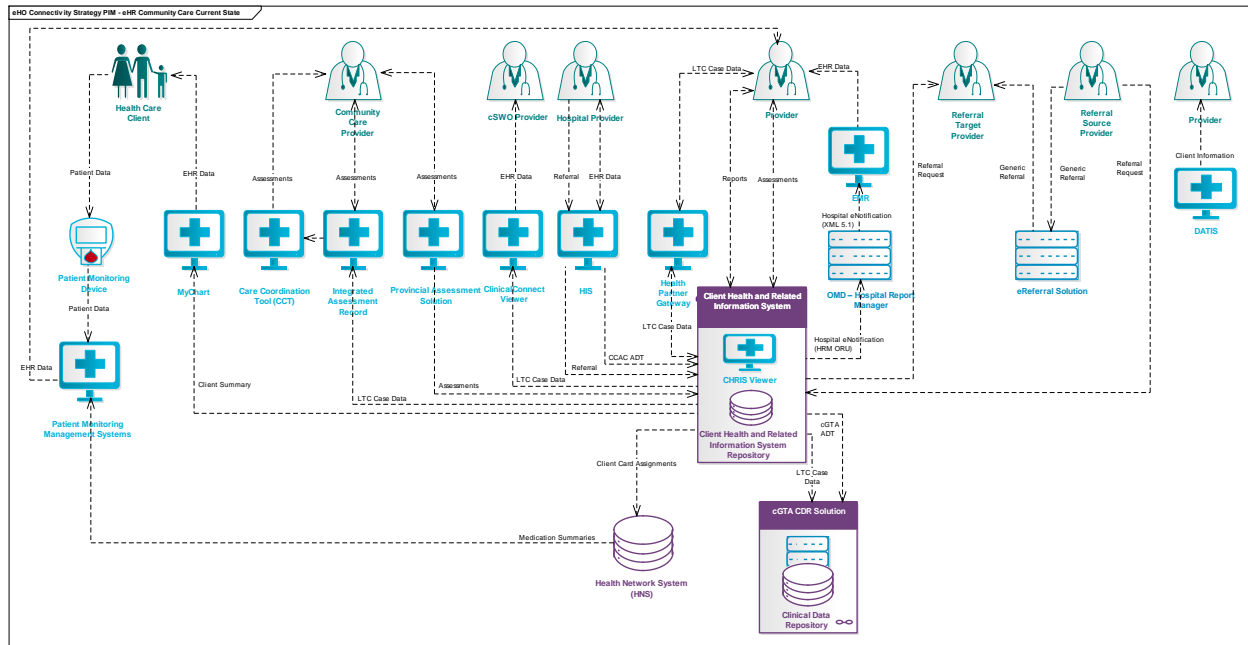


Figure 14: Current state community care information flow

Today, CCACs participating as early adopters of the connectingGTA solution are feeding CHRIS reports into the CDR, and viewing them with the connectingGTA viewer. However, information and reports from CHRIS, the care coordination tool (CCT), the integrated assessment record (IAR), the drug and alcohol treatment information system (DATIS), telehomecare, and existing eReferral solutions are not broadly available for electronic consumption outside of the applications themselves. Processes such as assessment, referral, transfer of care, and remote health care client monitoring also result in reports that would benefit the delivery of care across all settings.

The HIAL project plans the delivery of subscription and notification services, based on requirements from DI common services and provincial client registry projects, with input from Cancer Care Ontario.

TRANSITION

Reports uploaded by provincial community care systems such as IAR, CCT, DATIS, and eReferral solutions must be suitable for sharing to the CDR. This requires integration with provincial client and provider registries for linking community information with the provincial EHR.

The eReferral provincial reference model needs to be updated to reflect CDR integration. Existing eReferral solutions need to begin uploading assessments, reports, care plans, and other reports suitable for sharing to the CDR.

While the future state of the CDR is a single repository, due to practical needs such as data quality management and project risk and dependency, a transitional approach is required to deliver timely clinical value while preparing for future consolidation. Clinical documents originating from acute/ambulatory, primary, and community settings will be housed in separate repositories on a per-care setting basis. Documents within these repositories will be accessed via a single index so that, from an external perspective, they appear as a single, consolidated repository.

PROVINCIAL EHR INTEGRATION ASSETS

Provincial EHR integration assets are foundational elements of the EHR blueprint that enable the contribution and consumption of EHR information. Systems involved in contributing or consuming EHR information must integrate with a number of these services, based on system role and clinical need.

PROVINCIAL HIAL

The provincial HIAL provides a single point of integration to EHR services, acting as the broker between external systems and the registries, repositories and services behind it. The HIAL applies security and privacy controls, message validation, transformation, enrichment, orchestration, and auditing for all transactions; it is engineered for availability and to handle the high volumes of transactions inherent to the EHR. Security controls include the authentication and authorization of all transactions via the user registry and, as needed, anti-virus services, as well as privacy controls such as audit and consent management.

Summary of Health Integration Access Layer (HIAL)	
Current State	Future State
<p>HIAL 1.0 provides:</p> <ul style="list-style-type: none"> • Transaction security, mediation and orchestration • Initial consent (CMTA) and privacy audit (MCTA) solutions • Terminology services for DI • Lab report notifications on behalf of OLIS 	<p>HIAL 2.0 provides:</p> <ul style="list-style-type: none"> • Transaction security, mediation and orchestration through a policy-driven architecture; services can be created and have their behaviour modified through policies and business rules. • Consent integration (CMTA) and an optimized privacy audit integration (MCTA) • Full subscription and notification capabilities with content and topic-based subscriptions and a corresponding subscription matching engine • Segmentation: the HIAL can be logically divided into eHealth Ontario and regional segments, each with its own service levels, reporting, etc. • The service oriented architecture (SOA) service registry, a single catalog of all provincial ehealth services and their associated policies; metadata associated with the services identifies the HIAL segment they belong to, service-level agreements, their intended use, etc. • Enhanced terminology asset management tools and runtime HIAL integration to terminology value sets and maps • Generalized asynchronous message processing capability • Advanced, policy-configurable logging framework with searchable metadata • A message archive for the long term retention of message content as required • Advanced reporting, monitoring, and alerting
<p><i>Transition</i></p>	

- HIAL 2.0 is an extension of and replaces HIAL 1.0. For a period of time, aspects of HIAL 1.0 and HIAL 2.0 will co-exist. Services will be migrated from HIAL 1.0 to HIAL 2.0 on a set schedule, with a service existing only on one of the two HIALs at any given time. New services will be built on HIAL 2.0
- Additional HIAL segments will be allocated on the HIAL 2.0 infrastructure as required

Strategic Assets

- Service registry
- Message archive
- Terminology standards and services
- Provincial HIAL

Key Milestones

- Enhanced monitoring and reporting available for HIAL 1.0
- The initial HIAL 2.0 core release with a single service
- The second HIAL 2.0 release (soon after the core release) with subscription and notification, terminology standards and services, and the migration of services to HIAL 2.0

FUTURE STATE

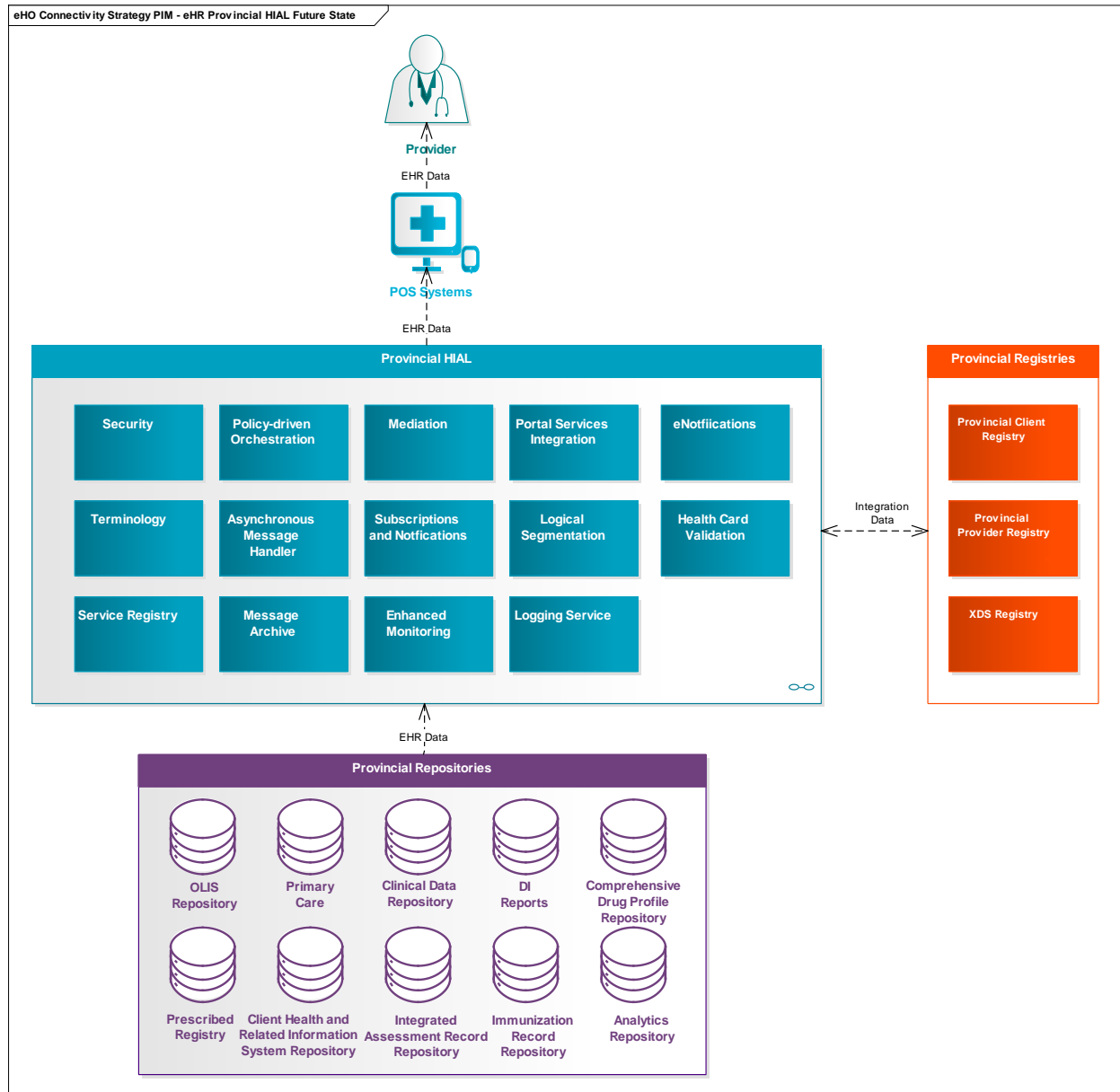


Figure 15: EHR HIAL technology stack future state

In future the provincial HIAL (HIAL 2.0) will be a centrally hosted and managed solution with HIAL segments (logical configurations residing on the provincial HIAL) that allow the regions and eHealth Ontario to utilize HIAL capabilities autonomously. The HIAL's integration capabilities will be used to meet the unique needs of each region, providing client, provider, location and terminology validation and/or translation, for all services. Projects will be able to leverage eHealth Ontario data exchange, content, and terminology specifications created using pan-Canadian and international standards to support shared needs.

Regional adoption projects will specify the processing required within the segments to support the requirements of their region. For example, within a HIAL segment, a connecting project will leverage the integration capabilities of the HIAL technology and provincial EHR integration assets to convert messages from the native format of a

regional lab information system, to those required for OLIS input feeds; regional specific code that is used for 'last mile' integration exists within regional HIAL segments of the provincial HIAL.

The connectingGTA backend solution includes a CDR HIAL. The bulk of investments made in this HIAL have been specific to CDR, reformatting data provided by the hospitals into CDR format and making it available through a standardized interface. The CDR HIAL is very much integrated with, and essential to, the CDR itself; while CDR HIAL investments are strategic, they are specific to the CDR. In future, the CDR HIAL will get data in and out of the CDR, all EHR transactions will be brokered by the standards-based provincial HIAL, and regional HIAL segments will be used to connect regional legacy systems with provincial EHR services.

SERVICE REGISTRY AND SERVICE ORIENTED ARCHITECTURE (SOA) POLICIES

Two key investments underpin the SOA of Ontario's EHR: the service registry, and SOA policies. The service registry is the authoritative source of provincial EHR service information. Implementers interested in connecting a POS system to the EHR, browse the registry to find services that meet their needs and information required to connect and consume those services.

SOA policies describe the approach to building and publishing EHR services to achieve consistency for key service characteristics including error handling, monitoring, reporting, and the business level description of services. SOA policies are enforced through project gating and/or service catalog management processes.

The SOA policies described in **appendix B** have been developed, peer reviewed, and approved for use by eHealth Ontario. The intent is to broaden the scope of these policies to EHR services throughout the province through the governance of the strategic committee. Changes to policies will likely occur prior to becoming provincial standards.

TERMINOLOGY

A large portion of EHR content is expressed in clinical terminology – language that is very specific and unambiguously conveys clinical meaning. Clinical terminology and code systems have been developed by international standards development organizations in support of ensuring that clinical meaning is preserved in the exchange of clinical information. Examples of such code systems are SNOMED CT® and LOINC®.

Consistent use of clinical terms and codes among EHR and POS systems are called semantic interoperability – where clinical meaning is consistent and preserved as information is exchanged among systems. Semantic interoperability is essential to driving improved clinical outcomes through clinical decision support systems, and improving population care through clinical data analytics. For example, trending of individual or population health indicators is not possible without consistent use of clinical terms and codes.

The terminology registry contains the standard provincial terminology and code systems and reference sets (subsets of code systems). Where appropriate, it also maps related local terms to provincial terms. The registry is consulted as part of EHR transactions to validate clinical terms, and translate them from local terms and codes to their provincial equivalent. In cases where terminology maps need to be applied to process EHR transactions, it is preferable to submit EHR records to repositories using terms as authored, and apply maps which translate terms as they are retrieved. Both the original local term and the translated provincial term should be available in the retrieved records. This maintains fidelity of the EHR record and avoids the need to change the content of EHR records as terminology maps evolve.

SUBSCRIPTIONS/NOTIFICATIONS

The subscription service allows providers to specify notifications they want to receive, and direct them to where they want them delivered (EMR, email address, cell phone/SMS). Subscription details will vary, depending on the level of specificity required. For example, primary care providers who work in multiple practices or settings may need to direct notifications to the EMR instance where they care for specific clients. Depending on the delivery channel, a notification may be a simple message that new clinical information is available for a client, or it may include actual clinical information. Providers register their interest in a topic, such as 'new lab report', and notifications are sent when any such activity takes place for their clients.

Together, subscription and notification services improve the timely delivery of care by minimizing the time it takes for new information to reach providers. These services also support referrals and the transition of care, by ensuring all interested providers are promptly notified of test results, diagnostic reports, and assessments, updates to care plans.

Subscription and notification functionality has been implemented by the PCR, which notifies the XDS registry of any changes to a client's demographic information. This capability can be used to ensure that the POS systems used by providers are kept in sync with the PCR – a beneficial integration fundamental to linking client identities and records to create the provincial EHR. In this case, eHealth Ontario subscribes for updates on behalf of clinical systems.

Subscription and notification capability has been procured as part of the HIAL technology stack procurement. The HIAL project will build subscription and notification capabilities based on requirements from the PCR project and Cancer Care Ontario.

Once built, the PCR project will transition this capability to the HIAL. OLIS will then transition its current data broker functionality to use HIAL-based subscription and notification.

Integration with provincial clinical repositories will be required to enable notifications. These integrations will vary in terms of complexity on a repository-by-repository basis.

CURRENT STATE

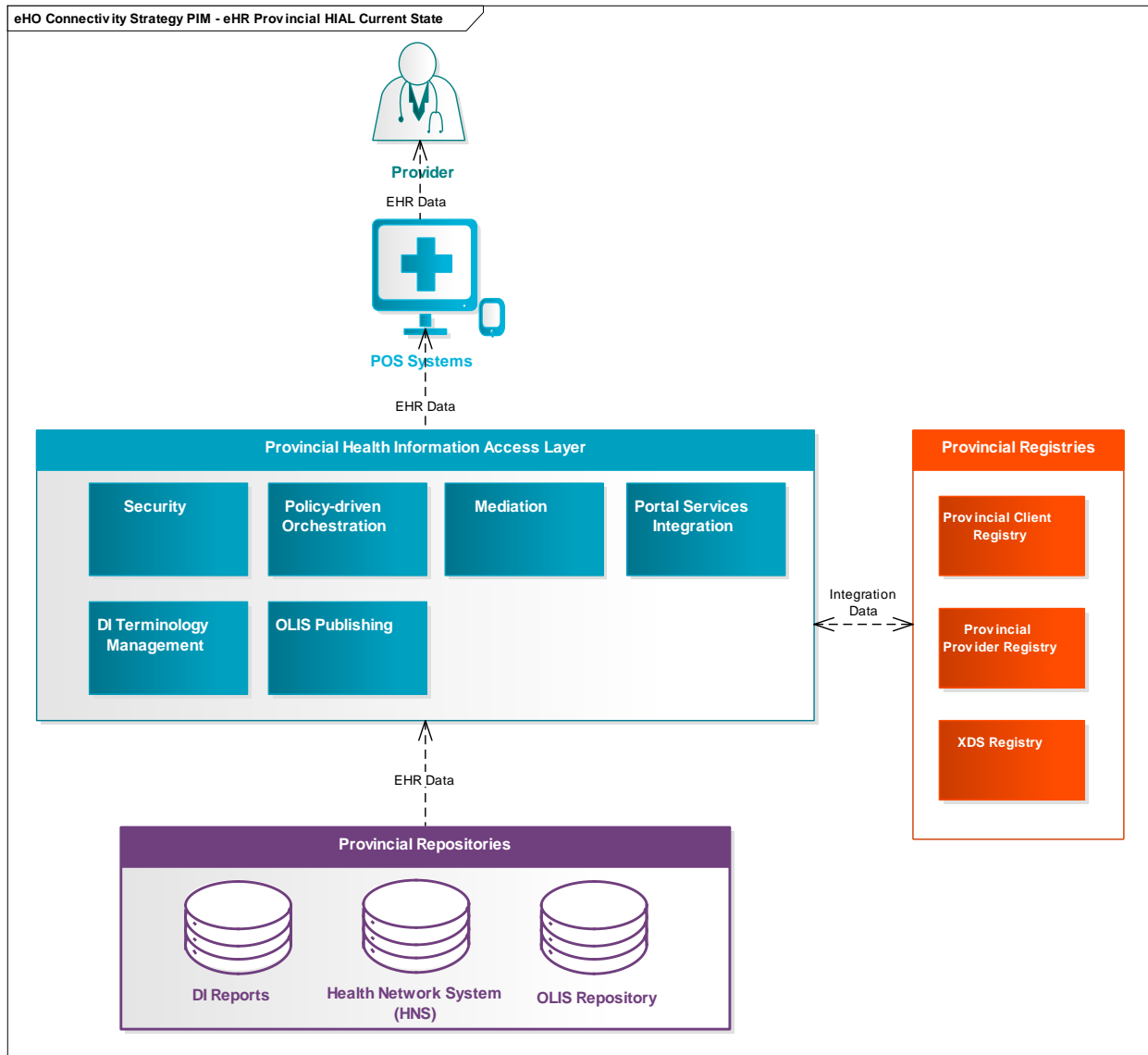


Figure 16: EHR HIAL technology stack current state

The current version of the provincial HIAL (HIAL 1.0) coordinates transactions for provider registry, client registry, OLIS portlet, ODB portlet and DPV. It also coordinates DI common services transactions, enabling province-wide discovery and viewing of diagnostic imaging reports. Soon, the HIAL will be supporting integration between primary care EMRs and the BORN registry, and will be integrated with provincial consent and audit solutions.

Incremental enhancements to the provincial HIAL are ongoing, with the HIAL evolving to version 2.0 over time and based on the needs of the province.

Integration with provincial audit and consent solutions is currently in the development and implementation phase.

TRANSITION

Transition of the current state provincial HIAL to the future state is largely a matter of adoption and enhancements. The future state, HIAL 2.0, is an extension of, and replaces and enhances the current HIAL. While aspects of both HIALs will co-exist while services are migrated, a service will only exist on one HIAL at any time. All new services will be built on HIAL 2.0, with additional HIAL segments allocated on the infrastructure as required.

PROVINCIAL CLIENT REGISTRY (PCR)

The provincial client registry (PCR), which contains 100% of OHIP-eligible client health card and address information, is the authoritative source for health care client identity, facilitating the unique, accurate and reliable identification of clients in Ontario.

It makes the connection between health care clients' health card numbers and other identifiers used across disparate systems, so clients can be identified by any identifier assigned to them, such as a hospital medical record number a pharmacy patient ID, or an EMR patient ID. Without contributions to the PCR from all clinical systems in the province, linked together by the PCR, only a partial view of the client's information would be available from the EHR.

The scope of an EHR is defined by the clinical community that shares a common client registry. Without a common client registry, and common algorithm and data for linking and un-linking client identifiers, electronic health records cannot be reliably associated with a specific person. A single provincial client registry, one that is considered the provincial authoritative source of client identifiers by all EHR viewers, is therefore essential to a provincial EHR.

Summary of Provincial Client Registry

Current State	Future State
<ul style="list-style-type: none">• Over 60 data sources, covering over 170 hospital settings, are contributing data• COTS MDM software is providing matching and linking of client identifiers across sources• Interfaces are supporting HL7v3 Pan-Canadian queries• Integration with DI common services supports client identifier resolution	<ul style="list-style-type: none">• EHR consumers and contributors are integrated with the PCR• Independent health facilities and CCACs, EMRs and CHRIS are contributing client information to the PCR• All ADT feeds are sent through the HIAL using a standardized provincial format, and are forwarded by the HIAL to all solutions requiring them (e.g. PCR, CDR, eNotification)• HL7v2 PIX-PDQ and HL7v3 PIX-PDQ are available for query via the HIAL• Pan-Canadian HL7 v3 add, revise, merge/unmerge, link/unlink interfaces are available• Subscription and notification synchronization mechanism with external systems is available• Systems in the province may maintain synchronization with the PCR through HIAL-based notification services• Integration with other provincial assets (consent management technology assets)

	(CMTA), monitoring and control technology assets (MCTA), OLIS, CDR, etc.) is complete
Transition	
<ul style="list-style-type: none"> In many ways, the current PCR is already end-state. Transition requires addressing policy and regulation issues related to the collection and disclosure of personal health information, as follows: <ul style="list-style-type: none"> Collection of client information from non-ministry assets (independent health facilities, physician EMRs etc.) General approval of PCR for clinical use Integration of additional contributors and consumers 	
Strategic Assets	
<ul style="list-style-type: none"> Provincial client registry 	<ul style="list-style-type: none"> Provincial EHR integration assets (HIAL, provider registry, ONE ID/user registry, service registry, audit, consent, terminology standards and services)
Key Milestones	
<ul style="list-style-type: none"> Availability of all defined HL7v2 & v3 interfaces and provincial ADT feed format Clinical use general approval (resolution of policy and regulation issues) Independent health facility (IHF)/CCACs/CHRIS/EMR contributions Integration with connecting programs Integration with OLIS Integration with all EHR consumers 	

FUTURE STATE

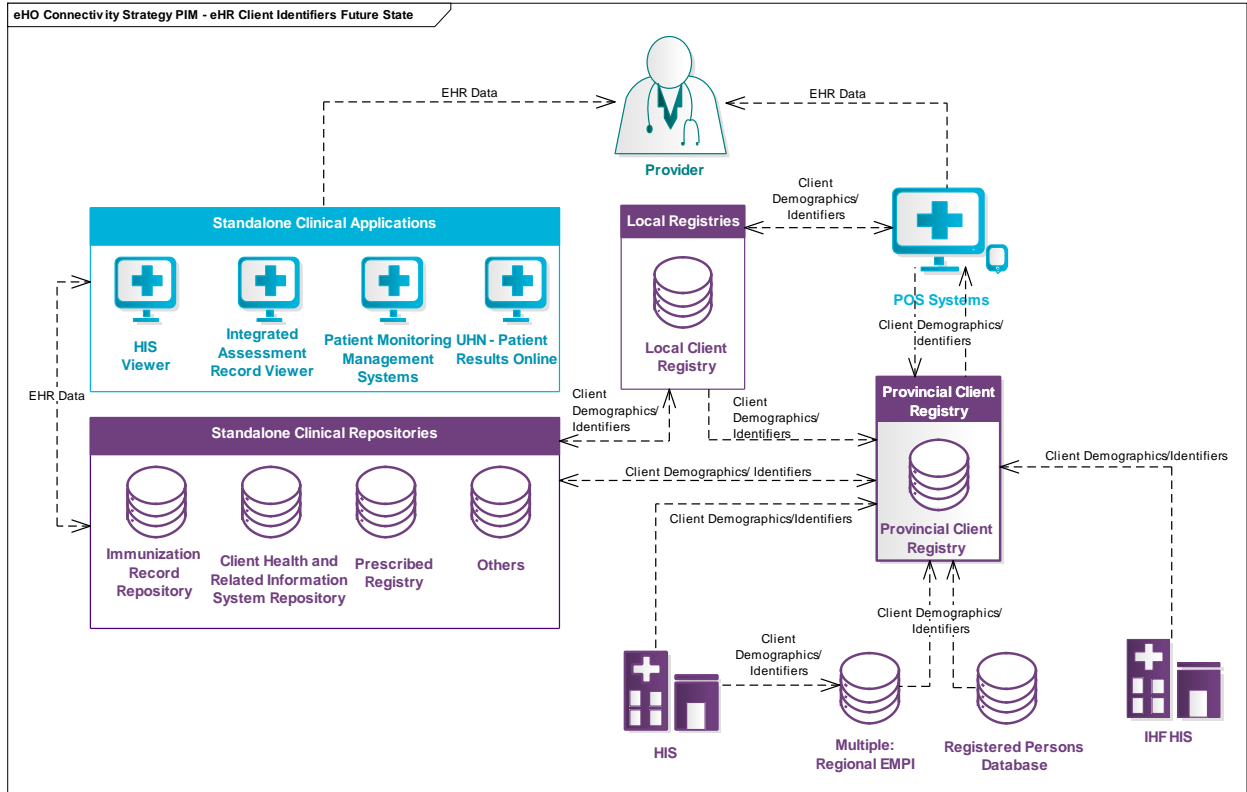


Figure 17: Future state client identifiers information flow

In future, a single PCR will link people with their health information. Each POS system that contributes information to or consumes information from the provincial EHR must integrate with the PCR to ensure synchronized client identity information. Over time, all EHR consumers will need to be integrated with the PCR as the system of authority for client identity information in order to present a fulsome view of a client’s personal health information.

However, given that many COTS POS systems will continue to rely on local client registries, keeping all systems in sync with the PCR will require a combination of ADT feeds to the PCR, active integration with the PCR, and notifications from the PCR to the POS systems.

CURRENT STATE

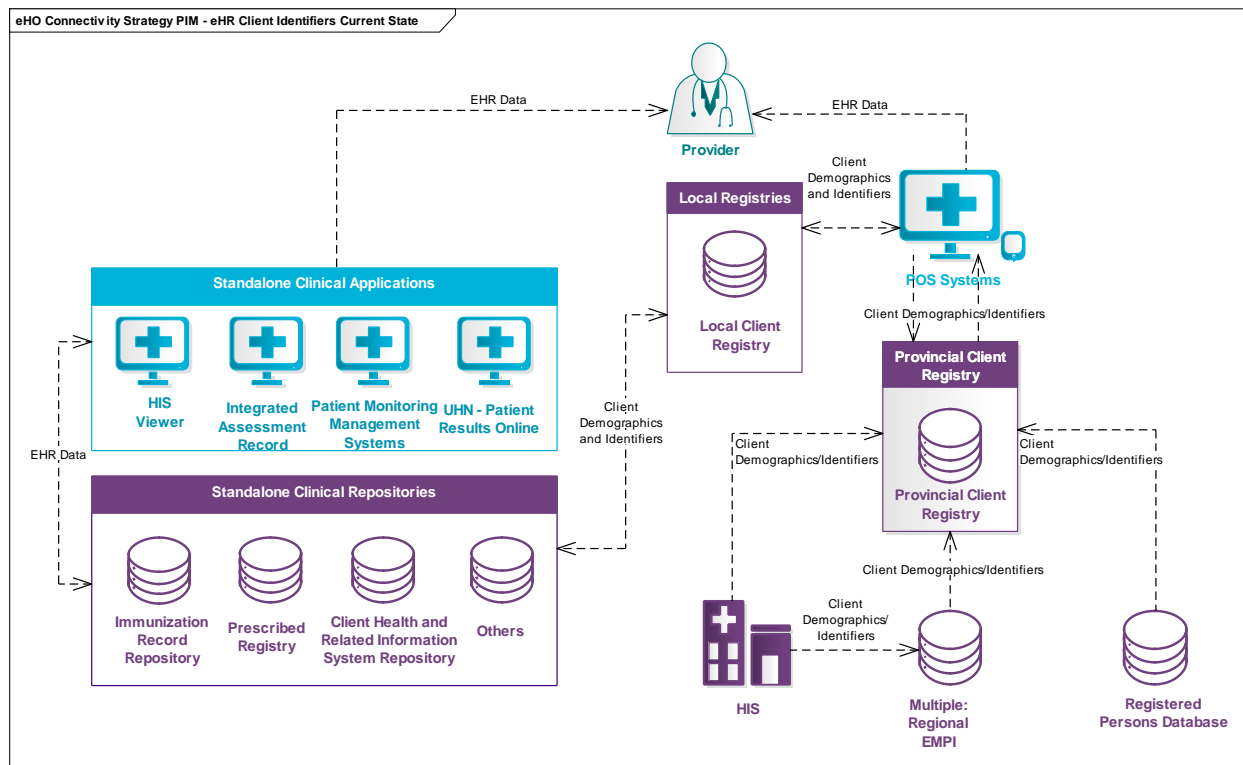


Figure 18: Current state client identifiers information flow

Currently over 60 sources, comprising more than 170 hospital locations, contribute client data to the PCR, adding and revising client information to the PCR through admit, discharge and transfer messaging. A legacy client registry receives information from the Registration Claims Branch’s registered persons data base solution only. This solution is custom built, and difficult and expensive to maintain, support and enhance. It is being decommissioned in favour of the PCR, with its master data management capabilities and significantly lower total cost of ownership.

TRANSITION

Since in many ways the current PCR is already at its future state, transition is largely a matter of adding additional interface support, and addressing policy and regulation issues related to the collection and disclosure of personal health information, including collecting client information from non-ministry assets (independent health facilities, physician EMRs), general approval of PCR for clinical use, and integrating additional contributors and consumers.

PROVINCIAL PROVIDER REGISTRY (PPR)

The PPR is the authoritative source of information about providers and service delivery locations for all EHR solutions, facilitating the unique and accurate identification of any individual or organization that provides health services in Ontario. It is a foundational component of the EHR, delivering provider profile information (including identity, roles, status, and location information and their relationships) from trusted professional colleges, MOHLTC, and provider organizations, and enabling provincial enforcement of consent directives and authorization rules.

Summary of Provincial Provider Registry (PR)	
Current State	Future State
<ul style="list-style-type: none"> • 10 data sources, covering 86% of regulated health care provider individuals, are contributing data • The PPR has: <ul style="list-style-type: none"> ○ Custom built provider registry functionality ○ Rigid interfaces and query options ○ Limited ability to apply data quality monitoring and remediation • The PPR is used for provider authorization and lookup • There is no support of unregulated health providers, and limited demographic support • The PPR provides batch data updates and batch data synchronization capabilities only 	<ul style="list-style-type: none"> • The PPR is used for provider authorization, provider directory, location registry, service registry, provider ID resolution, and automated re-credentialing • EHR consumers and contributors use the PPR for provider resolution • The PPR includes provider information from all sources, including 100% of regulatory colleges, HISs, and government resources • The PPR provides a single resolution to provider identity in support of consent and privacy monitoring • Provider self-service capabilities to manage work location, service information, affiliations and /or membership are available to provider organizations, colleges, and provider individuals • The PPR provides a master data management (MDM) tool to support increased functionality: <ul style="list-style-type: none"> ○ Real-time adds/updates ○ Probabilistic searching/matching ○ Many source contribution and resolution to a single ID • The PPR includes all provider identifiers that are used throughout the province, including identifiers issued and managed by HISs, EMRs, CHRIS • All unregulated health care providers are in the PPR. • A data quality monitoring process is in place
Transition	
<ul style="list-style-type: none"> • Work with regulatory colleges to bring on remaining regulated professionals will continue • Development of the PPR will take place in parallel to current provider registry consumption • Data quality and management will be provided in the short term by the existing provider registry • Policy/regulation issues will be addressed to ensure inclusion of unregulated health care providers 	
Strategic Assets	
<ul style="list-style-type: none"> • Regulatory college feeds. • PPR 	<ul style="list-style-type: none"> • Provincial EHR integration assets (HIAL, ONE ID, audit, consent, terminology standards and services, OLIS, CDR, DI common services)

Key Milestones

- Provider data quality, management and governance is defined
- Provincial provider registry technology refresh is rolled out
- The remaining colleges are contributing to the PPR
- Regulations and policy changed to support use of unregulated providers in PPR
- EMR/HIS/unregulated providers are contributing to the PPR
- A self-service tool for management of provider information, service, and location information is rolled out
- Integration with connecting programs is complete
- Integration with OLIS is complete

FUTURE STATE

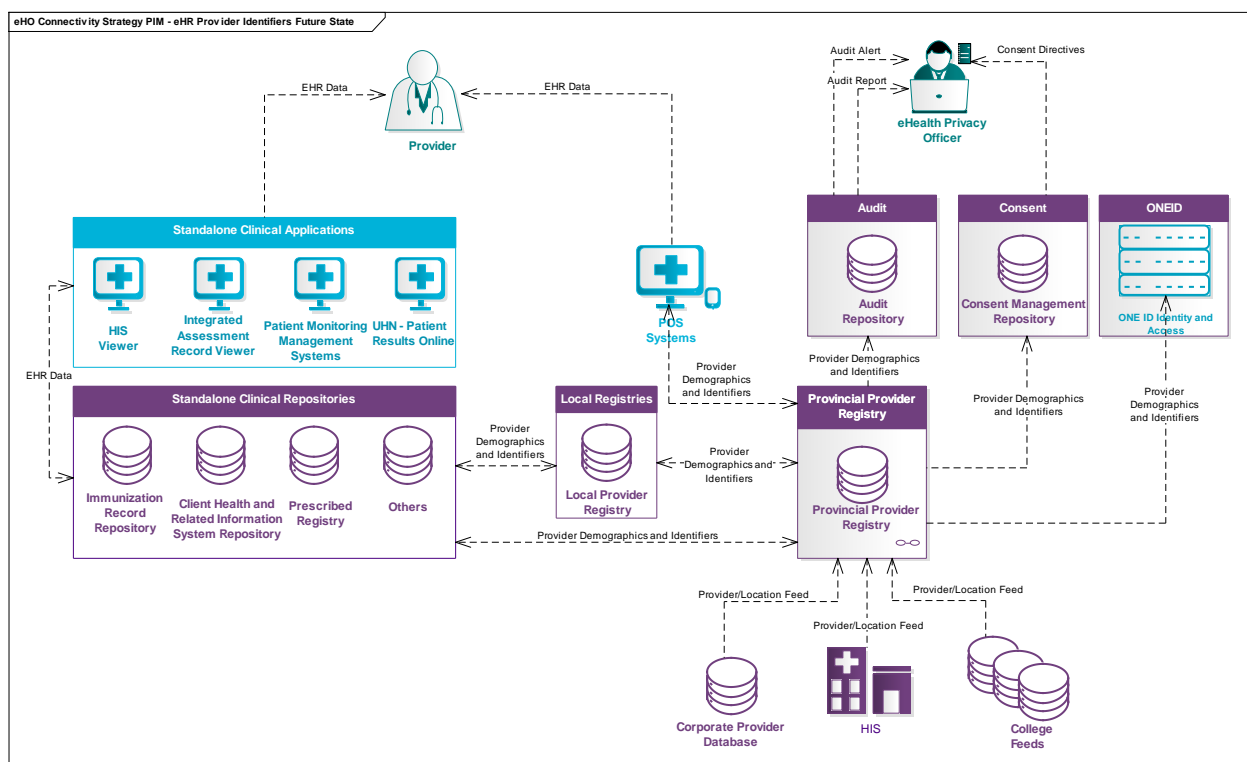


Figure 19: EHR Provider identifiers future state

In future, a single PPR will provide the authoritative source of provincial provider identification, location, and health service information. While health care providers will continue to use a digital identity at each organization in which they practice, the PPR will link these identities to a single provider individual, a capability that is essential to enforcing provincial privacy policies.

Health care providers and the organizations they work for will be able to update PPR information. Their systems will integrate with the PPR to ensure that local provider registries are in sync with the PPR. Ideally, POS systems should use the PPR rather than local provider registries; however, since many COTS POS systems will continue to rely upon local provider registries for identity information, keeping local systems in sync with the PPR will require a combination of self-management of provider information and change notifications from the PPR to the POS systems.

CURRENT STATE

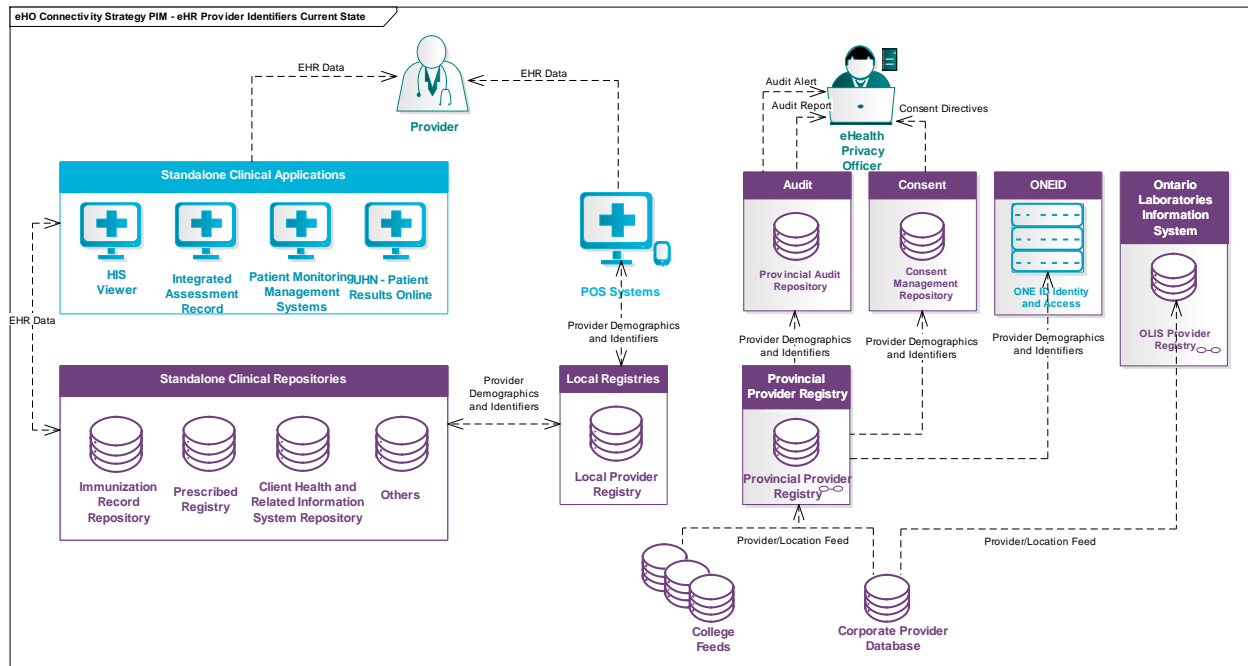


Figure 20: EHR provider identifiers current state

Today, the PPR is a custom-built solution to support authorization of access to personal health information based on the current status of the provider's license. Provider profile information is supplied to eHealth Ontario from a growing list of regulatory colleges including – the College of Nurses of Ontario, College of Midwives of Ontario, Royal College of Dental Surgeons of Ontario, College of Dietitians of Ontario, College of Psychologists of Ontario, Ontario College of Pharmacists, and College of Denturists of Ontario. The College of Physicians and Surgeons of Ontario profile information is currently provided from the MOHLTC's corporate provider database along with health care organizations (both regulated and independent health facilities).

The PPR currently receives data from these regulatory colleges and makes provider information available to over 400,000 provider individuals and organizations (both active and inactive), representing 86% of regulated providers in the province. However, it does not link multiple provider identities to a single individual provider, nor does it allow providers and their organizations to directly update provider identity information.

CHRIS, OLIS, cGTA, ClinicalConnect™, Panorama, OTN, and many other solutions maintain and use local lists of provider information (local provider registries) and are not integrated with the current PPR.

TRANSITION

While 86% of regulated health care providers are contributing data to the PPR, transition from current to future state involves working with the regulatory colleges to bring on the remaining regulated professionals, as well as policy/regulation work to include unregulated providers. A technology refresh will take place while the current PPR continues to serve providers. Provider data quality, management, and governance issues will be addressed, as well as integration with the connecting programs (connectingGTA, cNEO, cSWO) and OLIS.

PORTALS AND VIEWERS

Ideally health care providers would view EHR information from within their core POS system. While the EHR architecture makes provision for this, the majority of today's POS systems are not designed for such integration. For the foreseeable future it will be necessary to rely upon EHR portals and viewers to ensure all providers have access to provincial EHR information.

In Ontario, significant investments have been made into regional web portals that provide a view into the provincial EHR. These portals provide access to health care records such as acute care admit, discharge and transfer records, lab results, diagnostic imaging reports, allergies, and drug dispenses. In the SWO region, the ClinicalConnect™ portal has been deployed and has significant uptake. In the GTA region, the connectingGTA portal has recently gone live in a limited production release with the plan to roll out to the entire region within the year. The NEO region has expressed a desire to use the same technology as the GTA region for their regional portal. eHealth Ontario is also developing a standards-based web portal with embedded custom portlets that can be launched from ONE Portal.

These EHR portals provide read-only views of the EHR. However, other portals and special focus web applications target specific audiences and work flows for creating or modifying health care client data. Examples include:

- IAR: an integrated assessment record application for managing community care and mental health assessments
- CCT: the care coordination tool for creating, maintaining and sharing coordinated care plans and sending secure messages between members of the care team
- CHRIS: the client health and related information system, a web-based operational tool for CCAC patient management
- HPG: the health partner gateway, an application for managing home care service referrals. This is an extension to CHRIS which allows non-CCAC individuals to pick up documents related to services that they are asked to provide.
- eCHN: the electronic child health network, a secure electronic network that enables authorized care providers across Ontario to access health information about pediatric patients from disparate sources.
- Panorama: an immunization and pandemics management system.

As these applications provide functionality too complex to be integrated directly as a portlet in one of the EHR viewers, they will continue to exist as standalone applications for the foreseeable future.

Summary of Portals and Viewers	
Current State	Future State
<ul style="list-style-type: none"> • Regional portals exist, but present only a subset of the EHR • There is a proliferation of special focus portals with no catalogue or unified entry point • Providers require different credentials for accessing different portals • Most portals use local registries and are not integrated with provincial registries, preventing the 	<ul style="list-style-type: none"> • Single sign-on provides seamless access from POS systems to ONE Portal • ONE Portal provides a seamless single-sign on launching point for regional and special focus portals • All portals support the passing of health care client context as well as single sign-on

reliable passing of health care client context to inform a shared, provincial EHR	<ul style="list-style-type: none"> Regional portals present a complete view of the EHR
<i>Transition</i>	
<ul style="list-style-type: none"> Technology refresh for ONE Portal is completed ONE Portal enhancements will take place, to support aggregation of and linkage to regional and special focus portals HIS/EMR and ONE Portal support for eHealth Ontario's SAML single sign-on standard will enable seamless launching of ONE Portal from POS applications Regional portals are integrated with provincial assets (PR, CR, OLIS, CDR, DI) providing a complete EHR view Regional and special focus portal support for eHealth Ontario SAML single sign-on standard will enable seamless launching from ONE Portal Regional and special focus portal support for eHealth Ontario SAML health care client context standard will enable single health care client selection 	
Strategic Assets	
<ul style="list-style-type: none"> ONE Portal ONE ID Regional Portals: <ul style="list-style-type: none"> CDV ClinicalConnect™ viewer Special Focus Portals: <ul style="list-style-type: none"> CCO Panorama CHRIS/HPG OTN Provider Hub 	<ul style="list-style-type: none"> Provincial registries and repositories: <ul style="list-style-type: none"> PPR PCR OLIS CDR DI EMR systems HIS
Key Milestones	
<ul style="list-style-type: none"> Completion of ONE Portal technology refresh Finalization of ONE ID SSO/Federation Availability of ONE Portal single sign-on from HIS using SAML specification Availability of ONE Portal single sign-on from EMR using SAML specification Completion of regional portal integration with provincial assets (PR, CR, OLIS, CDR, DI) Availability of regional portal single sign-on from ONE Portal via SAML Availability of special focus portal single sign-on from ONE Portal via SAML Completion of regional portal integration with provincial registries Availability of regional portal health care client context sharing via SAML Completion of special focus portal integration with provincial registries Availability of special focus portal health care client context sharing via SAML 	

FUTURE STATE

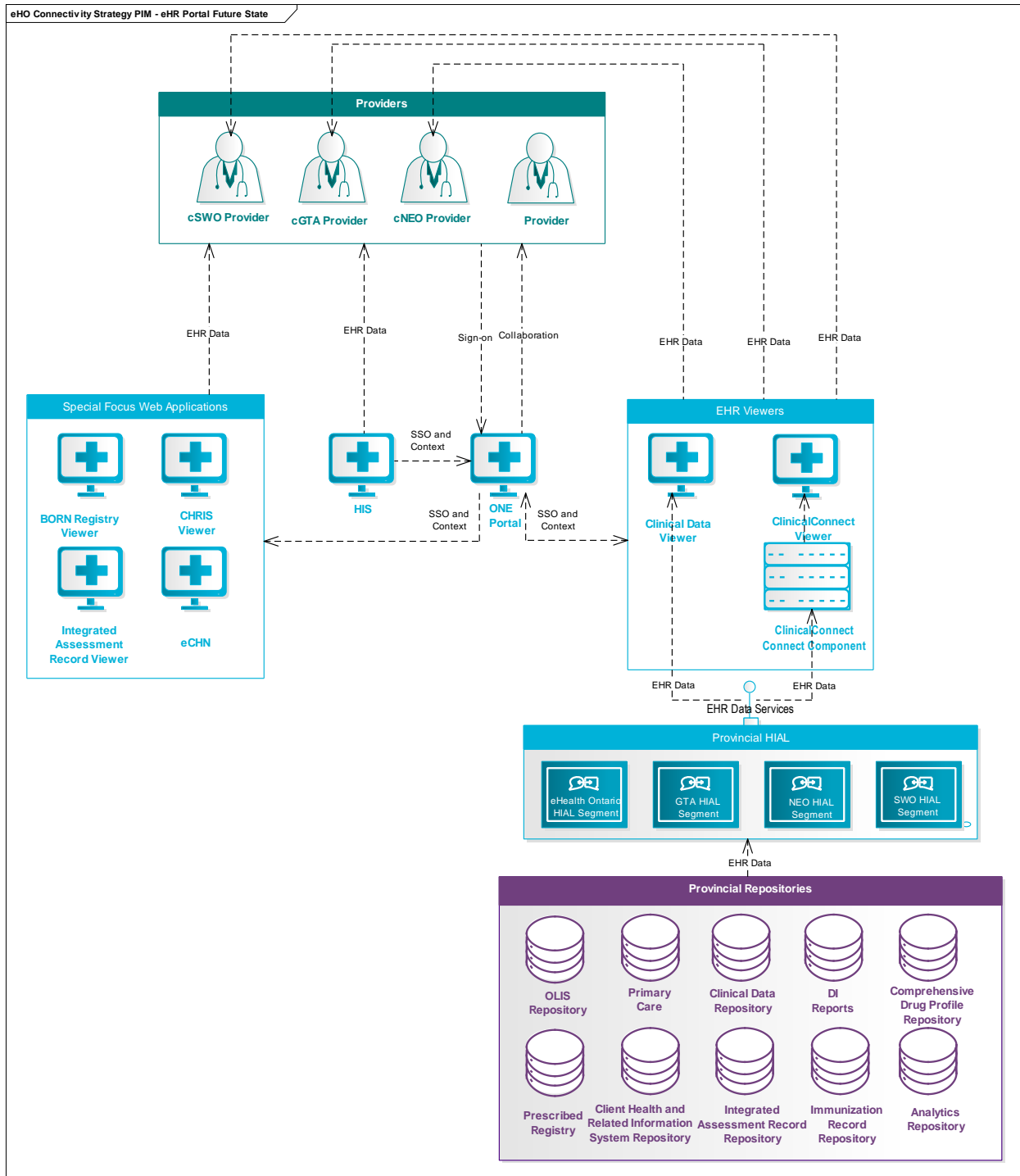


Figure 21: Future state information flow for portals and viewers

The strategy for portals has three components:

1. Ensure all providers in all regions have access to:
 - A regional/provincial portal showing province-wide EHR data

- All special focus portals necessary for their practice
2. Provide a single point of access to the regional, provincial and special focus portals. Providers will also be able to launch ONE Portal from regional viewers with single sign-on and health care client context.
 3. Enable single sign-on with both provider and client context sharing for launched applications, so providers do not need to maintain multiple sets of credentials to access different applications, and can seamlessly transition between them.

WEB BASED EHR VIEWERS AND SPECIAL FOCUS WEB APPLICATIONS

In future, all providers in Ontario will have access to web-based provincial EHR viewers that are supplementary to their core clinical information system, offering provincial views of health care client clinical information. These viewers will be designed according to providers' needs and preferences, and will be integrated with their core systems to minimize the amount of data entry required to view the information of interest. Since the regional hubs (SWO, GTA, and NEO) work closely with clinicians in their areas, they will provide the input and oversight for designing and maintaining regional viewers tailored to regional requirements. Each viewer may have its own look and feel but they will all be integrated with provincial assets, ensuring a consistent view of EHR information across all viewers.

The SWO region's ClinicalConnect™ viewer will continue to be the web-based EHR viewer for providers in the region. Due to the significant investments made, as well as clinical uptake and its value to providers in the region, there is no clear benefit to decommissioning the viewer in favour of the CDV. Similarly, the CDV will remain the web-based EHR viewer for the GTA region.

In the NEO region, a logically separate instance of the CDV will be created on the GTA infrastructure to serve providers. This instance of the viewer will contain the same clinical portlets as the GTA instance, accessing the same data sources, but branding, layout, and overall look and feel will be tailored to meet the needs of NEO providers.

Strategic special focus web applications will continue to be developed as required. Those with significant adoption and clinical value, such as Panorama and IAR, will still exist but will be enhanced to support launching from a unified point of access, to receive client and provider context.

UNIFIED POINT OF ACCESS

Currently, ONE Portal provides two services:

- Collaboration and communities
- Access to web based EHR applications

The collaboration spaces and communities provided by ONE Portal allow providers across the province to share documents, conversations and data in a secure manner. Providers can be enrolled in multiple communities on ONE Portal.

The eHealth Ontario provincial EHR portal (which contains portlets providing access to lab results and diagnostic imaging reports) is currently accessed via ONE Portal: providers log into ONE Portal and, once authenticated, are

provided a link to the EHR portal. ONE Portal is also used to launch special focus web applications such as drug profile viewer and Panorama.

ONE Portal does not currently support single sign-on to other applications, or the passing of provider or health care client context.

ONE Portal will provide a unified point of access to provincial health care systems and services. A provider will log into ONE Portal and be presented with collaborative spaces for communicating with other providers as well as sharing documents and information. Providers will also have access to links to regional and provincial EHR viewers and special focus web applications. And they will be able to launch the ONE Portal from regional and provincial EHR viewers.

Use of ONE Portal as a unified access point for all web-based clinical applications will increase adoption and uptake for these services and applications, as providers will access them all through a single URL. As new systems and services come online or change, providers will immediately be made aware of them.

SINGLE SIGN-ON (SSO) AND CONTEXT SHARING BETWEEN PORTALS

Once all applications have a unified launching point through ONE Portal, they can be extended to use single sign-on and context sharing.

Each EHR viewer and special focus web application will support single sign-on based on eHealth Ontario's SAML-based standard. This standard permits an application to be launched from an HIS, EMR, or any other POS system, and automatic log in based on previously-provided user credentials (such as user name and password), and passing provider identifiers (such as college license number) and client identifiers (such as Ontario Health Number) from the original system. The user credentials are used for sign-on, while the client and provider information are used to establish the shared context. This allows a provider to find a client in one application, and then seamlessly transition to another application without needing to launch it separately, re-establish credentials, or search for the client again. This context sharing requires that both the launching application (ONE Portal) and the launched application (the regional EHR viewer or special focus web application) are aligned with the finalized eHealth Ontario specification.

CURRENT STATE

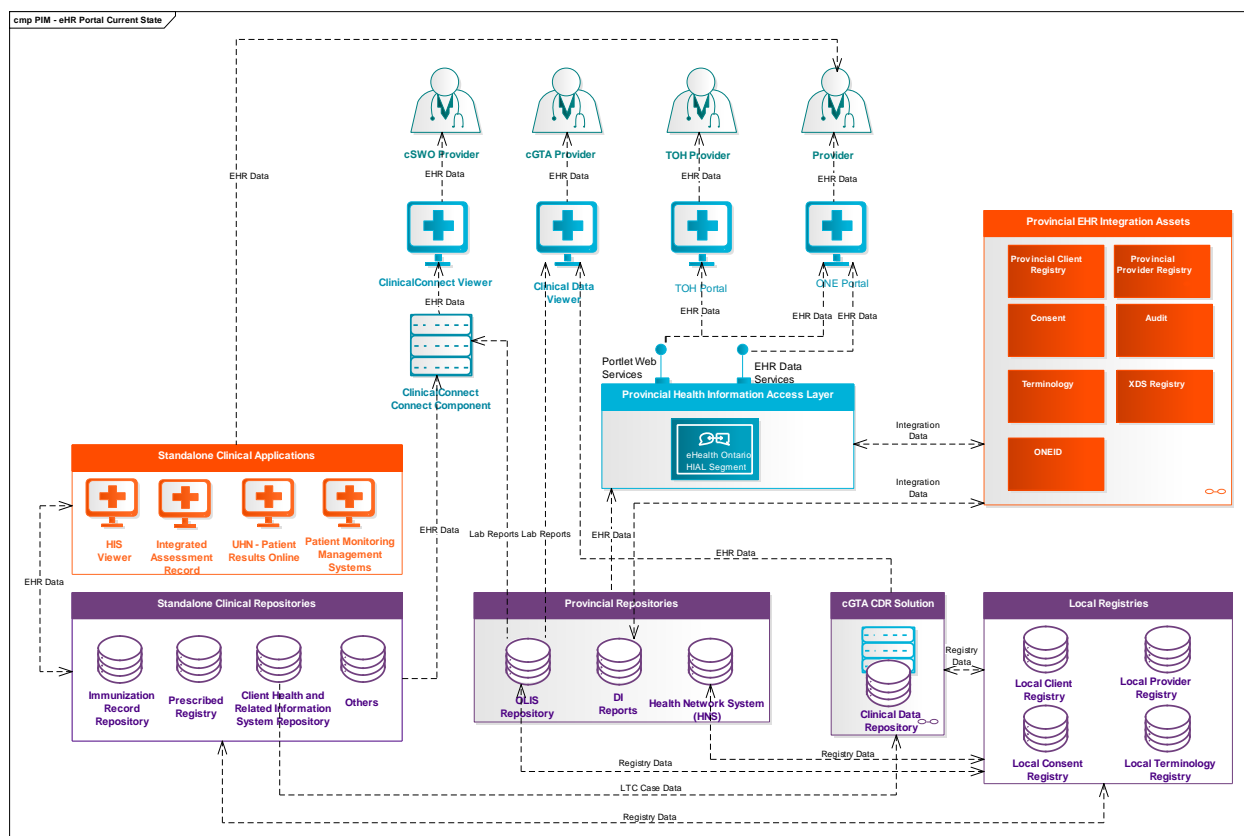


Figure 22: Current state information flow for portals and viewers

WEB-BASED EHR VIEWERS AND SPECIAL FOCUS WEB APPLICATIONS

In the SWO region, the ClinicalConnect™ portal has been deployed and has significant uptake. Its primary source of data is hospital information systems in SWO, but it also presents data from other clinical data repositories such as OLIS.

In the GTA region, the connectingGTA CDV has recently gone live in a limited production release with plan to roll out to the entire region within the year. Its primary source of data is the provincial CDR, but it also presents data from other clinical data repositories such as OLIS. The CDV is a web portal that has COTS portlets embedded in a standards based web portal. The portlets are written using web standards, but communicate with one-another using a custom messaging system.

Currently, the NEO region does not have a regional portal. Pilots are underway at The Ottawa Hospital using portlets provided by eHealth Ontario, but they are not expected to be rolled out to the entire region.

eHealth Ontario has developed a standards-based web portal with custom portlets that can be launched from ONE Portal. The portlets comply with web standards, but were developed internally by eHealth Ontario, and provide access to PCR, PPR, lab results from OLIS, and DI reports and images from the provincial DI-r.

Multiple independent projects are underway across the province to create independent, special focus portals. These applications are being developed without common standards for sign-on, security or look and feel. They are

not integrated with provincial repositories such as the PCR and PPR, or with one another. Although they deliver clinical value, there is no consistency in how they are accessed or how they work together.

SINGLE SIGN-ON AND CONTEXT SHARING BETWEEN PORTALS

The eHealth Ontario SAML single sign-on specification, which includes specifications on passing client context along with logon information, has been approved by its strategic committee. A preliminary implementation is being used to launch the connectingGTA CDV from acute care HIS systems. For more information on single sign-on and context sharing, see the following sections on ONE ID.

TRANSITION

In order to provide a consistent view of EHR information across all viewers, each regional portal needs to be integrated with provincial assets, particularly PCR and PPR. Once common registries are used by a viewer, they can start receiving data from provincial repositories. Transition steps are:

1. The ClinicalConnect™ viewer receives data from the provincial CDR
2. Hospitals in all regions feed the provincial CDR
3. All viewers (GTA/NEO CDV as well as ClinicalConnect™) receive medication dispense information
4. All viewers receive diagnostic image reports.

To create a unified launching point for all web applications, ONE Portal will be upgraded to allow extended functionality such as personalization and collaborative spaces, and to provide links to regional and special focus portals.

Once all applications have a single launching point through ONE Portal, the solution can be extended to use ONE ID for single sign-on and context sharing. The connectingGTA CDV already supports the draft eHealth Ontario SAML standard by ONE ID for launching the application from hospital information systems. ONE Portal will be enhanced to support the same specification so that it can be launched directly from HIS and EMR systems.

The remaining portals will continue with their current roadmaps, but will be enhanced to support the single sign-on and context sharing required for them to be launched directly from ONE Portal.

ONE ID

Summary of ONE ID

Current State	Future State
<ul style="list-style-type: none"> • ONE ID systems and processes are approved for protection and access of PHI • ONE ID provides inclusive security services for OTN, CCO, ONE Portal, DPV, OLIS, Panorama and others • A distributed network of registration agents supports the issuance of ONE ID credentials • ONE ID provides a security enforcement layer for provincial HIAL segment 	<ul style="list-style-type: none"> • ONE ID is an identity federation operator and routes distributed authentication traffic for the province • ONE ID provides a centralized application authorization datastore, with management interfaces to assist service owners in making authorization decisions • ONE ID is a mobile application security provider • ONE ID provides a large deployment base of

<ul style="list-style-type: none"> • ONE ID is a federated identity provider (IDP) • ONE ID provides identity and entitlement data provisioning and reconciliation services • ONE ID provides enhanced risk based authentication • Health care client context management between POS systems and EHR viewers occurs at EHR viewer launch only 	<p>provincially trusted digital identity providers</p> <ul style="list-style-type: none"> • Participating viewers and POS systems are able to set and acquire health care client context, enabling health care client context to be continually maintained between a provider's POS system and EHR viewer • ONE ID provides a federated trust relationship between ONE ID and Go Secure for purpose of enabling provider single sign on
<p style="text-align: center;"><i>Transition</i></p> <ul style="list-style-type: none"> • An end state context management solution will be created, including architecture and standards governance • Finalization of federation business framework (policies, standards & agreements) will take place • connectingGTA will transition to the provincial solution 	
<p>Strategic Assets</p> <ul style="list-style-type: none"> • Provider registry • ONE ID suite of services 	
<p>Key Milestones</p> <ul style="list-style-type: none"> • Onboarding of regional EHR viewers (cGTA, cNEO, cSWO) • Onboarding of ONE Portal as a federated application • Migration of cGTA pilot organizations • Onboarding of special focus web applications 	

FUTURE STATE

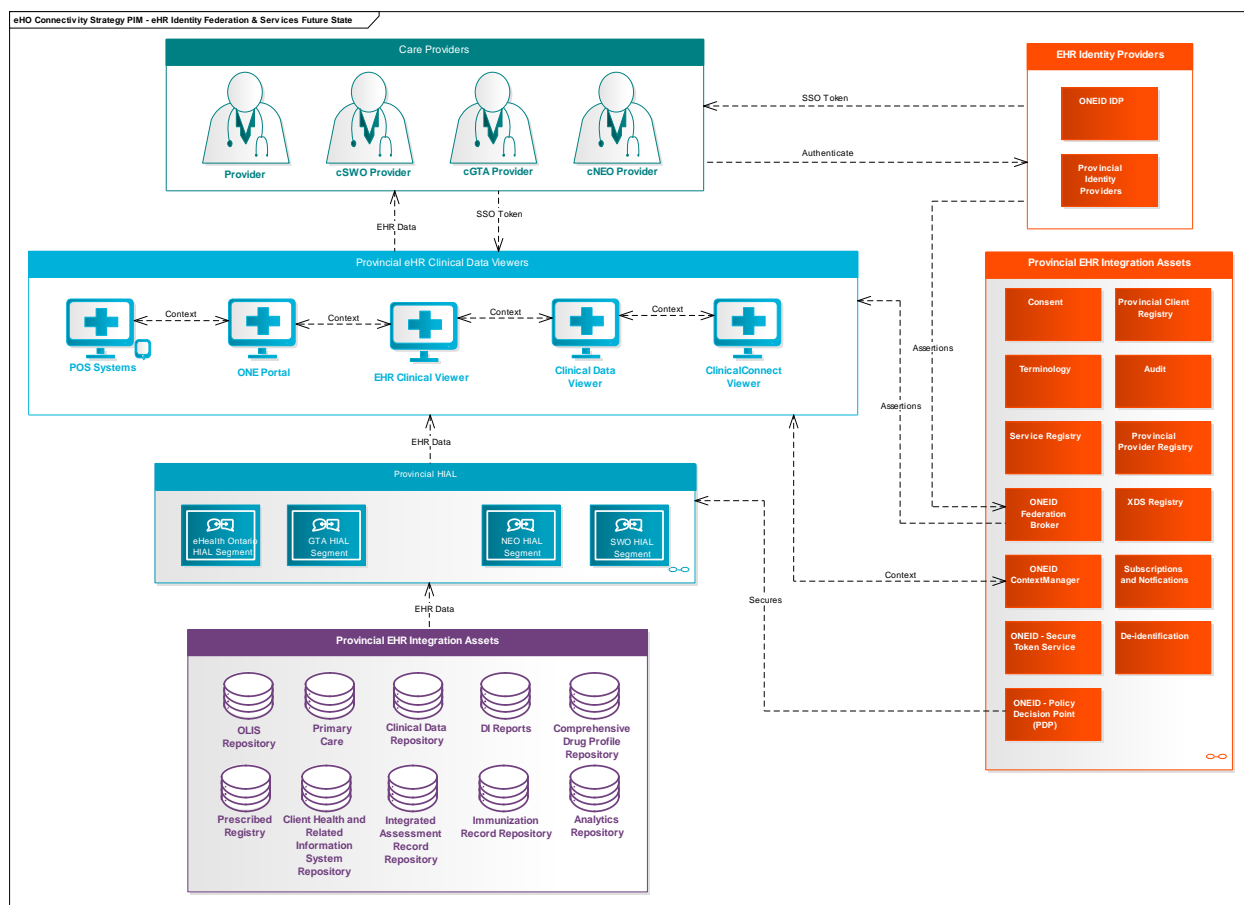


Figure 23: EHR identity federation and services future state

The future state for ONE ID is a platform which delivers a comprehensive authentication, authorization, and context management solution which can be leveraged by consumers of and contributors to of the provincial EHR.

CONTEXT SHARING

In future, the context management element of ONE ID will see a considerable redesign. The existing context solution will be replaced with one that offers more robust, feature-rich context management and which, although decoupled (technically) from single sign on, will continue to give providers a seamless passing of client context between participant applications.

This will enable context information to flow freely between applications without the constraints currently experienced from being coupled to authentication transactions. Once selected, client context information will be immediately available to any applications participating in the provincial context management solution. Similarly, the provider will be able to select new context from any participating application and have that updated information made available to the other EHR viewers.

This bi-directional and distributed context management framework will form the basis of the provincial health care client context management solution.

AUTHENTICATION

The ONE ID federation broker will provide the foundation for all single sign on transactions for the EHR clinical viewers and POS systems. It will provide a robust framework enabling participating organizations and applications to securely and reliably route authentication information between parties. Through its architecture model, organizations can easily join the provincial federation and quickly realize the value and services it offers.

In addition to the provider workflow and adoption efficiencies, the federation broker will also provide a centralized location in which provincial/MOHLTC security directives can be applied. The key function of the broker is to securely route authentication transactions between parties. As part of this transaction, the broker receives metadata related to the provider making the request, which is compared to provincially established (and approved) security directives to determine if the transaction should continue, be rejected, or flagged for follow-up investigation.

The federation operator sets the provincial standards, specifications, and policies related to federated identities and services, which provides a centralized point of responsibility for management of the provincial federation. It also enables a more efficient engagement, review and approval process with the MOHLTC and other government bodies (e.g. IPC). Leveraging eHealth Ontario's governance committees to set and communicate these policies and standards ensures all key stakeholders have input into the material.

Just as the broker is key to the secure routing of identity data, federated IDPs play a critical role in the success of the provincial federation and the EHR as a whole. Federated identity providers are organizations that onboard new users; creating digital identities based on a formalized registration process. It is anticipated that all acute care facilities in the province will be onboarded as federated IDPs, providing EHR viewer access for a significant number of providers without complex workflows or secondary credentials overhead.

As the provincial federation rollout proceeds, it is expected that additional identity providers will participate. Although acute care reaches a significant number of providers, there are other types of identities critical to a successful EHR. Community care, for example, represents another large stakeholder group whose identities could be leveraged for EHR access.

Regardless of the stakeholder group, leveraging identities which have been issued through trusted organizations is key to the provincial federation strategy.

AUTHORIZATION

The federated authorization solution will enable authorized individuals from across the province to manage access to federation-enabled EHR viewers. Along with manual update processes, automated rule-driven and bulk update facilities will be added to the solution, which will eliminate the need for services providers to maintain complex access control lists for their applications. Authorization decisions can be informed by data provided in the SAML authentication message.

CURRENT STATE

ONE ID is eHealth Ontario's identity and access management solution. It provides and manages credentials that clinicians can use to access EHR services, and enables single sign-on to EHR services using providers' existing credentials. It also provides a number of capabilities (e.g. authorization, risk-based authentication) used to secure

access to provincial EHR services. In its current state, ONE ID already delivers a significant amount of the required functionality related to identity, access, federation, and context services for the provincial EHR.

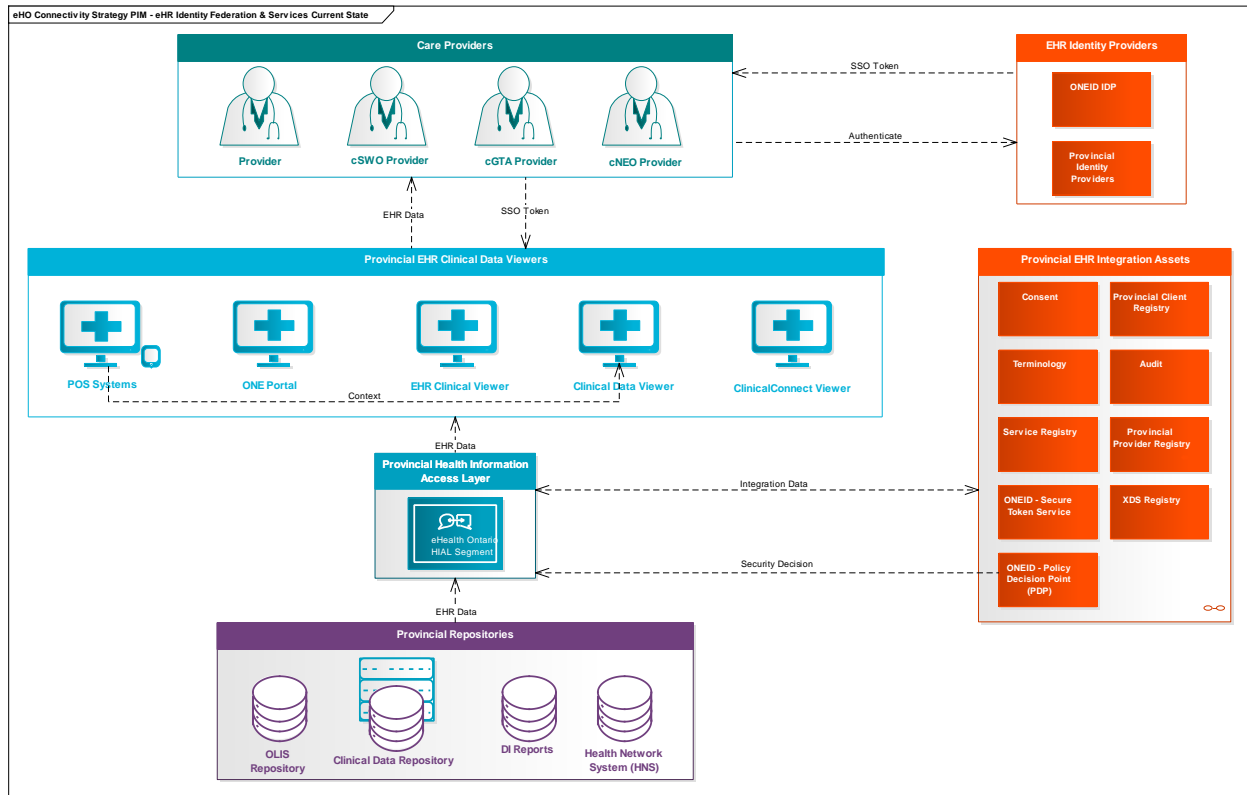


Figure 24: EHR identity federation and services current state

CONTEXT

The single sign-on and context sharing capabilities that ONE ID provides are key enablers to provincial EHR connectivity. They offer streamlined access to EHR services for providers who have already logged onto supported hospital information systems.

This provincial single sign-on solution enables care providers to access EHR services using a digital identity that has been issued by a federated identity provider. Clinical context sharing has been integrated with the single sign on technology and process. A provider viewing a client’s data in their hospital information system and wanting a broader EHR view of that data can click a button to launch a browser and display the client’s EHR information. Single sign on and context sharing make it unnecessary to enter a username or password or explicitly indicate the client in order to view EHR information.

Identity federation with client context sharing ensures providers don’t have to log onto the EHR viewer, or select the client in the EHR viewer; they are already logged on, and client context has already been established.

In its current state, clinical context information is passed inside the SAML authentication messages that flow between the source system (currently only two HISs are supported) and the destination (EHR viewers). The limitation of this implementation is that context is only passed as part of the logon/single sign on process; client context is not continually maintained throughout a provider’s (portal, EHR viewer, POS) session.

AUTHENTICATION

A core function of ONE ID is to provide digital identities to providers in Ontario for the purposes of consuming provincial EHR services. Through an extensive network of registration agents (RAs), ONE ID utilizes an established, mature, and MOHLTC-approved business process to verify a provider's real world identity and issue a digital credential.

ONE ID supports a range of delegated user management functions including assisted registration, express registration, and service desk support. It also offers self-service capabilities to manage passwords (change and forgotten) and identities (profile updates and forgotten IDs).

As an identity provider, ONE ID is also responsible for providing authentication services for end-users and protected applications. Today these protected applications include both internal eHealth Ontario-owned or managed services such as ONE Portal, OLIS, and the ODB portlet, as well as externally owned and managed services such as those offered by CCO and OTN. To satisfy this requirement, ONE ID has implemented a robust authentication process which has been approved by MOHLTC for consuming services containing personal health information. Authentication within ONE ID is delivered through a combination of user ID and password, knowledge questions, RSA tokens, digital certificates, and risk-based/adaptive authentication.

ONE ID also fulfills the role of a federated identity provider. Using the processes described above, ONE ID accounts are trusted for federated login to services such as the connectingGTA Portal and the cNEO regional viewer. As the provincial identity federation grows, ONE ID accounts will be trusted for access to a larger suite of federated services.

SERVICE AUTHORIZATION

Service authorization is the mechanism by which a user or system's eligibility to access a particular EHR service is evaluated. Such authorization is known as 'coarse-grained authorization'; detailed access controls such as read/write permissions are the responsibility of each individual EHR service.

The current EHR service authorization model is based around an authorization database which is manually maintained by ONE ID representatives. This interim approach creates a distributed use authorization store, which is centrally managed by trusted registration agents.

Authorization data for individuals is added to the SAML response token and passed on to the service/application provider. The service providers can then use this data to aid them in making an informed decision on the user's eligibility to access the requested service.

All EHR services that are presented on the provincial HIAL are authorized by ONE ID. Before any request is passed by the HIAL to a clinical domain repository, the HIAL contacts the ONE ID policy decision point to ensure that the requester (user and/or system) is properly identified and that they are authorized.

Authorization is accomplished by comparing authentication information contained within a validated SAML message to a set of rules maintained by ONE ID for the selected target resource. This application/message level security is in addition to the transport level security provided through mutual, certificate based authentication at the transport layer.

TRANSITION

Activities to transition to the future state of ONE ID will include creating an end state context management solution, as well as finalizing a federation business framework, including policies, standards and agreements. All regional EHR viewers (connectingGTA, cNEO, cSWO) will be onboarded, as will the eHealth Ontario portal as a federated application. connectingGTA pilot organizations will be migrated, followed by special focus web applications.

AUDIT

Summary of Audit	
Current State	Future State (Proposed)
<ul style="list-style-type: none"> • An interim audit solution known as tactical privacy audit solution (TPAS) is in service until a full privacy audit solution is in place. • TPAS provides: <ul style="list-style-type: none"> ○ Custom code that parses messages traversing the HIAL to detect possible privacy access breaches ○ Identification of a surpassed threshold for provider access to client personal health information 	<ul style="list-style-type: none"> • A full privacy audit solution known as monitoring and control technology assets (MCTA) is in place to replace TPAS • PHI-related transactions are logged for privacy auditing purposes • Messages traversing the HIAL and from direct database connectivity are parsed • An intelligent security information and event management solution offers active monitoring with real-time alerting and automated (custom) reporting • A correlation engine compares messages and events against multiple business rules to detect different kinds of privacy access breaches
Transition	
<ul style="list-style-type: none"> • Deployment of a limited production release is currently being finalized. The first two lines of business to be monitored will be DI common services and OLIS • TPAS will run in parallel with the MCTA solution for a short period of time, but will eventually be decommissioned 	
Strategic Assets <ul style="list-style-type: none"> • DI common services • HIAL, PPR, PCR • MCTA 	
Key Milestones <ul style="list-style-type: none"> • Performance testing is passed in the preproduction environment. • QA testing for custom code components is complete. • MCTA monitors all transactions that traverse the HIAL and generates privacy-related reports. • Integration with DI common services and OLIS is complete 	

FUTURE STATE

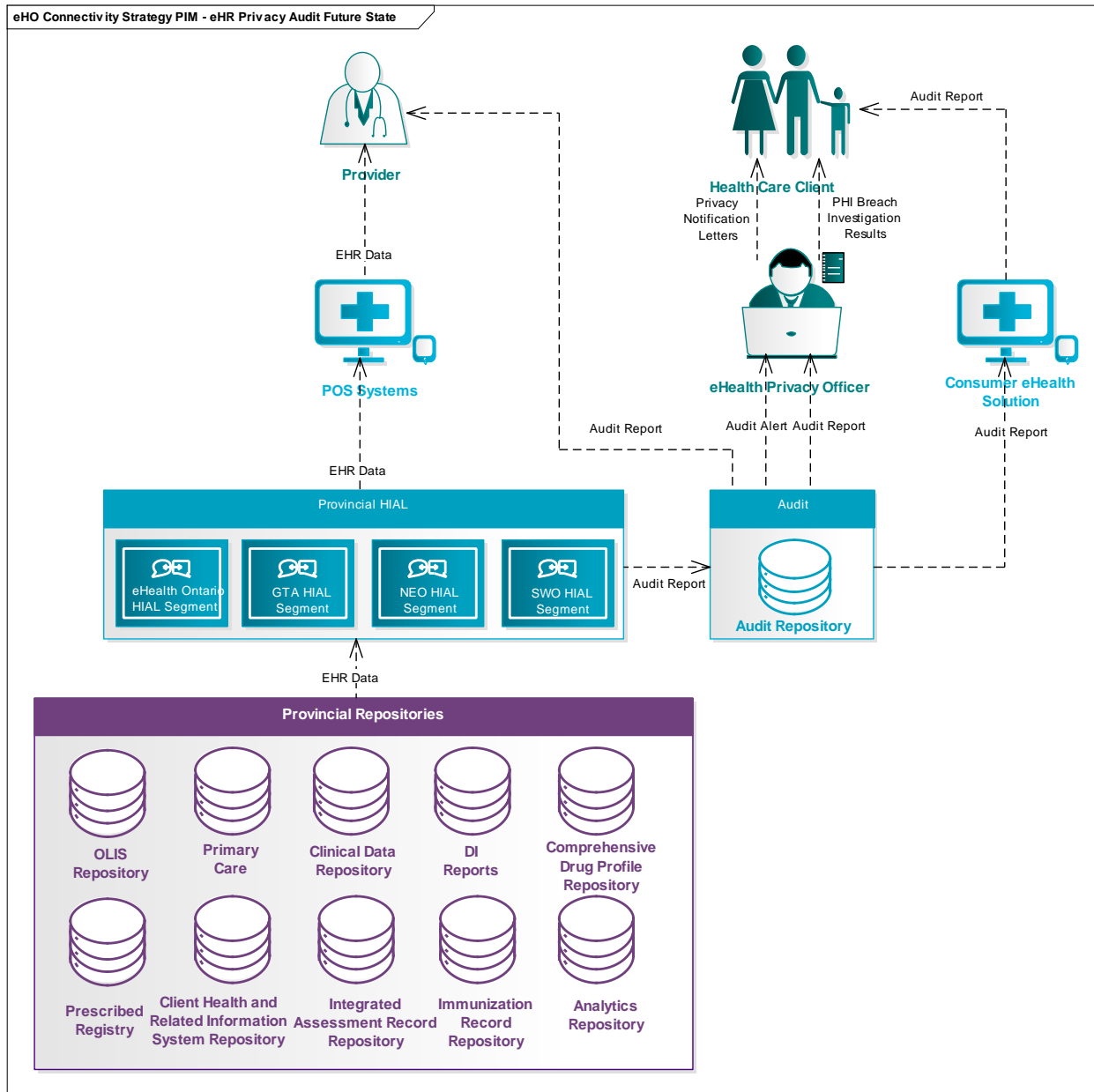


Figure 25: EHR privacy audit future state

Personal Health Information (PHI) audit trails are an essential part of the EHR privacy compliance. As per O. Reg. 329/04 under { XE "Personal Health Information Protection Act" }PHIPA, eHealth Ontario is required to have the ability to respond to requests for information on the PHI contained in eHealth Ontario's systems, and who has accessed this information.

In future, the MCTA solution will provide a centralized audit repository for privacy purposes. All transactions relating to PHI that consume EHR-related services through the eHealth Ontario HIAL segment will be written to this repository. The core functionality of the audit solution will include:

- Logging of all PHI-related transactions, for privacy auditing purposes

- Reporting and analytics tools to present information in standard format
- Monitoring and alerting: the detection of inappropriate use based on configurable business rules and system configurations, including the ability to correlate audit events and the generation of intelligent, context-based alerts, for suspicious events or behavior
- Security mechanisms to prevent unauthorized access to, and unauthorized use of, audited information

The interim TPAS solution will run in parallel with MCTA while provincial EHR services are transitioning to the new audit solution.

CURRENT STATE

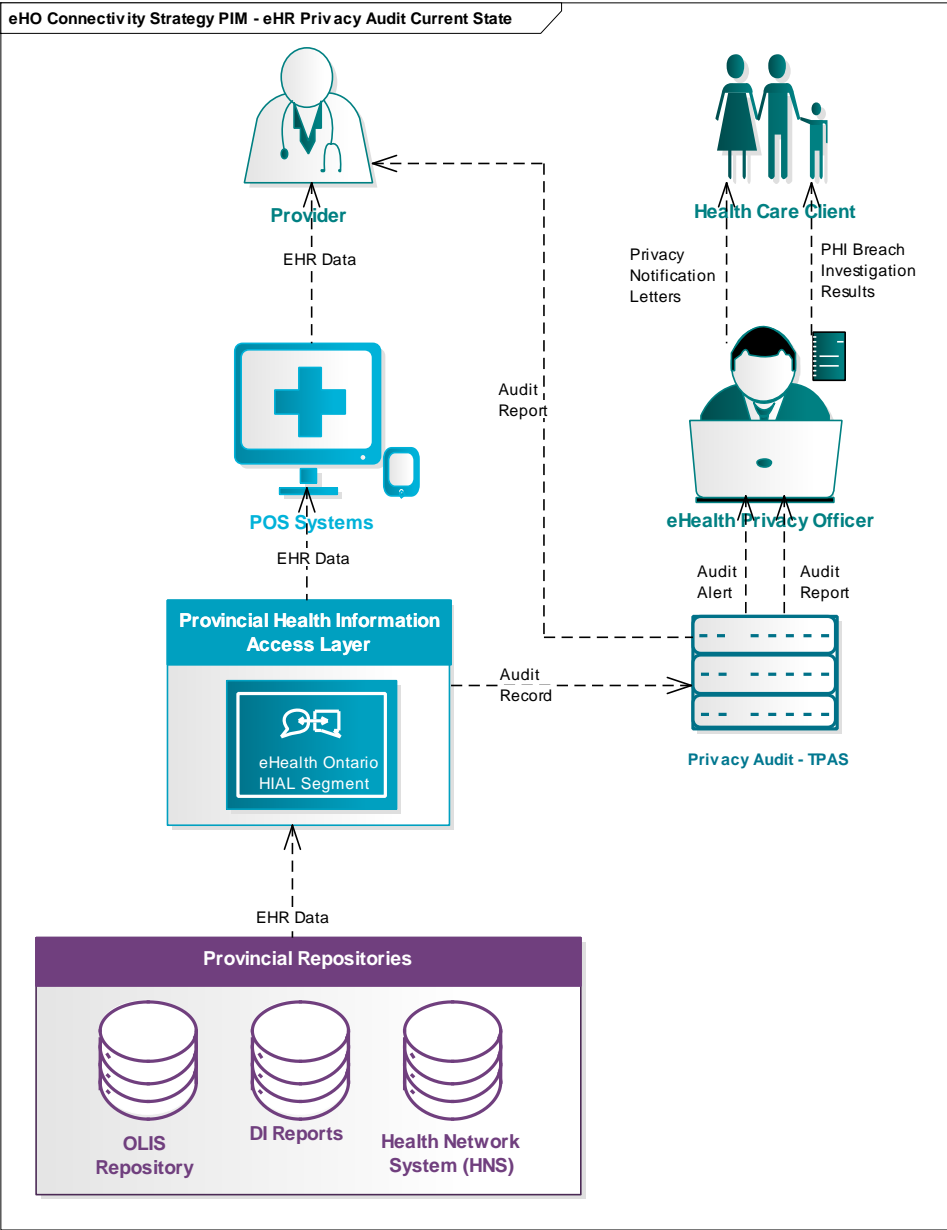


Figure 26: EHR privacy audit current state

Transactions relating to PHI that consume EHR-related services through the HIAL (1.0) are currently being monitored by an interim audit solution – tactical privacy audit solution (TPAS). TPAS detects attempts by providers to access *excessive* quantities of personal health information, and generate security alerts for immediate assessment by eHealth Ontario’s privacy team. A simple threshold mechanism is utilized, but no event correlation intelligence or configurable business rule logic is currently in place.

TRANSITION

Transition activities include the deployment of a limited production release; the first two lines of business to be monitored will be DI common services and OLIS. The TPAS solution will run in parallel with the new future state MCTA solution for a short period of time, but will eventually be decommissioned.

CONSENT

Health care clients have the right to control whether their personal and personal health information is shared with other providers, organizations and caregivers. The consent service contains client-provided directives, and is consulted during the execution of an EHR transaction to ensure that it does not disclose information against the client’s wishes. Consent directives may be applied at any time and may affect information already in the CDR or other clinical repositories.

Summary of Consent Management Connectivity	
Current State	Future State
<ul style="list-style-type: none"> Consent directives are submitted to eHealth Ontario through a mail-in channel for DI common services, and through ServiceOntario for OLIS Line of business-specific consent management solutions are used for each line of business (e.g. OLIS, DI CS, CDR) Support for the eHealth Ontario consent management policy varies across lines of business 	<ul style="list-style-type: none"> CMTA is the system of record for client EHR consent directives, and is used to notify clients of consent override events or updates to client consent policies CMTA is used by eHealth Ontario privacy officers to manage consent directives on behalf of clients and hospital privacy offices All lines of business use CMTA to manage and validate client consent CMTA is used as a province-wide registry for client consent directive. Partner consent management systems are synchronized with CMTA through the subscription and notification mechanism CMTA uses multiple delivery channels (phone-in, in-person, in-person through partners, mail, fax) CMTA provides access to consent management functionality to partners (such as ServiceOntario), clients and hospital privacy officers
Transition	
<ul style="list-style-type: none"> CMTA provides consent management and validation services to DI common services. Most of the available policy types are implemented OLIS is migrated to CMTA as follows: <ol style="list-style-type: none"> Management functionality Consent validation functionality Consent enforcement 	

- The consent management system is consolidated with connectingGTA
- All 12 different consent directive types are implemented
- Additional delivery channels (ServiceOntario, phone, internet) are enable.
- 'Slave' consent management systems are integrated with CMTA through the subscription and notification mechanism

Strategic Assets

- CMTA components
- Provincial EHR integration assets (HIAL, provincial registries, ONE ID, audit)
- Point of service systems

Key Milestones

- Integration with a second line of business (OLIS)
- Integration and consolidation of consent management systems with connectingGTA
- Adoption of consent management standard for policy exchange with external systems/partners
- Full implementation of subscription and notification mechanism for policy synchronization
- Enablement of additional delivery channels (ServiceOntario, phone, internet)

FUTURE STATE

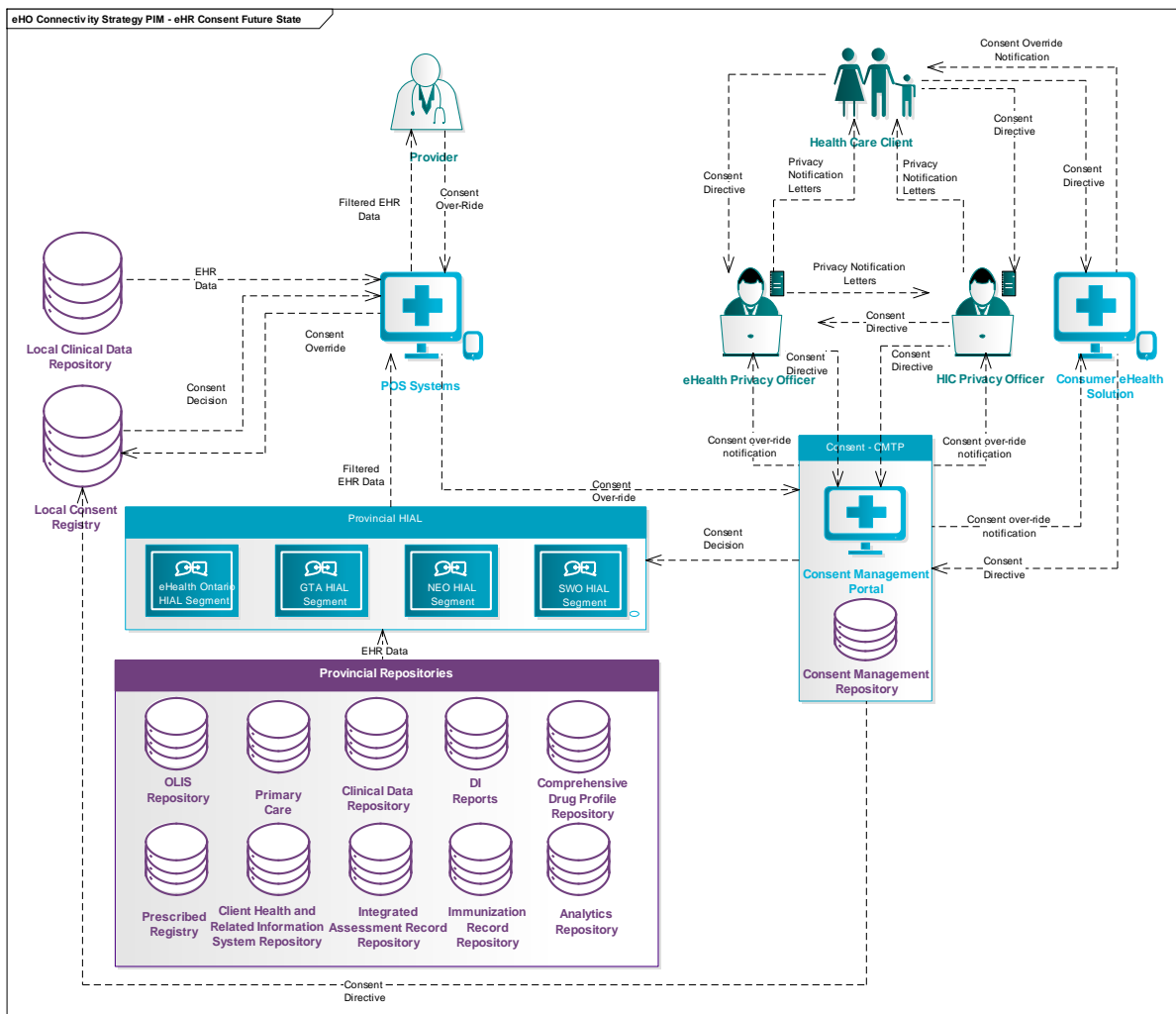


Figure 27: EHR consent future state

In future, privacy officers, government entities, and clients will manage consent directives through secure access to a single consent management portal. Provincial HIAL segments will ensure that consent directives are applied to the EHR transactions they broker, using the provincial consent solution. Where consent directives are overridden at the point of care, the override will be logged and the client notified of who overrode the directive and why. The solution will support the directive granularity defined by the connecting privacy committee. It will replace existing ad-hoc solutions and provide a simpler and lower cost solution to operating and integrating multiple consent management solutions.

CURRENT STATE

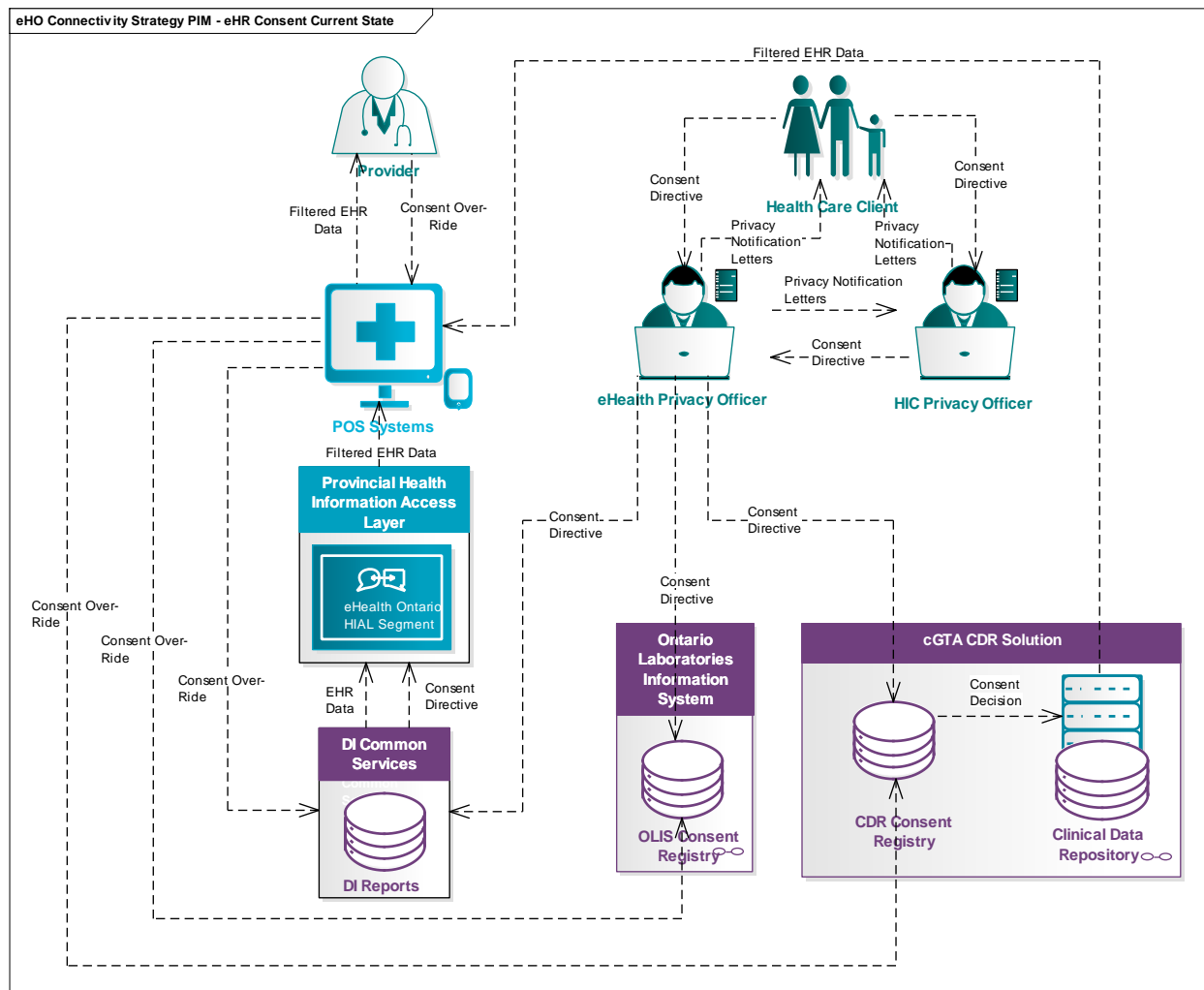


Figure 28: EHR consent current state

Client consent is currently managed within individual lines of business or regions. Support for consent directive granularity is currently not consistent across systems. Distribution of notifications to hospitals and clients is manual; a report from individual lines of business is mailed to the recipient by the privacy office.

TRANSITION

The preferred way of transitioning systems to CMTA is through integration with HIAL and PCR/PR registries first. This provides an optimal and cost efficient transition path at the expense of a potentially increased implementation timeline. Alternatively, some quick wins can be achieved by a phased integration (first transferring only consent management capabilities to CMTA, leaving validation and enforcement of consent to the line of business, and then gradually transitioning consent validation and enforcement to CMTA and HIAL respectively).

On the current CMTA roadmap, DI common services, OLIS and connectingGTA are the programs scheduled for integration.

PROVINCIALY INTEGRATED EHEALTH SERVICES

While the connectivity strategy's primary focus is the provincial EHR, the ehealth services provided by the Ontario Association of Community Care Access Centres (OACCAC), Cancer Care Ontario (CCO), and the Ontario Telemedicine Network (OTN) offer opportunities for addressing broader provincial needs.

ONTARIO ASSOCIATION OF COMMUNITY CARE ACCESS CENTRES (OACCAC)

Summary of OACCAC Connectivity	
Current State	Future State
<ul style="list-style-type: none"> Provincially manages, consolidates, and shares all CCAC related patient health information with the health system Enforces privacy and security policies Uses local client registry (integration with provincial client registry in progress) Uses local privacy and security controls (federation with ONE ID in progress) Contributes CCAC client health information to Connecting Ontario (connectingGTA completed, cSWO and cNEO in progress) Contributes CCAC assessment records to the integrated assessment record (IAR) Performs single sign on launching, with client context, of the CDR viewer for CCAC users (connectingGTA completed, cSWO and cNEO in progress) 	<ul style="list-style-type: none"> Consolidates and shares all community-related patient health information with the health system Makes full use of provincial client, provider, and consent registries. Uses the provincial HIAL to consolidate and share community related health information via the provincial CDR Uses the provincial HIAL to subscribe to patient health information from outside of the community sector Contributes community-related patient health information to the EHR Is federated with ONE ID as a service provider (enabling the single sign on launch of CHRIS and HPG), and as an identity provider (enabling the launch of provincial EHR services/portals for CCAC users)
Transition	
<ul style="list-style-type: none"> The scope of health information consolidation and sharing will be expanded to include all community agencies (contracted service providers, community support agencies, first responders (e.g. emergency medical services), long term care homes, hospices, and others as required) The community health information contribution to the provincial CDR will be completed and expanded Integration with the registries and the HIAL subscription and notification service will take place, as well as ONE ID federation 	
Strategic Assets	
<ul style="list-style-type: none"> CHRIS Health partner gateway 	<ul style="list-style-type: none"> Fax services eNotification
Key Milestones	
<ul style="list-style-type: none"> Expand scope of health information consolidation and sharing to include all community agencies including contract service providers, suppliers, community support agencies Complete and expand the contribution to the provincial CDR: <ul style="list-style-type: none"> Complete in-progress cSWO and cNEO integration Expand to include additional community health information Complete in-progress integration with eHealth Ontario assets: <ul style="list-style-type: none"> PCR ONE ID federation of CCAC identify provider and service provider (CHRIS/health partner gateway (HPG)) Integrate with HIAL services: 	

- Subscribe to eNotifications from all health sectors
- Publish community-based eNotifications

FUTURE STATE

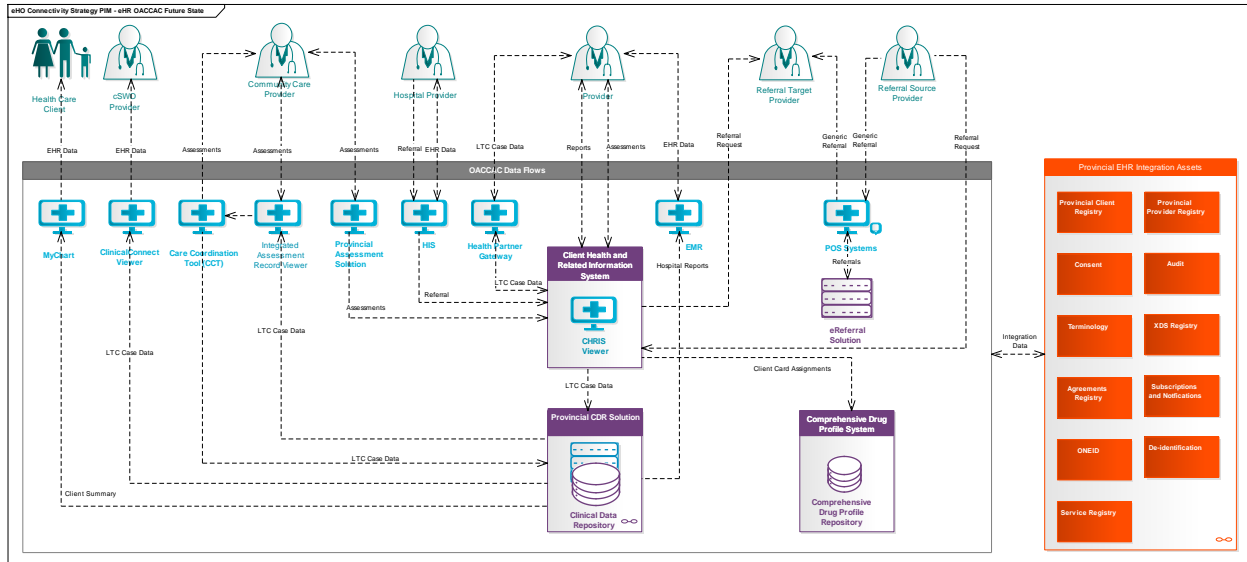


Figure 29: EHR OACCAC future state

In the future, OACCAC will be fully integrated with the provincial provider, client and consent registries. OACCAC assets will not only consolidate and share all CCAC-related patient health information with the health system and the EHR, but also all community-based patient health information such as that from CCAC-contracted service providers and suppliers, emergency medical services, community support agencies, long-term care homes, and hospices. The EHR will be fully populated with community-based health information, and EHR viewers from each region will be fully integrated with CHRIS, making the full client record available to community-based users. Integration with eHealth Ontario registries and services will provide data sharing consistency, integrity, and security. OACCAC service oriented architecture services will be published on the provincial service registry, where systems integrators can find the services and the information they need to establish connections to them.

CURRENT STATE

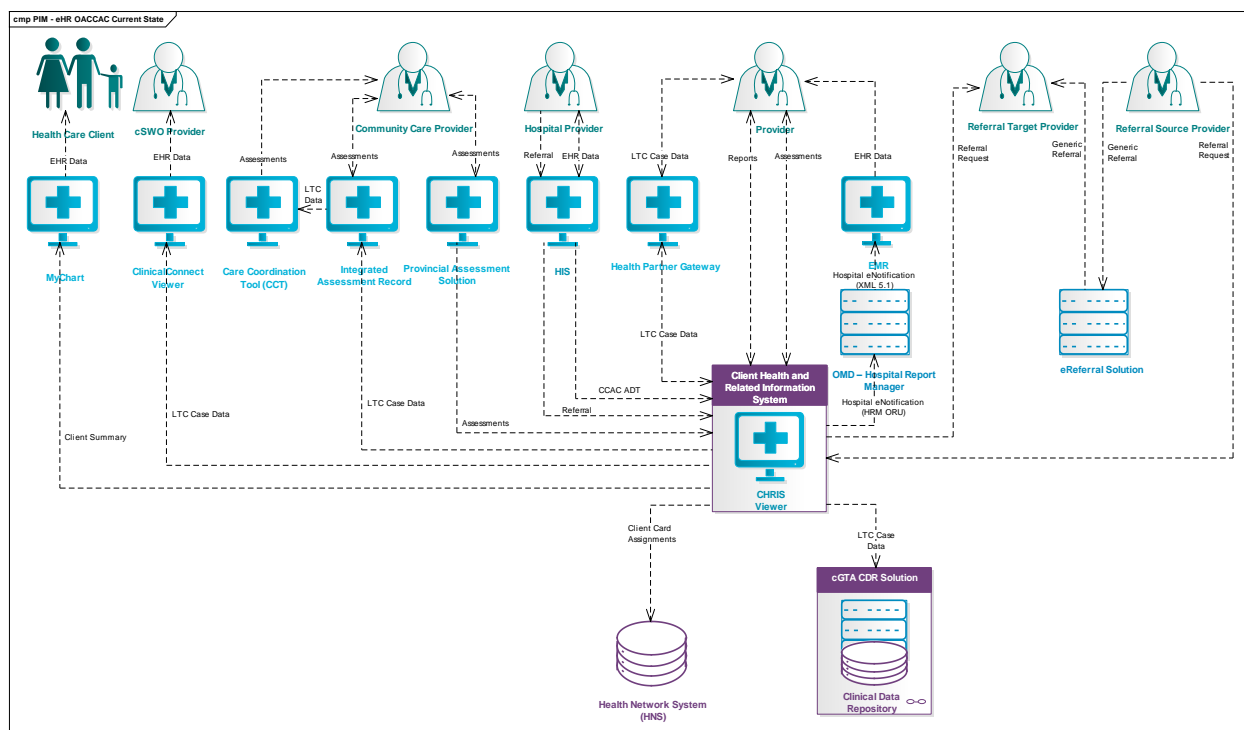


Figure 30: OACCAC current state. Several integrations with provincial assets are underway and population of cGTA CDR is complete.

Although full two-way integration with the PCR is underway, OACCAC assets currently use their own client and provider registry. The ONE ID federation of CCAC identity providers is in progress, as well as OACCAC asset support and trust for ONE ID credentials; when complete, provincial single sign-on with client context will be supported for other federated services and identity providers. CHRIS currently contributes to the connectingGTA CDR, while integration with cSWO and cNEO is in progress. OACCAC assets offer a selection of system-to-system interfaces and graphical user interfaces to provide CCAC health system partners (e.g. primary care, hospital, contracted service providers) with access to CCAC information.

TRANSITION

Integration with eHealth Ontario assets such as PCR and ONE ID will be completed. Additional integration with the PPR and remaining services (e.g. HIAL) will be initiated once those services are available. The contribution of CCAC assets to the provincial CDR will be expanded to provide a provincial client view of CCAC information.

The OACCAC mandate needs to be expanded to include consolidation of all community-based information. The existing integrations can be expanded to make the additional community information available throughout the province.

CANCER CARE ONTARIO (CCO)

Cancer Care Ontario provides a comprehensive suite of provincial services in support of its role as the Ontario government's advisor on cancer and renal systems and access to care for key health services. This section identifies potential synergies between CCO assets and provincial EHR integration assets, to the benefit of both. CCO asset connectivity is only described where there is a clear benefit from integration with provincial EHR

integration assets. CCO assets that will not be integrated with provincial EHR integration assets are not represented in the PIM views below.

Summary of CCO Connectivity	
Current State	Future State
<ul style="list-style-type: none"> • Uses a local client registry, except for WTIS/cardiac care network (CCN) applications which are integrated with provincial client registry • Uses a local provider registry • Uses local privacy and security controls • Receives direct reports feed from labs • Receives direct DI reports from hospitals • Has ONE ID integration for access to the ICS-InScreen tools • Maintains a list of primary care provider to health care client relationships (primary care roster information) • Has mature data warehouse and business intelligence/analytics capabilities 	<ul style="list-style-type: none"> • Various CCO services integrate with provincial client, provider, and consent registries • Federation is complete with ONE ID for WTIS web, DAP-EPS and the interactive symptom assessment and collection tool (ISAAC) • Information in provincial DI, lab, and medication repositories is utilized • CCO services are exposed via the provincial HIAL (leveraging HIAL privacy and security controls) and presented in the provincial service registry • An opportunity to leverage CCO business intelligence/analytics capabilities and primary care roster information for broader ehealth/EHR use is available
<i>Transition</i>	
<ul style="list-style-type: none"> • Complete the integration with the provincial registries and repositories via the HIAL • Complete ONE ID federation • Expose CCO web services behind the provincial HIAL • Share provider and client feeds with provincial registries 	
Strategic Assets	<ul style="list-style-type: none"> • Cardiac care network (CCN) • Wait time information system (WTIS) • Ontario breast screening program: integrated client management system (OBSP:ICMS) • CCO data warehouse • Provincial EHR integration assets (HIAL, provincial registries, ONE ID, audit, consent, terminology standards and services)
<ul style="list-style-type: none"> • eClaims • iPort Access • ICS/InScreen • DAP-EPS • ISAAC 	
Key Milestones	<ul style="list-style-type: none"> • Complete integration with eHealth Ontario assets: <ul style="list-style-type: none"> ○ ONE ID federation of CCO identify provider and service provider • Integrate with HIAL services: <ul style="list-style-type: none"> ○ Provincial registries (PCR, PPR) and feeds ○ Provincial repositories (OLIS, DI, CDR) ○ Provincial assets (consent, privacy audit, terminology standards and services) ○ Service catalog for CCO eClaims

FUTURE STATE

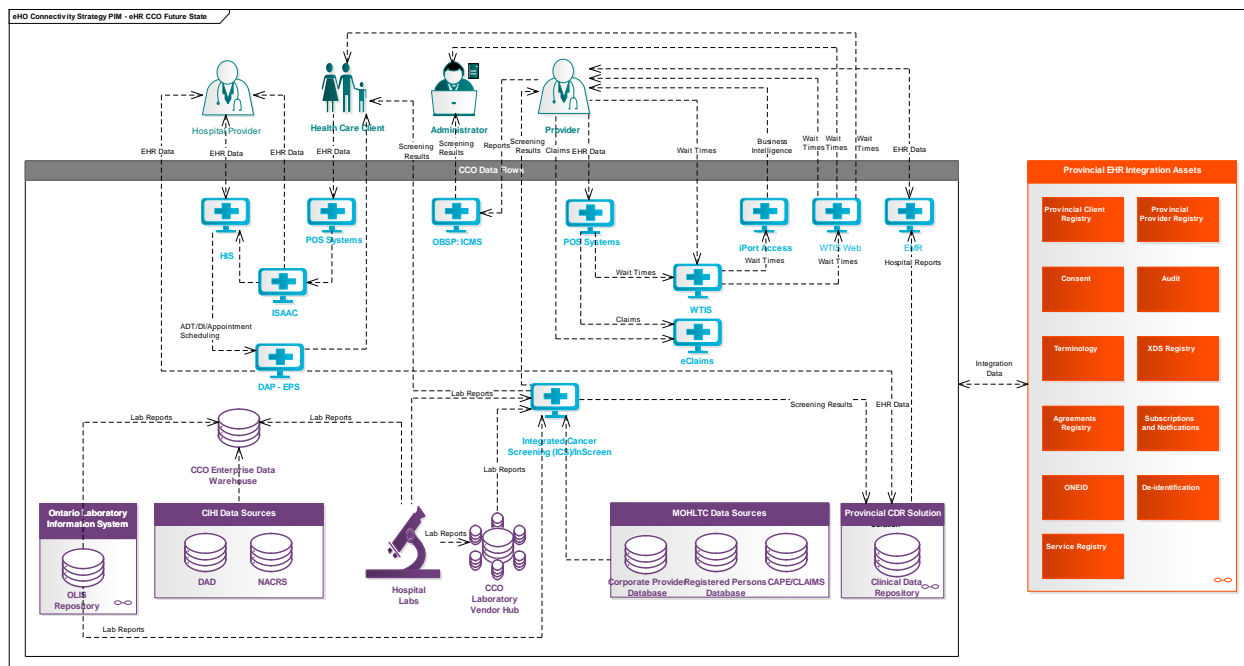


Figure 31: EHR CCO future state

There is a significant opportunity to leverage the health care client/provider relationship information in the integrated cancer screening (ICS) tool as a provincial ehealth service. There is also an opportunity to leverage CCO’s business intelligence and analytics capabilities for primary and secondary use of provincial EHR information.

Participating in ONE ID as a federated service provider will enable health care provider single sign-on access to ICS/Inscreen, eClaims, wait times information system (WTIS), the diagnostic assessment program - electronic pathway solution (DAP-EPS), and the interactive symptom assessment and collection tool (ISAAC) from providers’ POS systems. There is an opportunity to launch into various CCO services from ONE Portal with single sign-on and context sharing.

Accessing EHR information via provincial clinical repositories will reduce the amount of point-to-point integration that currently occurs between CCO and health care provider organizations. The Ontario breast screening program integrated client management system (OBSP:ICMS) will be able to retrieve DI reports from the provincial repository, avoiding manual entry of DI reports. Screening results and care pathway reports can be shared as part of the provincial EHR and delivered to EMRs via the provincial CDR and HIAL notifications.

Integration with provincial client and provider registries will improve data accuracy and currency for both CCO and provincial registries. Publishing CCO services on the provincial service registry will support health care provider discovery and integration with CCO services, and exposing CCO services on the provincial HIAL will leverage the HIAL’s privacy and security controls.

CCO services such as integrated cancer screening (ICS)/InScreen, eClaims, and the diagnostic assessment program – electronic pathway solution (DAP-EPS), would benefit significantly from a provincial consumer identity management strategy/solution, a necessary precursor to digitizing the patient screening and care pathway experience.

CURRENT STATE

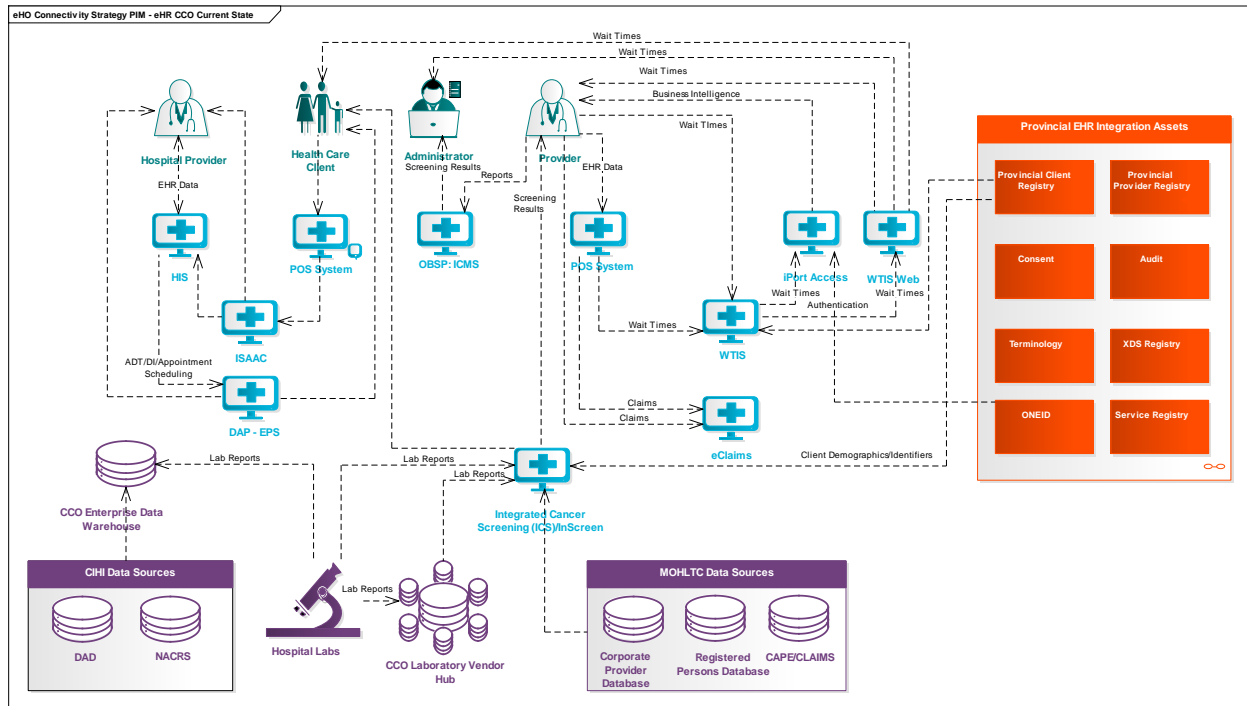


Figure 32: EHR CCO current state

CCO currently maintains its own client and provider registries, without integration with provincial registries. WTIS is an exception, as it integrates with the provincial client registry. It also maintains identity management capabilities for access to many of its services, though it leverages ONE ID for access to iPort Access.

CCO has integrated directly with OLIS and hospital information systems to enable various screening, research, reporting, and analytics functions. The organization maintains high-quality data sets (e.g. primary care roster) and robust data warehouse and analytics capabilities that could be leveraged for broader provincial ehealth use.

TRANSITION

Transition for CCO involves further integration with provincial EHR integration assets such as PCR, PPR, and HIAL subscription and notification services, and ONE ID federation.

As OLIS transitions to leverage HIAL 2.0, CCO transitions to access OLIS via the provincial HIAL. Once HIAL 2.0 subscription and notification capabilities are in place, DAP-EPS and ICS/InScreen will begin sending care pathway reports and screening reports (respectively) to the provincial CDR for general sharing via EHR and for targeted delivery to EMRs.

ONTARIO TELEMEDICINE NETWORK (OTN)

The Ontario Telemedicine Network provides a full suite of telemedicine services as well as facilitating the exchange of patient health information as part of completing telemedicine transactions. While a number of these services are well positioned for broader provincial ehealth use, they are not currently integrated with provincial EHR integration assets.

Summary of OTN Connectivity	
<p>Current State</p> <ul style="list-style-type: none"> • The provider services directory is scoped to telemedicine, and based on information provided by health care providers • Providers use credentials provided by ONE ID to access OTN HUB, telemedicine directory, eConsult and OTN learning • OTN services use OTN client and provider registries and privacy controls • Discharge summaries, consult notes, and other EHR-relevant information are accessible via OTN services 	<p>Future State</p> <ul style="list-style-type: none"> • The provider services directory is integrated with the provincial provider registry • OTN integrates with ONE ID as a federated service provider • OTN services integrate with provincial client and provider registries, provincial consent management, and other provincial EHR integration assets, and are published through the provincial services catalog • EHR-relevant information is shared via the provincial CDR • OTN reports are delivered to primary care EMRs via HIAL notification services • OTN eConsult service is interoperable with eReferral and POS systems throughout the province
<p>Transition</p> <ul style="list-style-type: none"> • Integrate patient monitoring management systems (PMMS) with hospital report manager (HRM) • Complete the integration with the provincial registries and repositories via the HIAL • Complete ONE ID federation • Complete eConsult alignment with provincial eReferral PRM 	
<p>Strategic Assets</p> <ul style="list-style-type: none"> • App formulary • Telemedicine directory (includes providers, programs, sites and video systems) • Scheduling application • Video conferencing 	<ul style="list-style-type: none"> • PMMS • OTN eConsult • OTN learning • Provincial EHR integration assets (HIAL, provincial registries, ONE ID, audit, consent, terminology standards and services)
<p>Key Milestones</p> <ul style="list-style-type: none"> • Complete PMMS alignment with provincial remote patient monitoring (PRM) • Complete the ONE ID federation of OTN as an identity provider and service provider • Integrate with HIAL services: <ul style="list-style-type: none"> ○ Provincial registries (PCR, PPR) ○ Provincial repositories (DI, CDR, MOH-HNS) ○ Contribute consult notes and PMMS discharge summaries to provincial CDR ○ eNotifications ○ Provincial assets (consent, audit, terminology standards and services) • Complete eConsult alignment with eReferral PRM 	

FUTURE STATE

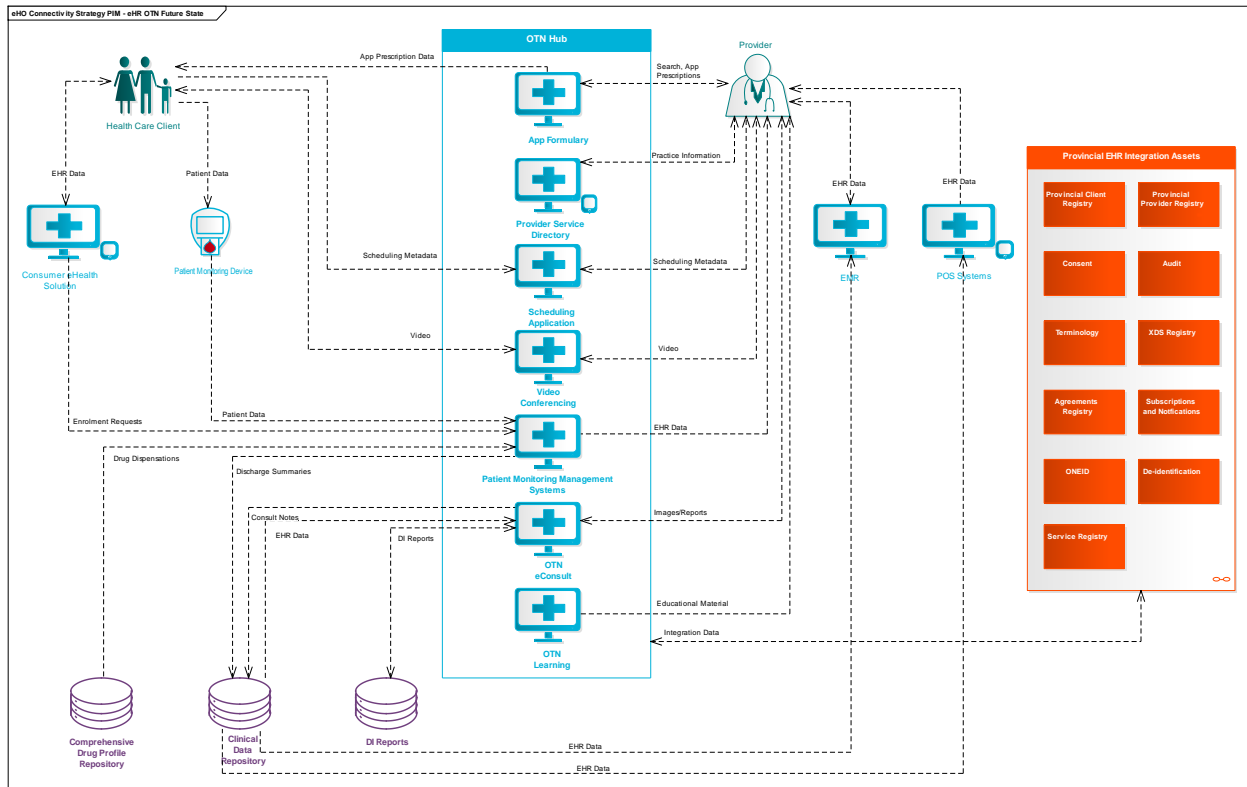


Figure 33: EHR OTN future state

In future, integration with provincial EHR integration assets will provide common understanding of patient, provider, and clinical terminology, as well as privacy and security controls. Integration with the provincial provider registry will provide the opportunity to leverage OTN's provider services directory's user interface for the self-management of PPR's provider services information, and keep OTN's provider services directory up-to-date with the latest information from professional colleges. It will also allow services to leverage OTN's scheduling and app formulary solutions for broader provincial ehealth use.

Integration with ONE ID as a federated service provider will enable provider single sign-on to OTN services, using local logon and credentials. Providers will launch OTN services with patient context, without requiring secondary logon.

OTN services, with descriptions, specifications, implementation guides, and sample messages, will be published through the HIAL 2.0's service oriented architecture service catalog, where integrators and implementers can discover provincial EHR and ehealth services along with the information required to connect to them.

Through integration with the provincial client registry and clinical data repository, OTN will be able to submit consult notes, discharge summaries, progress notes, and other information to the CDR for broader sharing as part of the provincial EHR, and for targeted delivery to POS systems via HIAL notification services. Conformance with the provincial eReferral reference model will make OTN's eConsult service interoperable with other conformance eReferral solutions and POS systems throughout the province.

CURRENT STATE

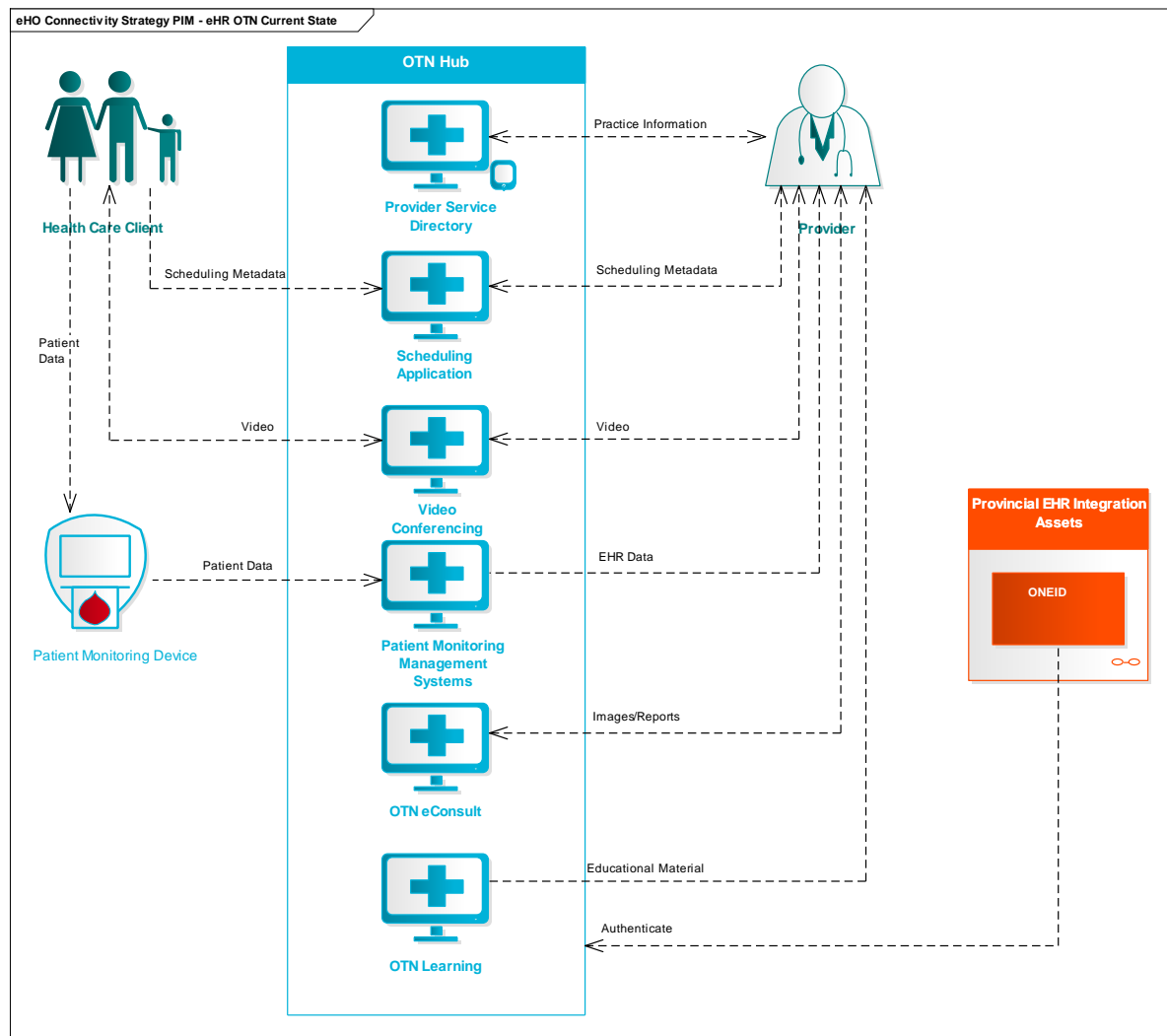


Figure 34: EHR OTN current state

While a number of OTN's services, such as eConsult, scheduling, and the provider services directory, are well positioned for broader provincial ehealth use, they are not currently integrated with provincial EHR integration assets. Without integration with the provincial client registry, the health information generated or captured through OTN's services cannot be safely and reliably linked to a health care client's provincial EHR.

TRANSITION

In order to provide progress notes, discharge summaries, and consult notes to primary care providers, OTN must integrate with HRM. Once HIAL 2.0's subscription and notification capabilities are in place, OTN will retire HRM integration in favour of report delivery via the CDR and HIAL notification, without impact to EMRs.

Active integration with the provincial client registry (e.g. real-time queries to PCR at registration time) ensures continuous high-quality of client demographics for both OTN's services and the provincial client registry. Because OTN's ehealth services rely on the provider services directory for provider service details, they will all benefit by integrating the provider services directory with the provincial provider registry (i.e. OTN's services don't need to integrate directly with the PPR).

ONE ID federation can be executed independently of integration with other provincial EHR integration assets.

PCR integration is a prerequisite for CDR integration, and integration with both PCR and PPR are required as part of eReferral and remote patient monitoring provincial reference model conformance.

ENVIRONMENTAL CONDITIONS FOR SUCCESS

In describing a future state for the provincial EHR, the connectivity strategy projects beyond current commitments, regulations, data sharing agreements, information management/IT practices, and adoption of provincial architecture and interoperability specifications. As a result, a number of inhibitors to success have been identified.

ACCEPTANCE OF THE CONNECTIVITY STRATEGY

The connectivity strategy can only achieve its goals of fostering provincial EHR connectivity if it is accepted and enforced by EHR stakeholders throughout the province. While the current version of the strategy is the culmination of extensive consultation, collaboration, and review with a broad array of stakeholders, ongoing engagement will be required to maintain its relevance. Proposals, projects, and designs related to the EHR must be assessed for conformance to the strategy, and exceptions or deviations granted at a provincial level of governance.

EFFECTIVE GOVERNANCE

Provincial ehealth services must be consistently private, secure, easy to find, and interoperable. However, each connection of an HIT asset to the provincial EHR exposes a tension between the needs of the individual integrator and health service provider, and the needs of the provincial EHR community. This is why governance is vital in systems integration.

EHR governance requires empowered representation from Ontario's health care stakeholders mandated by the ministry to establish the Ontario EHR. Strategic alignment is essential to ensure the province's resources are effectively deployed, and to promote and enforce a common architecture so initiatives contribute to an integrated set of EHR services for the province. Governance members will make strategic decisions and enforce direction in support of establishing Ontario's EHR connections, based upon Ontario's ehealth blueprint and its associated architecture and standards specifications.

Facilitated by eHealth Ontario, four provincial committees have been established to meet the broader needs of governance in key areas. With membership including subject matter experts from interest groups across the province, committee members engage their constituents to ensure that decisions and direction are informed by the broader health care community.

The Ontario EHR architecture and standards business and technical and strategic committees are advisory and approval bodies; the business and technical committee for provincial architecture and standards products, services, policies, and processes, and the strategic committee for providing direction on how EHR connections should be established.

These committees provide a forum to involve key health care stakeholders in architectural and standards decisions, thereby increasing support in the community, and helping overcome adoption barriers. Comprised of representatives from 23 health care organizations across the province, members include representatives from: CCO, connectingGTA, cSWO, cNEO, OACCAC, the OHA, OntarioMD, OTN), MOHLTC, and CHI. For more information on these committees contact architecture@ehealthontario.on.ca.

The ConnectingPrivacy and ConnectingSecurity committees work towards establishing consistent approaches to privacy and security for organizations participating in a provincial EHR system. These committees facilitate discussion of privacy and security challenges unique to EHRs, develop supporting tools – including policies, standards, governance framework, processes / supporting guides – and provide advice and guidance related to

technology, provincial policy, and legislation. Members include representatives from regional hubs (cSWO, cNEO and connectingGTA), the MOHLTC, Ontario's Information and Privacy Commissioner, and CHI.

Enforcement of the policies, standards, and priorities these governance bodies establish vary from committee to committee. For example, technical policies relating to connectivity are enforced at a system level, often by the provincial HIAL. Business-related policies are typically governed by legally binding agreements. Governance committee members also act as ambassadors, fostering conformance to policies and standards through their personal and organizational influence. Together, these governance bodies define a consistent approach to establishing EHR connections that is well informed and vetted by key industry experts and stakeholders.

Currently, EHR data governance occurs at project and regional levels, with no formal processes to ensure provincial alignment. This lack invites inconsistency in provincial EHR information quality in terms of accuracy, completeness, currency, timeliness, and clinical value. Implementing a long-term provincial governance model will promote and support EHR stakeholders in adopting mature data management best practices; this may include expanding the scope existing governance forum(s) to establish provincial data management best practices, and adding improved data management practices and rigor to project and regional governance to help foster adoption of provincial best practices.

MOHLTC is responsible for establishing an EHR governance body that sets strategic investment priorities in alignment with broader public sector objectives. This will directly inform strategic planning at all levels, leading to more effective utilization of provincial resources and a more focused approach to realizing the provincial EHR.

These governance bodies, along with their respective mandates, frameworks, and policies, must be integrated to align with and support one another. Having an effective provincial EHR governance model, where all stakeholders are clear on decision authority and accountability, is essential to achieving a unified, cost-effective, high quality, safe, private, and secure provincial EHR.

AN OPEN PROVINCIAL EHR PLATFORM

The connectivity strategy describes a future where all provincial EHR information will be consumable through POS systems and provincial EHR viewers. However, it also anticipates a demand from health care clients and providers to be able to consume EHR information in a way that is optimized for specific clinical workflows and care scenarios. For example:

- In many scenarios, viewing all provincial EHR information for a client is not appropriate or required; EHR information needs to be filtered, organized, and presented in a way that optimizes specific provider workflows and care decision making.
- In managing a chronic condition, clients may only need to see and provide very specific EHR information.
- In managing the health of their roster, primary care providers may need to view subsets of EHR information at a roster level, rather than an individual client level.

While the connectivity strategy does not attempt to describe the care scenarios requiring a custom view of EHR information, it does acknowledge how to respond to this inevitable demand.

Provincial EHR platform is a term used to describe a future environment where providers, delivery partners, and vendors can rapidly develop solutions that integrate with provincial EHR integration assets in support of client and provider needs. This environment would support the development of cloud and mobile apps, portals and portlets,

system-to-system integration, and other solutions that make optimized, purpose-built use of EHR information. By providing underlying technology infrastructure, operating systems, a development framework and libraries, as well as certified, secure, reusable code modules and toolkits, the provincial EHR platform allows solution developers to focus on innovation clinical value, without the burden of acquiring and managing the required underlying technology. Solution developers would access this environment via a web browser, and begin assembling solutions by reusing modules and toolkits that have been proven to integrate with provincial registries and repositories. The platform would support the testing, certification, and deployment of solutions to an integrated app registry or the provincial service catalog as applicable. Also, since this platform leverages technology investments and assets across solutions, solutions can be brought to market faster and at lower cost, and be rapidly scaled to meet provincial demands.

This provincial EHR platform is not just about development, testing, and certifying EHR solutions. It would naturally support the hosting of pre-built, commercial solutions, such as cloud-based point of service systems or specific ehealth applications.

A crucial requirement for this platform is vendor conformance testing. Today, vendors wishing to participate in the provincial EHR market have no way to proactively demonstrate integration with the provincial HIAL, clinical repositories, provincial registries, and other assets. The opportunity to develop and test integration with provincial EHR assets is currently only open to vendors who have successfully competed in an open procurement process; which stifles innovation and prolongs the development of EHR solutions. Exposing provincial EHR development and testing interfaces to the vendor community would not only improve the quality of procurement submissions, but accelerate the time to market for winning submission solutions. Moreover, since most of the Ontario EHR specifications are based on Pan Canadian and international specifications, the provincial EHR platform could support small and mid-sized Ontario companies who are striving to compete in provincial, national, and international markets.

PROVINCIAL ESAFETY MANAGEMENT

One of the benefits of provincial EHR connectivity is improved patient safety. Examples include:

- Timely provider access to all relevant client information, leading to better care decisions
- Appropriate client identification, to help ensure that health information is appropriately linked to clients
- Provider access to a comprehensive drug profile, to help avoid adverse drug interactions

- Consistent representation of health information and consistent use of clinical terminology, contributing to a consistent, unambiguous EHR.

However, while increased EHR connectivity fosters greater overall patient safety, it can also introduce threats. For example, once connected, POS and EHR systems can invite errors due to flaws in design, implementation, operation and / or maintenance. A growing body of research, as well as first-hand experience, shows that:

"... the use of IT does create hazardous circumstances and can lead to patient harm or death. Large-scale patient safety events are a new phenomenon that has the potential to affect many patients and clinicians, and this suggests that addressing them should be a priority for all major IT implementations."^[1]

An important new component of patient safety, eSafety, involves the lifecycle-based management of health care IT technology so it does not pose a threat to patient well-being. eSafety programs provide small, medium and large health care organizations with a robust methodology to detect, report on and respond to patient safety incidents, making a meaningful and sustained contribution to the overall safety of POS systems as well as the provincial EHR. The existence and extent of these types of threats to patient safety is becoming increasingly understood, as are the serious, and sometimes fatal, effects on patient outcomes.

Strategic and deliberate actions need to be taken at the provincial level, in conjunction with regional and local efforts, towards ensuring that such threats are understood and appropriately managed. Vigilant and proactive enterprise risk management efforts, based on a well-informed and well-educated community of POS and EHR stakeholders using current leading practices, will ensure a sustained and effective eSafety culture that provides for the safety of Ontario health care clients.

eSafety comprises the principles, standards and practice-based method that guide the design, procurement, implementation, use, and operation of POS and EHR systems toward improved patient safety. Based on foundational work from the National Health Service in England, U.S. Veterans Affairs, and an array of international quality, risk and safety standards, the *2013 eSafety Guidelines – eSafety for eHealth*^[2] program from COACH describes the fundamentals of eSafety. It provides practical approaches, as well as tools, templates and checklists

^[1] F. Magrabi et al. Clinical safety of England's national program for IT: A retrospective analysis of all reported safety events 2005 to 2011, *International Journal of Medical Informatics* (2015).

^[2] COACH: Canada's Health Informatics Association. *2013 eSafety Guidelines – eSafety for eHealth* (2013). Visit www.coachorg.com/en/practices/eSafety.asp for more information.

to support the implementation of an eSafety management program, and is the best starting point to better understanding and managing eSafety in Ontario. Already adopted by Alberta, the Northwest Territories as well as other jurisdictions, the COACH guidelines provide a good starting point for establishing eSafety in Ontario. Ultimately, Ontario needs an eSafety management strategy for provincial POS and EHR systems, including surveillance, monitoring, and responsive actions.

HEALTH CARE CLIENT IDENTITY MANAGEMENT STRATEGY

Health care clients and their families should have access to all their provincial EHR information, subject to applicable policies. Enabling this access requires clients to authenticate using credentials recognized at the provincial level. While the province is well-positioned for provider authentication to the provincial EHR through a network of trusted identity providers, currently no strategy exists for authenticating health care clients.

Several solutions currently in place in Ontario allow clients to log on to some form of client portal to access information about their care. In each of these solutions, clients are enrolled by their provider, and given credentials according to the provider's local identity management processes. Currently, these processes and credentials are valid only for information and services offered by the provider organization, and cannot be used to access wider provincial EHR information and services.

While a number of valid provincial client identity management options currently exist, a provincial strategy must be developed in order for patients to securely access their health information.

REGULATIONS AND AGREEMENTS

Today health-related information is exchanged by a number of organizations and enabled legislation, regulations and agreements; regulatory requirements vary according to which organizations are involved in the data sharing, and the data sets; providers of EHR information often need an explicit data sharing agreement with each consumer of its information.

Bill 78 (an act to amend the *Personal Health Information Protection Act, 2004*), in conjunction with the *Drug Interchangeability and Dispensing Fee Act, 1990* and the *Regulated Health Professions Act, 1991* seeks to provide a cohesive set of requirements for data within the EHR and responsibilities for organizations participating in the EHR. It identifies 'prescribed organizations' named through regulation, and defines the powers and responsibilities enabling these organizations to create and maintain the provincial EHR. It is anticipated that eHealth Ontario will be identified as a prescribed organization in support of its role as the systems integrator for the provincial EHR.

A provincial approach to data sharing agreements is necessary to realizing the provincial EHR as envisioned in the connectivity strategy. The nature of the provincial EHR is that information is available to those who have a legitimate need to view it, without pre-determined, explicit relationships between EHR information providers and consumers. A shared provincial data sharing agreement framework that minimizes the effort required to add EHR providers and consumers, or modify the types of data that is shared, is a necessary enabler for realizing a provincial EHR.

EVOLVING NEEDS AND EMERGING OPPORTUNITIES

The following section provides overviews of topics for which there has been no organizational commitment or provincial mandate to date, but which need to be acknowledged in the context of provincial EHR connectivity.

MHEALTH AND CONSUMER EHEALTH

The connectivity strategy and Ontario's ehealth blueprint have been designed to enable client access to the provincial EHR, for both contributing and consuming information relating to their health. Any system that has the required capability and authorization can connect to the provincial EHR, including systems a client could use to electronically participate in his / her care. While the provincial EHR architecture, as depicted in the connectivity strategy, is designed to support this connectivity, more is required at the business level to make these connections a reality.

mHealth, which has emerged as a sub-segment of ehealth, provides clients with the ability to capture and share health information using tools such as mobile app-enabled smart-phones or tablets, wireless medical monitoring peripherals, and real-time video communications. These tools allow clients to better manage their health, and to supply providers with better data in support of their clinical decisions.

To satisfy increasing challenges in delivering care, organizations and practitioners are embracing mHealth as a way to create innovative technological solutions to better engage clients, involving them closer in the clinical workflow and decision-making process.

With the emerging trend of client-entered data, personal health records, and remote client monitoring, providers and data consumers/organizations are developing or procuring different proprietary solutions to gain access to this information. There is no standardized business model to support these applications, and no standard provincial privacy and security framework in support of the exchange of mHealth data across the continuum of care.

A provincial reference model for mHealth delivery is needed to create an innovation platform that will guide the health care sector and vendors in developing mobile solutions and applications that integrate with the provincial EHR, and support the exchange of data between clients, providers and organizations. This will allow providers and consumers of mHealth solutions to interact within the ehealth space to send information to multiple data consumers using the same standards and security framework and methodology.

In future, organizations and vendors developing mHealth solutions should be able to refer to a standard provincial reference model (PRM) methodology and framework, and leverage provincial assets to share clinical data in a secure manner and reliable manner.

USING EHR DATA FOR HEALTH SYSTEM AND CLINICAL DECISION SUPPORT

While the connectivity strategy does not define approaches for using EHR information for health system and clinical decision support purposes, it does define how EHR information needs to be prepared for these purposes. The clinical domain repositories and registries contain information that is of interest to researchers and health system managers. The connectivity strategy recommends a consistent approach to preparing and providing this information, which enables the balancing of individual and community needs.

EHR information is made available for analytics by creating an independent replica of the registry or repository, and then applying de-identification techniques to create a version appropriate to its secondary use. These replicas need to be appropriately secured and isolated from the EHR registries and repositories.

Each extract of EHR data provided for analysis needs to be de-identified in a way that balances respect for privacy with specific analytics needs. Requests for EHR data extracts for analytics purposes must be assessed to determine de-identification requirements, based on the analytics objective, value to the community, respect for individual privacy, and the practices and controls employed by the requesting analytics organization.

While defining analytics requirements relating to primary and secondary use of provincial EHR information is clearly the responsibility of providers and researchers respectively, eHealth Ontario is well positioned to provide common technology services related to analytics to support shared needs. By leveraging existing enterprise extract, transform, load, business intelligence, and reporting capabilities, and supplementing these capabilities with enterprise de-identification and advanced analytics capabilities, eHealth Ontario could relieve providers and researchers of the responsibility for procuring and managing these technical services themselves.

However, although eHealth Ontario is well positioned to prepare replicas of EHR datasets for primary use, it is not currently mandated to provide clinical decision support and compliance monitoring tools.

DATA SHARING AGREEMENTS AND INFORMATION FLOW CONTROLS

All flows of information depicted in the connectivity strategy, and all exchanges of information for primary (e.g. EHR) or secondary (e.g. analytics) use, are executed under the terms and conditions of one or more data sharing agreements. These agreements between organizations are based on provincial and organizational privacy policies, and in accordance with the Personal Health Information Protection Act and Freedom of Information and Protection of Privacy Act. They outline the accountabilities of the parties to the agreement for the quality and accuracy of the data collected at the source, the bi-directional notification of potential data issues, and the singular accountability of the source to correct verified data issues.

The connectivity strategy assumes an agreements registry will ultimately be consulted as part of EHR transaction fulfillment. This registry will contain records of who has signed which data sharing agreements, and will only allow the exchange of EHR information between parties who have signed the appropriate agreements. Providers would have an interface to this registry to read relevant agreements and electronically sign and un-sign agreements. Endorsements of specific agreements by advocacy groups such as the OMA and CPMA would be indicated to assist providers in this process.

There is also a need for providers, particularly primary care providers, to be able to control the flow of information from their POS systems to the provincial EHR as well as analytics replicas of provincial registries and repositories. Whether this control is expressed as a data sharing agreement or some other form of consent, the default preference would be to use a single solution (i.e. an agreements registry and information flow management interface) for providers to manage their data sharing agreements and information flow controls. By integrating this interface with the subscription management interface that allows providers to define how EHR information flows into their POS, providers would have a single, comprehensive channel for managing information flow to and from their POS. They would access this agreements registry and information flow management interface through the same single sign-on mechanisms used for access to other provincial eHealth services.

INTERDEPENDENT REGISTRIES

SERVICE DELIVERY LOCATION

There is enormous value in capturing and sharing the three-way link between providers, the services they offer, and the locations where these services are available. This collection of related information would support electronic referrals and health care client access to care; additional value would be provided by including business hours, contact information, and availability and capacity.

Information in the PPR that could be leveraged includes identity, license, work location, and service delivery locations. What is missing is the relationship between providers and the health services they offer. While the PPR infrastructure could potentially be leveraged to include such information, providers would need to manage their lists of services. This would necessitate business change management processes to be created and put in place.

There is a significant opportunity to leverage OTN's provider directory, a platform that allows providers to self-manage information (including service location) related to the services that they provide.

PROVIDER EMR ROSTERING

One clearly emerging need is to inter-relate primary care providers with their clients and relevant EMR system. This data set is needed to support the targeted delivery of reports, and to reduce the need for physicians to manage un-matched reports.

Provider identity and work location information in the PPR could be leveraged. The relationship between providers and the systems they use, confirmed by the 'owner' of the system of this relationship, is missing, however, as is the relationships between providers and their roster of clients. While the functionality of the PCR could be leveraged for this purpose, its feasibility would hinge on the performance and capacity characteristics of the PCR's technology.

There is a significant opportunity to leverage CCO's ICS solution, as it maintains a high-quality set of primary care provider-to-patient relationships.

COGNITIVE COMPUTING

Cognitive computing is a class of technologies that provide capabilities including natural language processing, predictive analytics, continuous learning, decision automation, and pattern recognition. These technologies and capabilities are already in use around the world and in many sectors, including health care where it is used to provide relevant, context-based insights and support to care providers. Cognitive computing can therefore be seen as a companion to the provincial EHR: a union necessary to truly unleash the power of information technology upon the delivery of care.

Cognitive computing can provide practical solutions to some of today's data quality challenges. Capturing structured and codified data at the point of care is key not only to a consistent, reliable EHR, but also to a higher-order understanding of EHR information for research and clinical decision support. Cognitive computing at the point of care could allow providers to input data according to local practices and workflows; cognitive computing technology would propose a structured and codified version of this data for the provider to validate prior to

contributing to the EHR. This is one way cognitive computing could help balance the needs of the individual practice with the needs of the broader health care community.

The terms and concepts related to cognitive computing may appear to be futuristic at this point, yet these technologies hold the potential to solve many of today's more difficult EHR challenges. The provincial EHR is a comprehensive collection of health information that cognitive computing can help clinicians and researchers process and make sense of. Cognitive processing helps individuals process large amounts of data, focus on the information that really matters, discover patterns and meaning that would otherwise be missed if analyzed by humans alone, and leverage technology to make better care decisions.

Cognitive computing will no doubt have an increasingly relevant and important role in the delivery of health care globally. It will inform strategic architectural decisions going forward.

CONCLUSION

As the provincial EHR integrator, eHealth Ontario has the mandate to give providers access to health care information collected in the process of care. Our approach involves leveraging investments made to date, and providing a blueprint and plan for connecting information across multiple organizations to form a comprehensive view of the health record, regardless of source.

The connectivity strategy defines the path to connecting a client's health information to his or her care team. It describes how health care information will be connected to create an integrated EHR – one that provides a lifetime record of an individual's health history.

Based on extensive consultation and contributions from the ministry and a wide-range of stakeholders including clinicians, the strategy describes current and futures states of the EHR and the transition between the two. As part of the connectivity package, an online asset inventory has been developed, listing current ehealth solutions in use throughout the province. A business tool for planners and decision makers – the requirements for point-of-service procurement – has also been created. It contains practical requirement and evaluation information which support procurements that can then be copied and pasted directly into requests for proposals. Finally, support services are available to assist with adoption of, and alignment with, the connectivity strategy. The strategy will be updated annually.

This strategy will improve the speed and efficiency of health care delivery across Ontario and will save the health care system and taxpayers money. But building a fully interoperable EHR will take efforts from all of us in the health care sector. Work with us. We all have a role to play. Only a truly collaborative effort will result in a scalable system that can securely share the right information, with the right people, at the right time to support the myriad decisions required to improve health care for Ontario's 13 million citizens.

APPENDIX A: ACRONYMS

ACRONYM	DEFINITION
ADT	Admit, Discharge, and Transfer
BORN	Ontario's Pregnancy, Birth and Childhood Registry and Network
CCAC	Community Care Access Centre
CCO	Cancer Care Ontario
CCT	Care Coordination Tool
CDA	Clinical Document Architecture
CDPS	Comprehensive Drug Profile System
CDPR	Comprehensive Drug Profile Repository
CDR	Clinical Data Repository (may contain documents and/or data)
CDV	Clinical Data Viewer
cGTA	Connecting Greater Toronto Area
CHRIS	Client Health and Related Information System
CIHI	Canadian Institute for Health Information
CMTA	Consent Management Technology Assets
CMTP	Consent Management Technology Program
cNEO	Connecting Northern & Eastern Ontario
CPC	Connecting Privacy Committee
CPDB	Corporate Provider Database
CPV	Clinical Value Projects
cSWO	Connecting South West Ontario
DATIS	Drug and Alcohol Treatment Information System
DI	Diagnostic Imaging
DI-r	Diagnostic Imaging Repository

ACRONYM	DEFINITION
DPV	Drug Profile Viewer
EHR	Electronic Health Records
EMPI	Enterprise Master Patient Index
EMR	Electronic Medical Record
ENITS	Emergency Neuro Image Transfer System
ETP	Electronic Transfer of Prescriptions
FEM	Foreign Exam Management
HDIRS	Hospital Diagnostic Imaging Repository Services
HIAL	Health Information Access Layer
HIPAAAT	Health Information Protection and Associated Technologies
HIS	Hospital Information System: a comprehensive, integrated information system designed to manage the administrative, financial and clinical aspects of a hospital.
HIT	Health Information Technology
HNS	Health Network System
HRM	Hospital Report Manager
HSP	Health Service Providers
IAR	Integrated Assessment Record
IHF	Independent Health Facility: Privately run facility providing clinical services.
LHIN	Local Health Integration Networks
LIS	Laboratory Information System
MCTA	Monitoring and Control Technology Assets
MCTP	Monitoring and Control Technology Program
MDM	Master Data Management
MOHLTC	Ministry of Health and Long Term Care

ACRONYM	DEFINITION
OACCAC	Ontario Association of Community Care Centres
ODB	Ontario Drug Benefit Program
OLIS	Ontario Lab Information System
OMA	Ontario Medical Association
ONE	Ontario Network for eHealth
OTN	Ontario Telemedicine Network
PACS	Picture Archiving And Communications System: supports the storage and flow of medical imaging studies, including advanced imaging display workstations that provide dedicated and specialized functionality for the interpretation of imaging studies.
PCIS	Provincial Common Integration Services
PIM	Provincial Integration Model
POI	Physician Office Integration
POS	Point of Service system: any application used by health care providers to manage health care clients
PRM	Provincial Reference Model
PRO	Health care Client Results Online
RIS	Radiology Information System
RPDB	Registered Persons Data Base
SIEM	Security Information and Event Management
SOA	Service Oriented Architecture
SPIRE	Southwest Physician Office Interface to Regional EMR
SWODIN DI	Southern and Western Ontario Diagnostic Imaging
TDIS	Timely Discharge Information Summary
TOH	The Ottawa Hospital
XDS	Cross-Enterprise Document Sharing

APPENDICX B: SOA POLICIES

SOA Policy / Principle	Description
Service Profile	Defines the metadata to be collected about eHealth Ontario's HIAL-exposed services. Information assembled in the Service Profile will form the basis for records in the SOA Service Catalog, and will promote consistency in service documentation.
Service Taxonomy	<p>Defines an eHealth Ontario Service Classification Framework to enable the efficient management and discovery of services. The main objective of service taxonomy is to realize the following benefits:</p> <ul style="list-style-type: none"> • A common taxonomy • An effective service classification • Composability • Categorization
Service Naming	Defines the eHealth Ontario standards for architects/developers with respect to the naming services and related artifacts.
Service Security	States that externally facing services must use mutual SSL as a transport security and authentication control, and that externally facing services providing PHI data must use SAML 2.0 for exchanging authentication information.
Service Design Patterns	Guides SOA designers to utilize a pattern-based implementation of SOA services, follow standard message exchange patterns, be web service standards compliant, utilize shared utility services, follow the service security policy, and document the service designs against patterns or a divergence from known patterns.
Message Exchange Patterns	States that a SOA service architect must adhere to standard service invocation patterns prescribed by eHealth Ontario. In case existing patterns are not suitable for the task, the service architect must document the new pattern. If patterns cannot be used 'as-is', the service architect must document any deviations.
Rules Centralization	States that business rules management should be centralized through the business rule engine service, while any non-functional requirements should be managed through WS-Policy statements.
Logging and Exception Handling	The eHealth Ontario SOA service logging and exception handling standards described in this document applies to eHealth Ontario service side logging only (not to eHealth Ontario third parties/ partners/etc.), as well as to all new eHealth Ontario SOA services that are developed.

SOA Service Registry Management	States that the service definition for all external (provincial and regional) and internal services must be submitted and maintained within the SOA Registry, following the guidance provided in the service lifecycle policy.
SOA Service Registry Information Management	<p>Addresses the eHealth Ontario SOA architectural team, ensuring that:</p> <ul style="list-style-type: none"> ▪ The provincial SOA service registry content is kept complete, consistent, accurate and current ▪ The provincial SOA service registry is the authoritative source for consumer information about SOA services ▪ Service owners provide complete and accurate content updates in a timely manner ▪ Through the act of submission to the eHealth Ontario gating processes, service owners implicitly approve changes to the provincial service registry entries to bring them into conformance with the SOA service details supplied in those submissions
Service Lifecycle	Defines the eHealth Ontario SOA service lifecycle phases (stages), and the service transitions and states to be used by service designers/developers, Enterprise Architecture, and solution delivery teams, during the eHealth service creation process throughout all phases of the SOA service lifecycle process.
Monitoring	<p>eHealth Ontario’s Operations group is responsible for monitoring and collecting the defined service levels and key performance indicators for both internal and external delivery partners. This policy presents a minimum set of information to be collected and monitored, including the following categories:</p> <ul style="list-style-type: none"> • Availability • Performance • Usage
Reporting	<p>eHealth Ontario’s Operations group is responsible for collecting the defined service levels and key performance indicators for both internal and external delivery partners. This policy presents a minimum set of information to be collected and reported on; data collection should consider a wider set of attributes to accommodate future reporting requirements. Information reported upon includes:</p> <ul style="list-style-type: none"> • Availability – for each service (also considering service version) • Performance – for each service (also considering service version) • Usage– for each service (also considering service version) • Change Management – for services • Performance – for each orchestration • Usage – for each orchestration • Change Management – for orchestrations

APPENDIX C: PIM DIAGRAMS

The actors and systems shown in the provincial integration model (PIM) views are described in the following tables.

TABLE 1 – PROVINCIAL INTEGRATION MODEL ACTORS

Actor	Description
Administrator	A person who participates in an administrative role in providing health care, such as a privacy officer, computer administrator, or LRA.
EMS Provider	Ambulance, fire and other first responders.
eHealth Ontario Privacy Officer	A person responsible for managing consent and audit requests.
Health Care Client	A person who receives health care services from health care providers.
HIC Privacy Officer	A person responsible for managing the consent and audit requests for data for which they are the custodian.
Provider	A health care provider participating in the care of a health care client
Radiologist	A health care provider specializing in reading and interpreting medical images. Radiologists use the PACS workstation to interpret and report on medical imaging studies.

TABLE 2 – PROVINCIAL INTEGRATION MODEL SYSTEMS

System	Description
Agreements Registry	A record of which provider persons / organizations have signed which agreements (e.g. data sharing agreement). This registry will be consulted by the HIAL in processing transactions, enforcing disclosure to only those people and organizations who have signed the appropriate agreements.
Analytics Repository	Used to prepare EHR data for specific analytics purposes. Data sets from provincial clinical repositories required for analytics will be placed in this repository where they will be de-

System	Description
	identified and made available for each specific analytical use.
App Formulary	A repository of digital therapies (applications) available to clinicians for prescription to their patients, providing a source of truth regarding what can be prescribed, how to prescribe it, and to whom a particular application should be prescribed.
Assessment Solution	The authoring tool and system of authority for CCAC assessments. The tool has a mobile channel, as well as being offline capable.
BORN Registry	Ontario's pregnancy, birth and childhood registry and network. By collecting, interpreting, sharing and rigorously protecting critical data about each birth in the province, BORN makes a positive and lasting contribution to the health of mothers, newborns, children and the citizens of Ontario.
Care Coordination Tool (CCT)	<p>Intended to create, maintain and share coordinated care plans and send secure messages between members of the care team. The tool is being built initially to support Health Links.</p> <p>The CCT will be independent of specific roles and processes so Health Links can determine how to use it to support their approaches to care coordination.</p> <p>The solution is being designed to serve the needs of care providers from all sectors.</p>
CCO Enterprise Data Warehouse	Designed to make Cancer Care Ontario's data-holdings accessible to cancer planners (e.g. health care providers and researchers) through a secure, web-based analytical and reporting tool called iPort™, the EDW enhances the privacy and security of data stored at CCO, creates a more authoritative data foundation, and yields robust reporting and analytic capabilities for enhanced cancer planning, management and research.
CCO Laboratory Vendor Hub	A hub that aggregates laboratory test results and sends them to CCO.
CCT Repository	The repository that stores all CCT data.
CCT Viewer	The application that allows providers to interact with the CCT system.
CDR HIAL	The integration layer that mediates all access to and from the CDR.

System	Description
cGTA CDR Solution	A component comprised of both the CDR where clinical documents are stored, and the CDR HIAL that mediates all access to the CDR.
Circle of Care Communication	Also known as virtual health care (VHC), provides a method by which health care clients and their health care providers can communicate with one another electronically to provide timely health care services.
Claims history database (CHDB)	The repository of information retained by the ministry relating to medical claims submitted by providers for services provided to eligible residents. This OHIP database is used in assessing and processing claims.
Client Agency Program Enrolment (CAPE)	A repository of the association of a registered person with a specific physician at a specific agency in a formally recognized program.
Client Details Portlet	Validates patient information against the client registry before setting patient context for other portlets on the page to help ensure data belongs to the correct patient.
Client Selector Portlet	Uses health number, date of birth and gender to locate and verify a patient in the client registry. This portlet is used to perform data validation and set patient context for all other portlets on the page.
Clinical Data Viewer(CDV)	Currently known as the connectingGTA portal, this viewer - which presents a consistent view of clinical information - will be branded as the CDV once it becomes a provincial asset and is used by other regions. Its primary source of data is the provincial clinical data repository, but it also presents data from other repositories such as the Ontario laboratories information system.
ClinicalConnect™ Viewer (CCV)	<p>Also known as the regional clinical viewer, the CCV - which presents a consistent view of clinical information - is the EHR viewer for the SWO region. Its primary source of data is hospital information systems in South Western Ontario (SWO), but it also presents data from other clinical data repositories such as Ontario laboratories information system and client health and related information system.</p> <p>One component is the connecting South Western Ontario (cSWO) engine, which contains multiple adapters. Adapters use pull mechanisms to obtain data from hospital information systems as part of the population of the viewer. The cSWO connection engine is the source of all acute care and EHR data for the CCV.</p>

System	Description
Clinical Decision Support	Systems that link health observations with health knowledge to influence health choices by clinicians for improved health care.
Clinical Portal	Web portals used by clinicians that support the use of portlets serviced by portal services
College Feeds	Regulated colleges such as the college of physicians and surgeons of Ontario (CPSO) provide data to the provider registry. In the future, unregulated associations will also provide data to the provider registry.
Comprehensive Drug Profile System (CDPS) Formerly known as Medication Management System (MMS)	This system is the expansion of the health network system that includes data on Ontario Drug Benefit Program, narcotics & controlled substances and additional dispense data from pharmacies. It is available through web services exposed through eHealth Ontario's HIAL.
Connecting Greater Toronto Area (connectingGTA) Clinical Data Repository (CDR) Interim Client Registry (CR)	This in-house registry supports the needs of University Health Network. It is an interim registry used by the regional integration initiative. (Also known as University Health Network client registry)
Connecting Greater Toronto Area (connectingGTA) Clinical Data Repository (CDR) Interim Provider Registry (PR)	This in-house registry supports the needs of University Health Network. This is an interim registry used by the regional integration initiative. (Also known as University Health Network provider registry)
Connecting Greater Toronto Area (connectingGTA) Clinical Data Repository (CDR)	This solution currently used by connectingGTA is based on the Apelon technology stack (Apelon Distributed Terminology System, and TermWorks). The terminology services in use with the CDR are applying terminology validation and transformation to outbound data as it is being retrieved.

System	Description
Terminology Registry	
ConnectingOntario Clinical Data Repository (CDR) Consent Registry	This solution applies consent rules when accessing the CDR. It provides system and administrative interfaces for the purpose of managing consent directives and providing consent override notifications.
Consent Management Technology Assets (CMTA) - Consent	As the provincial consent management solution, CMTA will enable the uniform enforcement of privacy directives for all EHR transactions. If a consent directive blocking a specific provider's access to a client's information is declared, integration with CMTA allows this directive to be enforced across all identities a provider may be using to access the EHR.
Consumer eHealth Solution	Solutions that will provide health care client access to the electronic health record. Services will be exposed via the HIAL, and partners will create the applications that health care clients will interact with to access the services.
Corporate Provider Database (CPDB)	An integrated repository of health care stakeholder registration and program eligibility information used for operational and planning purposes.
De-duplication	Ensures that only one copy of a document which is stored in multiple repositories is sent to a target system. For example, only one copy of a lab report stored in both OLIS and the CDR is sent to an EMR.
De-identification services (also known as Anonymization services).	De-identification services remove client identifiers from EHR data in order to allow the data to be used in situations beyond the direct delivery of health care.
Diagnostic Assessment Program - Electronic Pathway Solution (DAP-EPS)	An Internet-based tool to improve the patient and provider experience throughout the diagnostic journey. This interactive website provides patients, DAP staff and health care providers with shared information and support as a patient progresses from the suspicion of cancer to a definitive cancer or a non-cancer diagnosis.
Diagnostic Imaging Common Services	Services and infrastructure to support the storage, query, and retrieval of radiology reports. Primarily the services are based around the IHE XDS profile but additional proprietary consent related services are also provided.

System	Description
Diagnostic Imaging (DI) Document Registry	Enables province-wide discovery and retrieval of DI reports and image manifests. The underpinning technology is the cross-enterprise document sharing (XDS) document registry.
Diagnostic Imaging Reports (DI-r)	The provincial repository for all diagnostic imaging reports.
Diagnostic Imaging Reports Portlet	Displays a list of diagnostic imaging (DI) reports from the provincial DI repository for a selected patient. It currently integrates with the patient selector portlet for patient context.
DI-r Specific Regional Viewer	Each DI-r has its own regional viewer capable of displaying reports and images contained within the DI-r.
Discharge Abstract Database (DAD)	Captures administrative, clinical and demographic information on hospital discharges (including deaths, sign-outs and transfers). Some provinces and territories also use the DAD to capture day surgery. Data extracted from the DAD is used to populate other CIHI databases, including the Hospital Morbidity Database (HMDB) and the Hospital Mental Health Database (HMHDB).
Drug and Alcohol Treatment Information System (DATIS)	Collects, analyses and reports substance abuse and problem gambling clinical treatment and client demographic data from over 170 specialized services agencies in Ontario. DATIS' mission is to contribute to the understanding and service enhancement of problem gambling and addiction in Ontario through the development and maintenance of a comprehensive, province-wide client information system. DATIS includes both a repository and viewer. The repository stores all DATIS data, while the viewer is the web application that allows providers to interact with the DATIS system. Agency-level data is publicly available on the DATIS website for agencies, the ministry, LHINS and other stakeholders.
Drug Profile Viewer (DPV)	The viewer of the Ontario drug benefit program is used in hospital emergency departments across the province.
Eastern Ontario Clinical Data Repository (EOCDR)	Also known as Brockville CDR, this solution was designed to get data from the acute setting to primary care EMRs in eastern Ontario. Reports from the EOCDR are now available via the OMD hospital report manager.

System	Description
Eastern Ontario Viewer (EO Viewer)	Used in regions of Eastern Ontario to view hospital reports stored in the Eastern Ontario clinical data repository. Acute care hospital reports are sent from the EOCDR to reports delivery system for distribution to primary care EMRs.
eCHN	The electronic Child Health Network (eCHN) is a secure electronic network that enables authorized care providers across Ontario to access health information about paediatric patients, instantly, from many different sources. eCHN is operated as a non-profit, government-funded institution. It collects the data resulting from patients' interactions with the health care system and consolidates them into the form of a single medical WebChart. eCHN provides a coherent, accurate and up-to-date patient record that is available wherever and whenever needed.
eClaims - New Drug Funding Program claims management system (NDFP)	Stores patient and treatment information about systemic therapy drug utilization at regional cancer centres and other Ontario hospitals, for which reimbursement is being sought according to strict eligibility criteria.
eHealth Ontario HIAL Segment	Responsible for mediating all access to provincial assets. Each region has a separate segment for mediating access to its own regional assets. All segments are built on the same technology stack.
Emergency Neuro Image Transfer System (ENITS)	A centralized web-based picture archiving and communication system that makes remote neuro consultations easier, faster and more accurate. Referring hospitals across the province send head scan images to ENITS where they can be accessed and viewed by neurosurgeons on-call anytime, anywhere.
Entitlement/Trust Relationships	Responsible for maintaining all rules that control who has access to what data. It is used by the HIAL to control access to provincial data.
EOHIS	Hospital information systems in Eastern Ontario that submit hospital reports to both the Eastern Ontario CDR and the cGTA CDR.
eReferral Solution	A business application to match referral requests with available health care resources and to manage the transfer of health care clients. (TC LHINs Strata, OTN's OTIX and Store-and-Forward).

System	Description
eUnity Viewer	Part of the ENITS system to view head trauma images. Primary users are neurosurgeons to provide emergency consults and determine if a patient needs to be transported.
Federated data collection via Adapters and Integrations (ClinicalConnect™)	Currently, the solution uses a pull model to acquire the data from various repositories when the information is required.
GTA HIAL Segment	Responsible for mediating all access to regional assets in the greater Toronto region. Each region has a separate segment for mediating access to its own regional assets. All segments are built on the same technology stack.
Health Network System (HNS)	The medication dispense information repository containing Ontario drug benefit claims data and narcotic dispenses.
Health Partner Gateway (HPG) - CHRIS Viewer	A province-wide system that provides external partners of the CCAC (e.g. contracted service providers, acute care staff) with access to their client information stored in the CHRIS and assessment systems. The system is accessed via either a web browser interface or a system-to-system web-service interface.
Immunization Record Repository	Part of Panorama, the provincial immunization and pandemics management system. The repository keeps track of immunizations of school pupils, day care attendees, and those vaccinated at public health clinics in a secure, web-based information system.
Integrated Assessment Record (IAR)	<p>An application that allows authorized users to view a consenting client's assessment information to effectively plan and deliver services to that client.</p> <p>The IAR allows assessment information to move with a client from one health service provider (HSP) to another. HSPs can use the IAR to collaborate with other care providers and view timely assessment information electronically, securely and accurately.</p> <p>The IAR is made up of a repository and a clinical viewer. The repository stores all integrated assessment data. The viewer is the web application that allows providers to interact with the IAR system.</p>
Integrated Cancer Screening	The ICS suite of information and technology tools creates electronic screening records for eligible Ontarians by collecting and integrating data from several sources (administrative,

System	Description
(ICS)/InScreen	clinical, cancer, laboratory, etc.)
iPort Access	A secure, web-based, business intelligence tool that provides wait time self-service reporting.
ISAAC	The Interactive Symptom Assessment and Collection (ISAAC) tool allows patients to assess and monitor their symptoms through an online computer program.
Local Client Registry	A generic registry that is stored, updated, and used locally by an independent clinical application to maintain client identifiers.
Local Clinical Data Repository	A repository used to store clinical information that is not part of the provincial EHR. Local clinical data is used to provide care, but as its name implies, it is used locally and is not shared with other applications via the HIAL.
Local Consent Registry	A generic registry that is stored, updated, and used locally by an independent clinical application to maintain and enforce consent directives.
Local Provider Registry	A generic registry that is stored, updated, and used locally by an independent clinical application to maintain provider identifiers.
Local Terminology Registry	A generic registry that is stored, updated, and used locally by an independent clinical application to maintain terminology mappings.
Mediation	A component that represents all capabilities for the HIAL to translate between different transport protocols, to transform between different message formats, and to route messages, in order to facilitate communication between consumers and service providers.
Monitoring and control technology assets (MCTA) - Audit	The centralized service that reports on who saw what EHR information, and when, and monitors EHR transactions in real time to identify suspicious behavior and notify privacy representatives for further investigation. The MCTA solution is a recent addition to the suite of key provincial assets, and the various provincial EHR services are transitioning from tactical and local audit solutions to the MCTA solution.
MyChart	Sunnybrook Health Sciences Centre's MyChart™ (also known as the Continuity of Care Record system) is an online website for patients to create and manage their personal health

System	Description
	information based on clinical and personal information.
NACRS	The National Ambulatory Care Reporting System (NACRS), which contains data for all hospital-based and community-based ambulatory care.
North East Ontario Network (NEON)	An existing large hospital system consolidation (22 of 25 hospitals). NEON supports the expansion of hospital information system (HIS) consolidation in the north east and facilitates more coordinated integration with provincial assets. However, this remains a regional asset. It is similar to other HIS consolidations around the province.
NEO HIAL Segment	The NEO HIAL segment is responsible for mediating all access to regional assets in the northern and eastern region. Each region has a separate segment for mediating access to its regional assets. All segments are built on the same technology stack.
North West Health Alliance Regional Hospital Information System (HIS)	An existing large hospital system consolidation that supports the expansion of hospital information systems in 13 hospitals in the North West, and facilitates more coordinated integration with provincial assets. It remains a regional asset, similar to other hospital information system consolidations around the province.
OBSP: ICMS	The Ontario Breast Screening Program: Integrated Client Management System is a database that supports OBSP operations of the OBSP, such as client recruitment, screening, reporting to client and physician, tracking abnormal cases, and recalling women for their next screening. It is also used for quality assurance, statistical reporting for CCO management and for the MOHLTC, and providing data to the National Breast Screening Program and various epidemiological studies.
Ontario Laboratories Information System (OLIS)	The provincial repository for lab reports, accessible by provincial EHR viewers and other portals via the patient lab results (OLIS) portlet and to other systems via web services. OLIS also supports lab orders and referrals.
Ontario Laboratories Information System (OLIS) Client Registry	This in-house registry supports the needs of OLIS. It is an interim registry used by the OLIS application to look up and manage clients.
Ontario Laboratories Information System (OLIS) Consent Registry	Contains consent directives for the disclosure of laboratory test results. This is a tactical solution that will be replaced and/or integrated with the provincial consent registry over time.

System	Description
Ontario Laboratories Information System (OLIS) Provider Registry	OLIS maintains its own local provider registry which is populated from MOHLTC CPDB.
Ontario Laboratories Information System (OLIS) Regional Integration Point	Regional hubs that act as the single point of connection to integrate groups of hospitals to OLIS.
ONE ID	eHealth Ontario's identity and access management solution. It provides and manages credentials clinicians can use to access EHR services, and enables single sign-on to EHR services using providers' existing credentials. It also provides a number of capabilities (e.g. authorization, risk-based authentication) used to secure access to provincial EHR services.
ONE ID Context Manager	Responsible for maintaining information related to a HCPs active patient context. It provides the interfaces necessary for health care Point of Service applications to both send and receive patient context. Through integration with other provincial systems the Context Manager will ensure that only approved systems can interact with the context manager and that only valid and currently logged in provider sessions can participate in the exchange of patient context.
ONE ID Federation Broker	Underpins the federated identity solution. It is responsible for routing the authentication request and response messages between federation partners, and for validating provider and organizations claims contained within the authentication response messages.
ONE ID IDP	eHealth Ontario's provincial identity provider. Health care providers request a digital identity which can be used to access regional and provincial federated services. Business processes and agreements ensure that a requester's identity is well verified.
ONE Mail	A trusted, secure channel for delivering personal health information and personal information. Two solutions are available: Partnered for large organizations with mail servers - ONE Mail provides encryption and ONE Mail active directory services; Direct for smaller organizations - hosted by eHealth Ontario, provides secure ONE Mail account and ONE Mail active directory services and calendar, scheduling sharing with other direct users.

System	Description
ONE Portal	<p>Enables health care teams to stay connected, work collaboratively and use eHealth Ontario applications to share clinical information.</p> <p>The collaboration spaces and communities provided by ONE portal allow health care providers across the province to share documents, conversations and data in a secure manner. Providers can be enrolled in multiple communities on ONE Portal.</p>
ONE ID - Secure Token Service (STS)	<p>Provides claims validation services for the provincial HIAL segment. It inspects client asserted authentication data (claims) such as Provider License and Organizational Identifiers and ensures that this data matches that contained in the provincial repositories. It also ensures that all parties involved in a transaction are properly verified and trusted by eHealth Ontario. Once all the validations are complete, the STS issues a signed token that is trusted by the services secured through the Provincial HIAL.</p>
Ontario Drug Benefit (ODB) Claims History Portlet	<p>Displays a list of the patient's drug claims from the Ontario drug benefit (ODB) program.</p> <p>This portlet currently integrates with the client selector portlet for patient context.</p>
Ontario Laboratories Information System (OLIS)	<p>The provincial repository for lab reports, accessible by provincial EHR viewers and other portals via the patient lab results (OLIS) portlet and to other systems via web services. OLIS also supports lab orders and referrals.</p>
Ontario Telemedicine Network (OTN) - econsult	<p>Allows health care providers to electronically request advice and securely exchange patient health information with one another for more efficient and effective consultations. The system allows for the exchange of digital artifacts such as lab results, exam results and digital photos. It manages clinical workflow to allow for orderly and safe transactions between providers.</p>
OntarioMD - Hospital Report Manager (HRM)	<p>Enables clinicians using a certified electronic medical record system to securely receive patient reports electronically from participating sending facilities.</p>
OntarioMD - Medical Profile Viewer	<p>An OntarioMD managed application that enables an access query of PHI from the EMR system to the hospital emergency department setting. The Medical Profile Viewer provides emergency department physicians with access to a subset of patient medical information maintained in the community physician's EMR.</p>

System	Description
OTN Learning	A learning management system that can be used for continuing education via video or online. Allows remote providers to access training that would not be available at their current location.
Patient Lab Results (OLIS) Portlet	Displays a list of the patient's lab test results and reports from the OLIS data repository.
Patient Monitoring Management Systems (PMMS)	<p>Supports OTN's chronic disease management program (Telehomecare) and small remote patient monitoring programs and pilots (post-acute monitoring, palliative). Patients submit health information to PMMS via devices in the home. Clinician monitor patient data and document clinical information (e.g. nursing notes) using the application's web-based interface.</p> <p>Clinicians monitor PMMS for patient alerts triggered by results that fall outside of ranges set for the patient. Alerts are reviewed, responded to and documented. Typical responses include contacting the patient, their provider or more urgent escalation if required.</p> <p>Clinicians also use PMMS to manage and document health coaching and education activities carried out with the patient.</p>
Patient Selector Portlet	Uses health number or alternative identifier (e.g. medical record number), date of birth and gender to locate and verify the patient against the provincial client registry. Once found, the portlet sets the patient context for all other portlets on the page.
Pharmacy Acquirer Host Solutions	A hub or service bus that consolidates claims transactions from the pharmacies for submission to the Ontario drug benefit claims system. There are 3 pharmacy acquirer hosts in the province. This is a MOHLTC owned service separate from the HIAL that uses the eHealth Ontario ONE Network.
Physician Office integration (POI)	A hospital report solution providing clinicians with secure electronic access to reports from hospitals into their electronic medical record systems - a significant need for primary care physicians.
Point of Service Systems	Encompasses a wide-range of locally-owned assets that continue to be required even with a fully-functioning provincial EHR. These include electronic medical records, hospital information systems, pharmacy management systems, picture archiving and communication system viewers, and other systems providers use for collecting or delivering EHR information.

System	Description
Policy Decision Point	A policy driven security enforcement layer integrated with the Provincial HIAL Segment. It evaluates requests submitted to provincial HIAL services and compares them to pre-defined, service specific rules. The PDP leverages provincial assets such as ONEID, Provider Registry, Client Registry and System Registry to validate requester data and compare against the authorization policy store. The PDP is ultimately responsible for providing an authorization response (allow or deny) to the HIAL which will in turn enforce that action.
Portal Context Framework Portlet	Allows all portlets on a web page to interact with one another and share patient context (such as health number) with other portlets on the web page.
Portal Services	An application server that hosts clinical web portlets (e.g., lab, Ontario drug benefits) that can be presented and viewed through supported portals (e.g., The Ottawa Hospital portal, ONE Portal) See individual portlets for descriptions of which lines of business are available.
Prefetch Engine	Automated service designed to trigger the retrieval of prior imaging studies before a radiologist reviews a current study. Allows the radiologist to efficiently compare current and prior exams on a PACS workstation without the overhead of locating and retrieving the images manually.
Prescribed Registry	Ontario regulations prescribe a list of persons who compile and maintain registries of personal health information for the purpose of facilitating or improving the provision of health care or that relates to the storage or donation of bodily substances. Health information custodians are permitted to disclose personal health information without consent to these listed persons. BORN is an example of a prescribed registry.
Provider Directory Portlet	Provides the ability to search for a health care provider within the provider registry by name, location and/or specialty.
Provider Service Directory	An application that maintains telemedicine specific practice information for providers and programs including service provided, catchment area, protocols, accepting patients, service location, and wait times. Also contains location (sites) and video end points (systems) used for telemedicine.
Provincial Assessment Solution	A provincial interRAI assessment creation and management tool used for intake purposes by all 14 CCACs and many LHIN funded community service agencies. The system is seamlessly integrated with CHRIS to optimize the CCAC staff work flow.








System	Description
Provincial Client Registry (PCR)	<p>The datastore for the identity and personal characteristics data of all people who have received health services in Ontario. It also includes all Ontario residents covered by OHIP.</p> <p>It is the definitive source for a health care client's identity, facilitating the unique, accurate and reliable identification of individual clients who receive care in Ontario, across the disciplines in the health care sector. Crucial to the provincial EHR, it links people to their associated identities throughout the health care system, enabling the linkage of health records to individuals.</p>
Provincial Clinical Data Repository (CDR)	<p>The provincial repository used for sharing clinically relevant EHR information not already shared through the laboratory, medication, or diagnostic imaging repositories. It includes information such as discharge summaries, patient assessment forms, clinical notes, and transcribed reports or procedures reports.</p> <p>The CDR HIAL is one of the dependent/necessary supporting technologies of the provincial CDR.</p>
Provincial Diagnostic Imaging (DI) viewer	<p>A specialized viewing application that supports the display of diagnostic images. The viewer can be run as a standalone application (where it is responsible for locating a health care client and study of interest, or launched in context from another EHR viewer. When launched from another viewer, the health care client, study, and user context will be passed into the imaging viewer.</p>
Provincial EHR Integration Assets	<p>Assets that provide common data, rules, etc. that link EHR data (provider and client registries), control access to EHR data (entitlement trust relationships), and provide audit and monitoring.</p>
Provincial Health Information Access Layer (HIAL)	<p>A centrally hosted and managed solution. The HIAL is a collection of technologies that orchestrates EHR transactions, ensuring that they are private and secure, and implementing integration capabilities.</p>
Provincial Identity Provider (IDP)	<p>Organizations 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 an organization must meet the required standards published by the federation operator as well as signing all applicable policy and legal agreements.</p>
Provincial Provider Registry (PPR)	<p>The repository containing an enumeration of all health care organizations and providers (identity, personal characteristics and professional roles), the services that they provide, and</p>




System	Description
	<p>the associations between them.</p> <p>It 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.</p> <p>The PPR is essential for the province-wide enforcement of access control, consent, and audit policies, and will play a key role in EHR transactions such as electronic referral and electronic consultation.</p>
Rapid Electronic Access to Clinical Health Information (REACH)	A portal that enables providers to view client data from William Osler, Headwaters, Trillium Health Partners and, Halton Healthcare hospitals. It is on the same platform as the SWO ClinicalConnect™ viewer (Medseek – Red Snapper).
Regional Diagnostic Imaging Repositories (DI-rs)	<p>Regional DI-rs are hubs for sharing DI reports and images within a region. The DI-rs also act as aggregators for publishing the DI related documents to the provincial DI repository as well as providing long-term storage for a small subset of hospitals in the province.</p> <p>The province is divided into 4 geographical regions for the purpose of amalgamating the diagnostic imaging results within the region. The regions are Southern and western Ontario (SWODIN), Northern and Eastern Ontario (NEODIN), Greater Toronto Area West (GTA West), and GTA east hospital diagnostic imaging repository services. Each region has its own repository that is responsible for storing the radiology reports and diagnostic images of their associated hospitals and independent health facilities. Each repository has a unique internal implementation but their external requirements and characteristics are the same.</p>
Regional Viewer	The web based EHR viewers for SWO, GTA, and NEO regions, presenting a consistent view of clinical information.
Registry and Common Services	Provide common data, rules, etc. that link EHR data (provider and client registries), control access to EHR data (Entitlement/Trust Relationships), and provide audit and monitoring.
Scheduling Application	An application for scheduling patients, providers and resources. Contains calendar information for all resources (human and otherwise). Can be used for video conferencing for clinical encounters, learning and administrative meetings. Scheduling information can be used to initiate and control video events. Currently sends out patient notifications about video conference via paper mail (letters).
Service Registry	Will be a definitive list of EHR services, including a description of the service and its

System	Description
	associated policies and technical specifications.
South West Physicians Office Interface to Regional Electronic Medical Record (SPIRE)	A hospital report solution providing clinicians with secure electronic access to reports from hospitals into their electronic medical record systems; this is a significant need for primary care physicians.
Standard Terminology and Terminology Services	<p>Used to manage and publish standard terminology assets, including code systems such as SNOMED CT®, LOINC®, ICD-10-CA®, provincial terminology sets (e.g. diagnostic imaging procedures), and terminology maps (e.g. local terms to provincial terms).</p> <p>Terminology services enable and support semantic interoperability through the use of standard terminologies, standard terminology models and standard terminology services. Interoperability is demonstrated by the consistency of human and machine interpretation of shared data and reports. Terminology services provide a common way for managing and retrieving these items, including historically correct version interpretation. Terminology services support the requirements for retrospective health record information and system data.</p> <p>This solution contains the standard provincial terminology and associated code systems in the form of terminology sets, and where appropriate, maps that relate local terms to provincial terms. The standard terminology services are consulted as part of EHR transactions to validate the clinical and non-clinical standard terms, and translate from local terms and codes to their provincial equivalent as appropriate.</p>
Subscription Management Service	Allows providers to specify the notifications they would like to receive about EHR information, and where they would like them delivered (EMR, email address, cellphone/SMS). Together, subscription and notification services improve timely delivery of care by minimizing the time for new information to reach providers.
SWO HIAL Segment	The HIAL segment responsible for mediating all access to regional assets in the southern and western region. Each region has a separate segment for mediating access to its regional assets. All segments are built on the same technology stack.
The Client Health and Related Information System (CHRIS)	<p>A comprehensive clinical case management solution for Ontario's CCACs. CHRIS supports CCACs in managing clients, referrals and services for Ontario residents requiring health and community service information, services at home or school, referral to community services, access to long-term care, or post-acute hospital units. It is a web-based system used by all 14 CCACs and maintains a historical health record for all their clients.</p> <p>CHRIS is supported by a number of critical components including: information data store,</p>

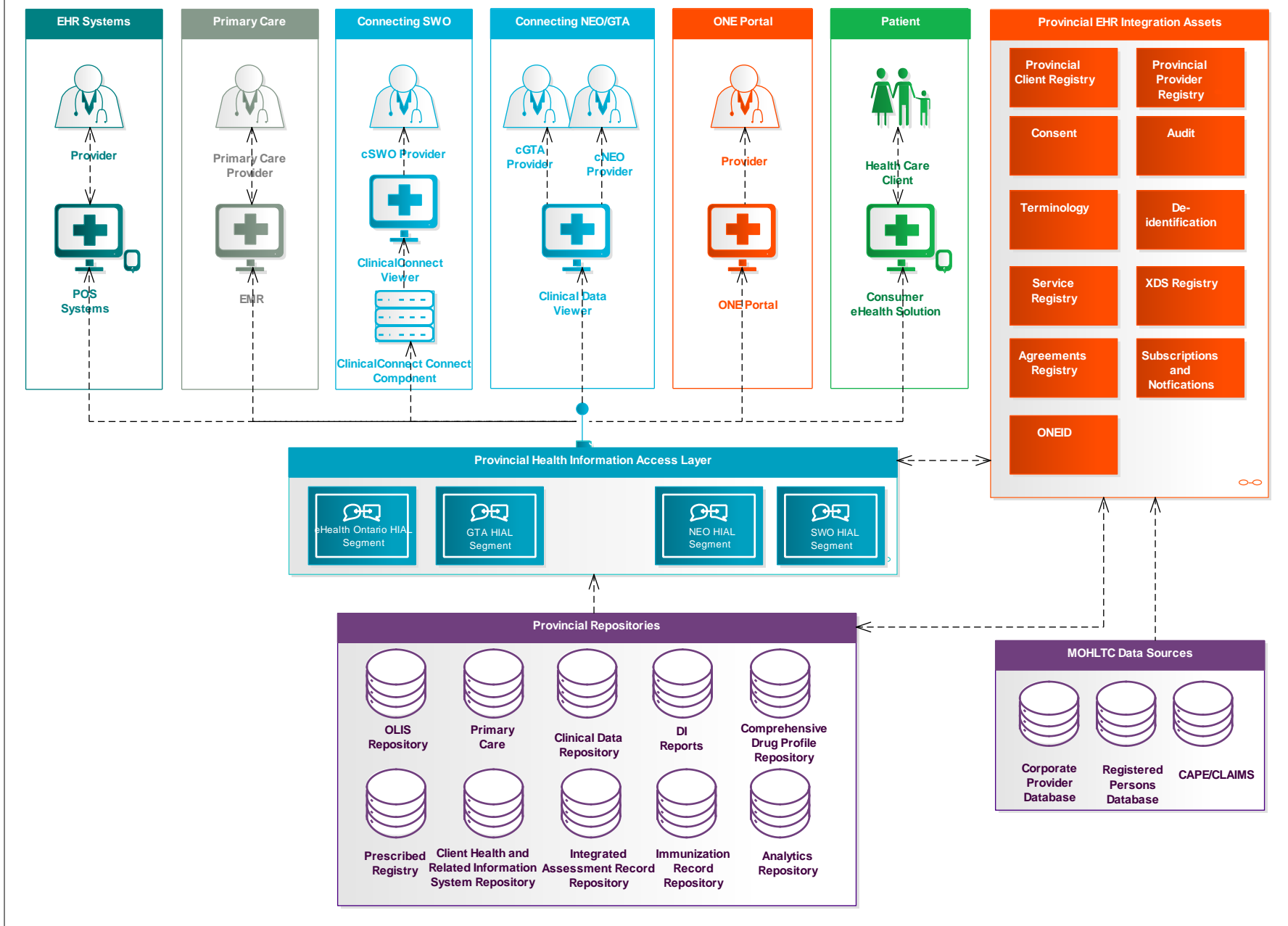
System	Description
	provincial information & referral, CCAC care connector tool, eNotification, and fax services.
The Ottawa Hospital (TOH) Portal	Currently, this portal utilizes Ontario laboratories information system, Ontario drug benefits and client registry portlets developed by eHealth Ontario. Authorization to access these services uses the provincial provider registry.
The Registered Persons Database (RPDB)	A personal information bank which is organized and can be retrieved by an individual's health number.
Timely Discharge Information System (TDIS)	A hospital report solution providing clinicians with secure electronic access to reports from hospital into the EMR - a significant need for primary care physicians.
University Health Network (UHN): Patient Results Online (PRO)	A portal enabling providers to view health care client data from Mount Sinai, Sunnybrook, Toronto East General, St. Joseph's Health Centre, St. Michael's Hospital, Women's College Hospital and Lifelabs.
Video Conferencing	<p>Leverages OTN's managed video infrastructure and the internet to securely connect patients and providers for clinical consults, educational events and administrative meetings. OTN's scheduling application provides event management and reporting services.</p> <p>PC-based videoconferencing is supported through its HUB portal, and integrated with its network of room- based systems. An OTN iOS application provides mobile videoconferencing connected with its larger videoconferencing network.</p> <p>A 'Send Invite' feature can be used to connect to patients and other non-provisioned third-parties to connect via PC-based videoconferencing for ad hoc meetings and consults.</p>
Wait Time Information System (WTIS)	A key enabler to Ontario's wait times strategy. It tracks and reports upon wait times for surgery , DI and emergency rooms, and supports alternate level of care data collection, the surgery efficiency targets program, MRI efficiency, and the Cardiac Care Network.
XDS Registry	A key component of the DI common services solution, specifically used in locating DI reports and image manifests.

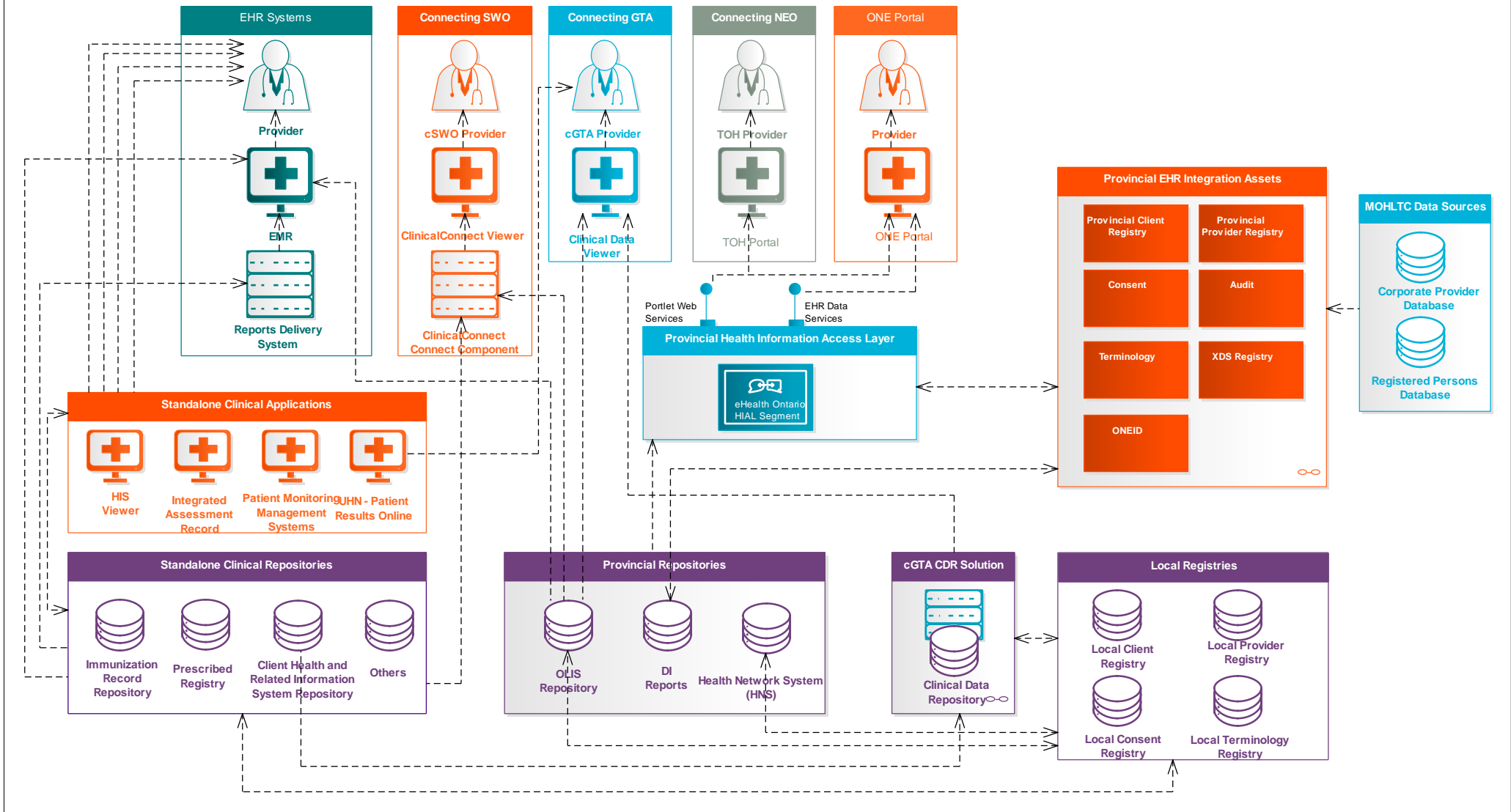
PIM VIEW LEGEND

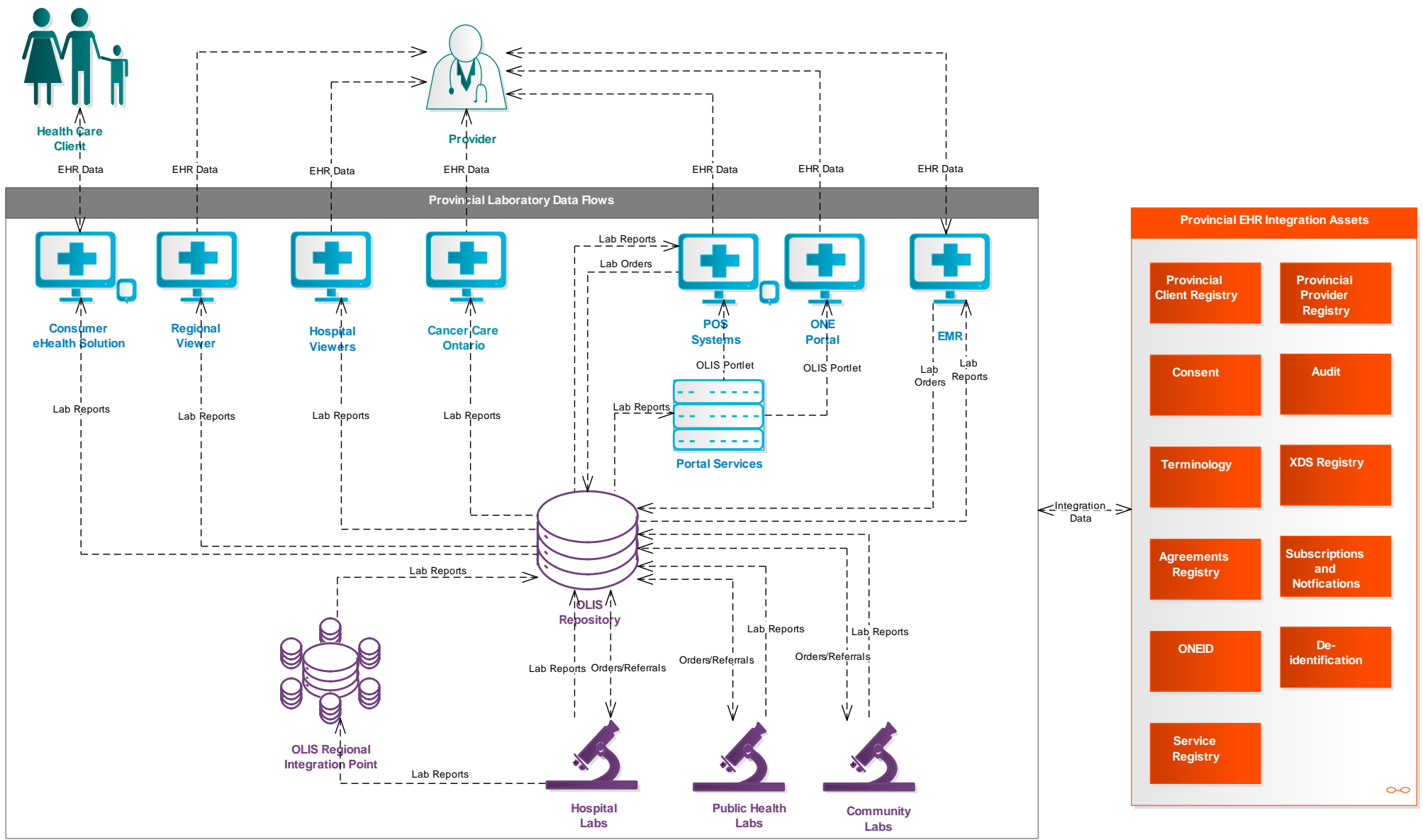
Actor/System	Icon	Description
Health care administrator		A person who participates in providing health care, but plays only an administrative role. This could be a privacy officer, computer administrator, or LRA.
Health care client		A person who receives health care services from health care providers.
Health care provider		A health care provider individual who participates in the care of a health care client.
Computer application		A generic application that does not necessarily provide a user interface. It may integrate various back-end systems or convert data from a repository to a form that can be displayed in an EHR System. Examples include the HIAL, ClinicalConnect™ adapter.
Data aggregators		Data aggregators receive data from multiple data sources and consolidate and/or uplift it for integration with provincial repositories.
Data repository		Generic object used to represent the various clinical data repositories and/or registries. It stores information and makes it available to be viewed in one or more EHR systems.
EHR viewer		The viewers used to access clinical data. May be web-based or desktop client.

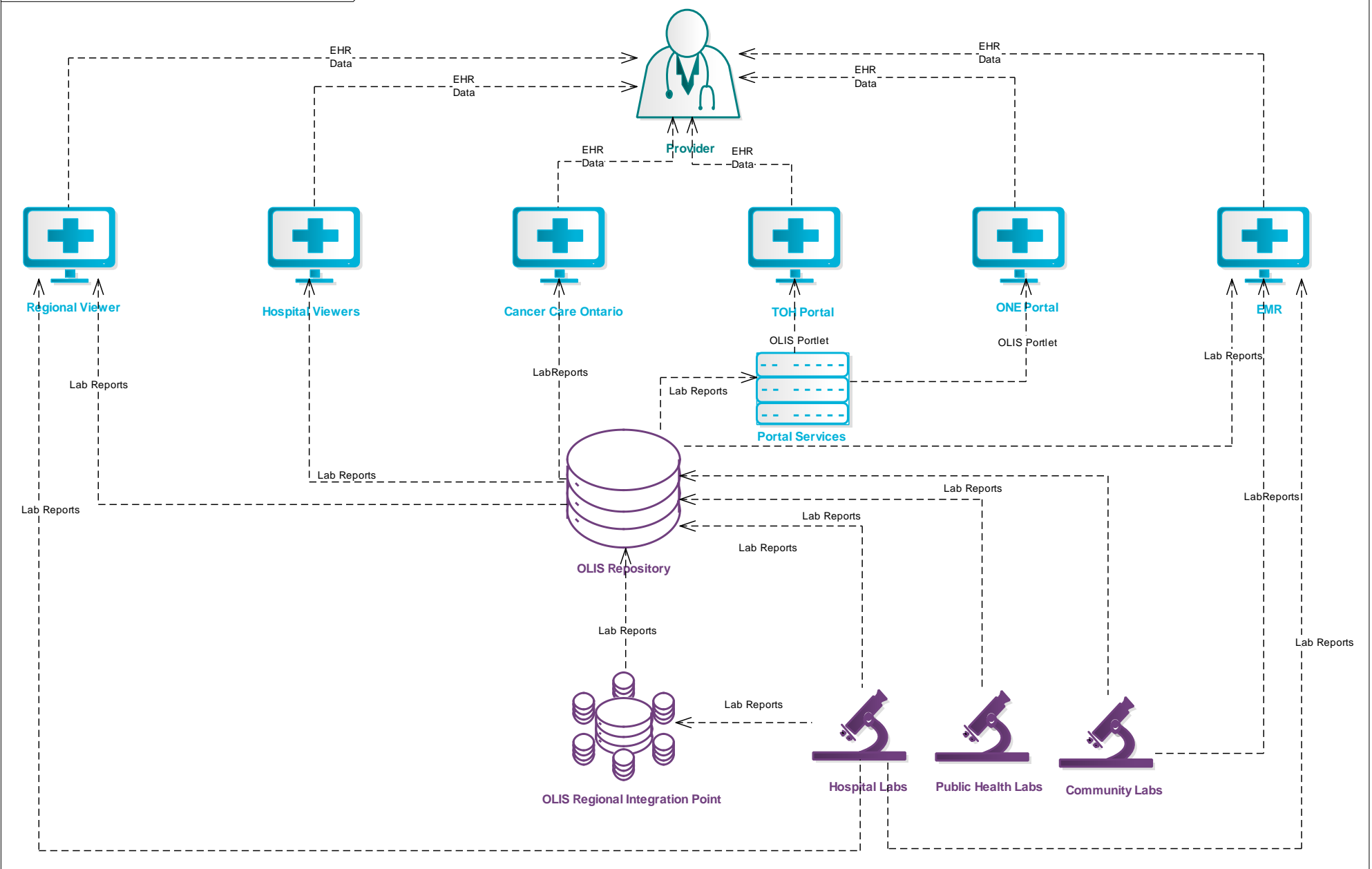
Actor/System	Icon	Description
Hospital/HIS		<p>Hospital information system: a comprehensive, integrated information system designed to manage the administrative, financial and clinical aspects of a hospital. Examples include QuadraMed CPR, Meditech Client/Server, Cerner Millennium, etc.</p>
Laboratory/LIS		<p>A generic laboratory or laboratory information system: may be a community lab, hospital lab, or public health lab.</p>
Point of service device		<p>A generic point of service device such as a desktop computer, tablet, or mobile device: may also be a generic EHR system.</p>

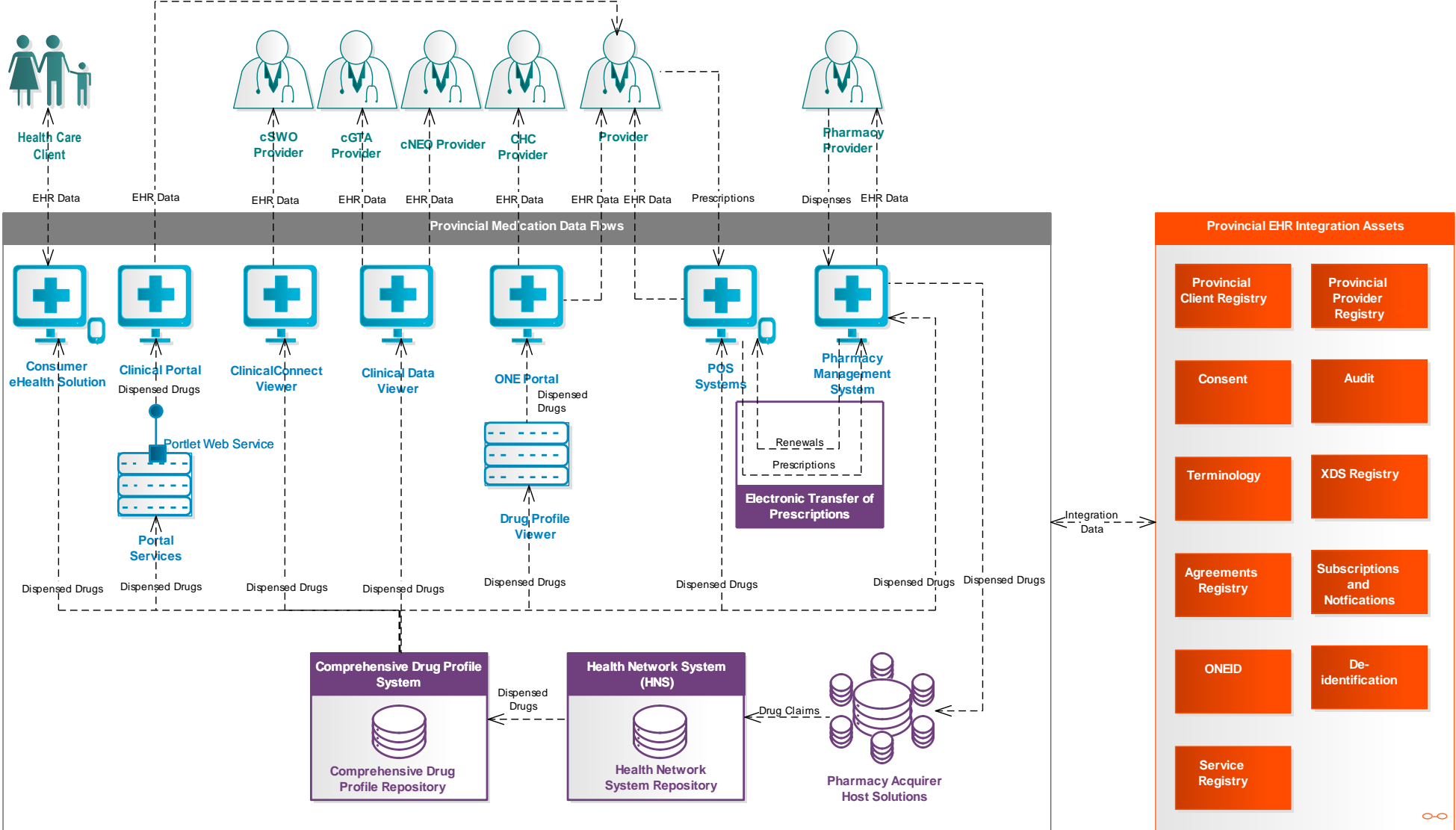
FULL SIZE PIM VIEWS



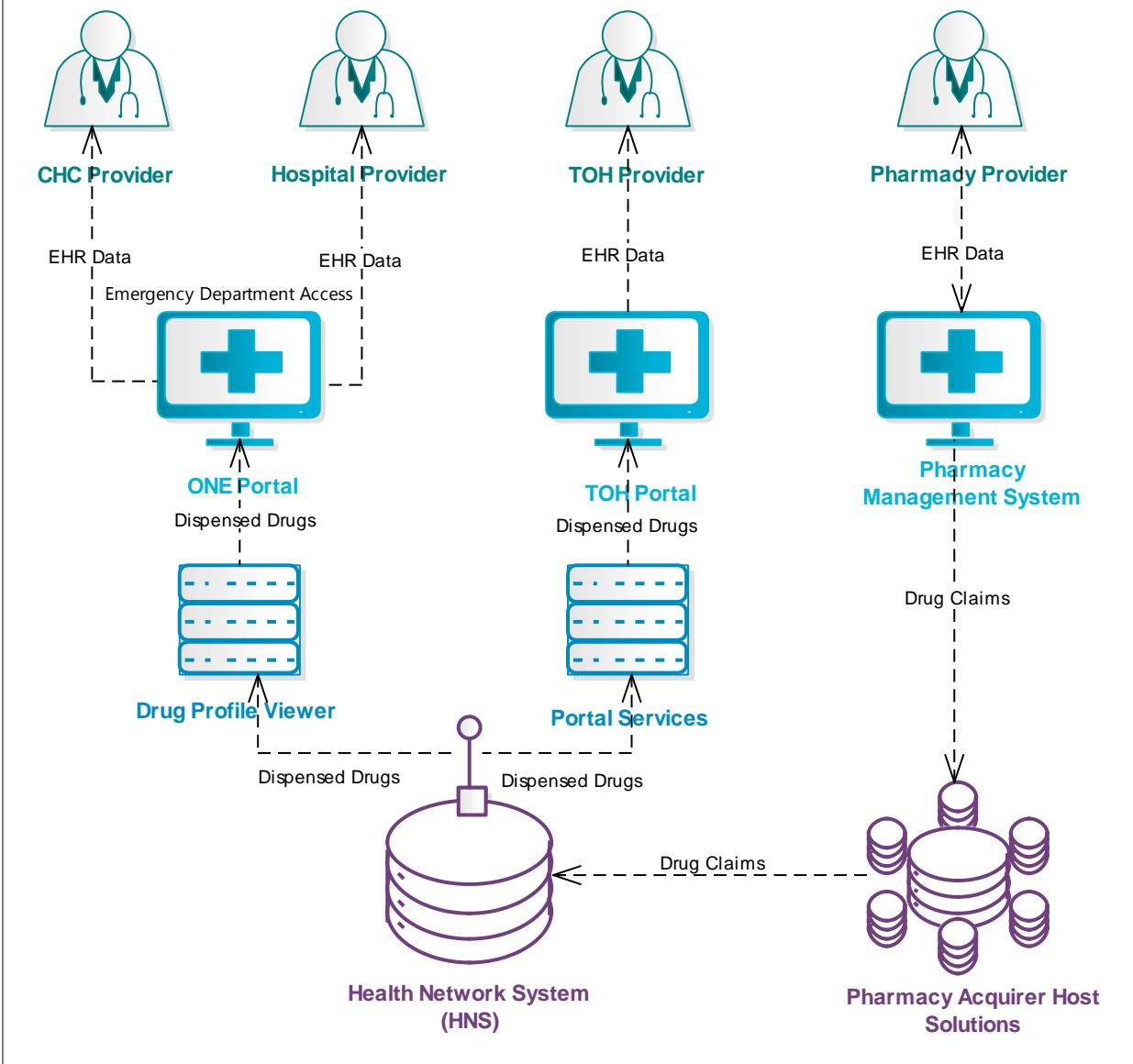


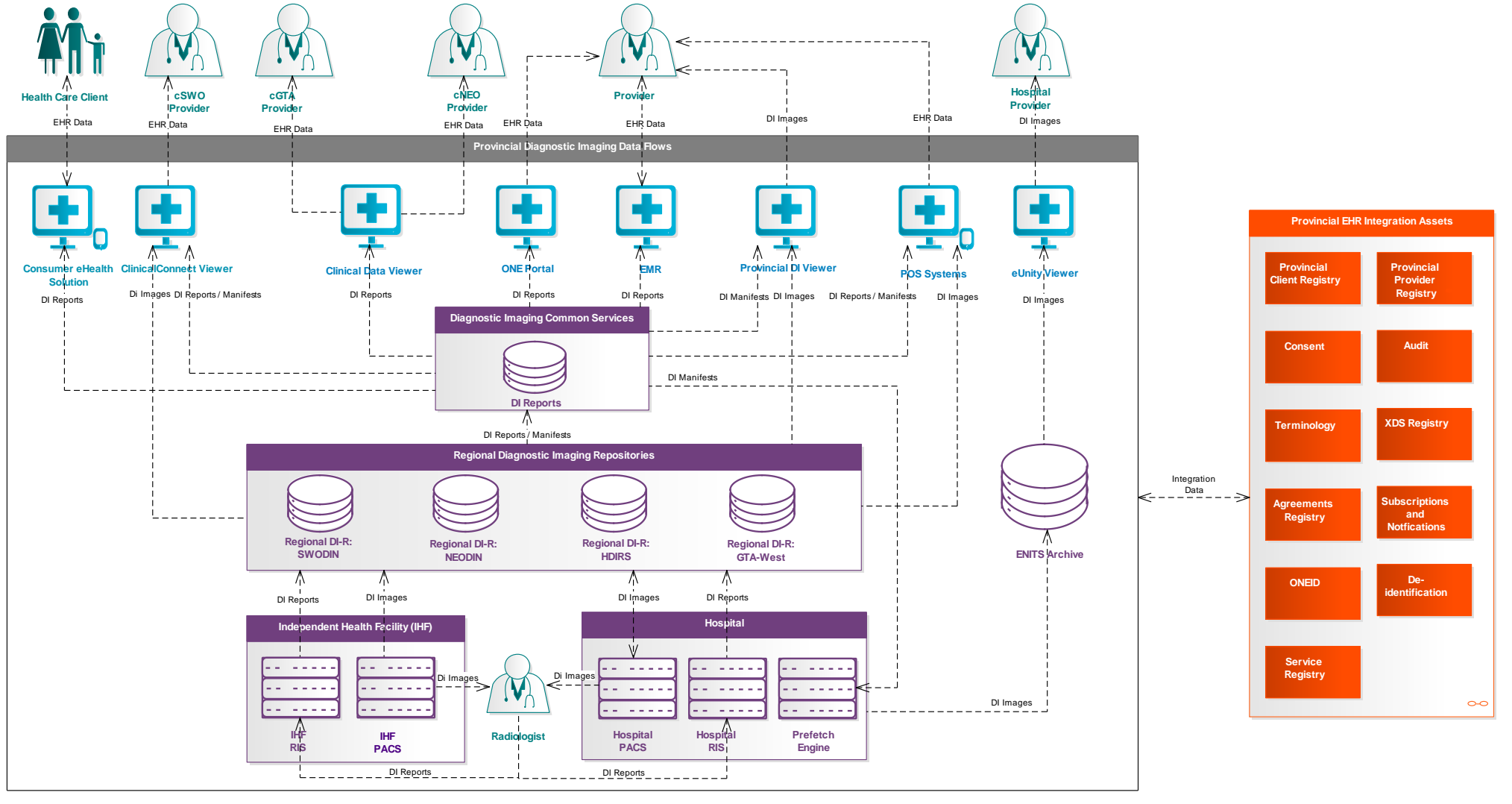


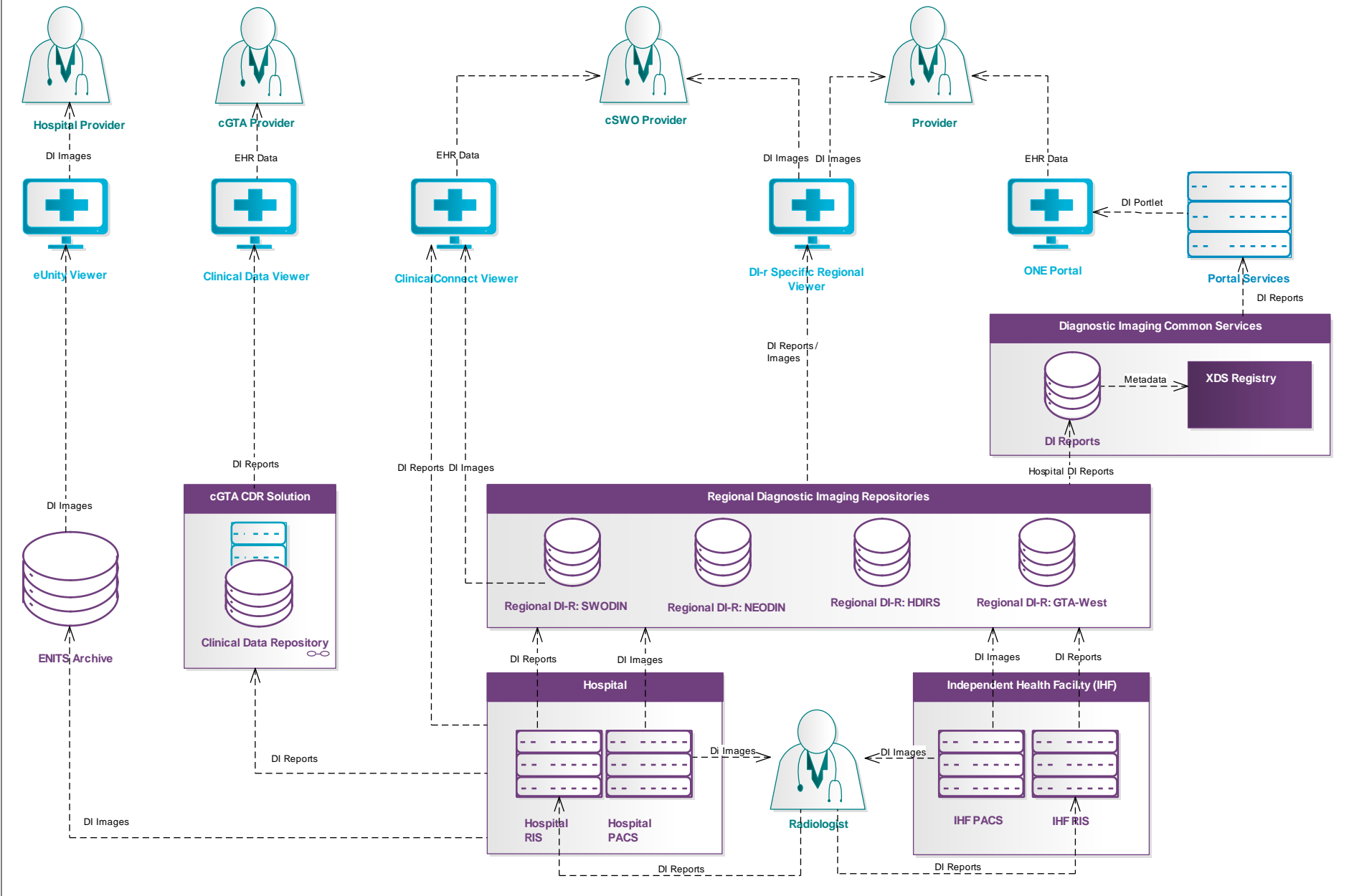


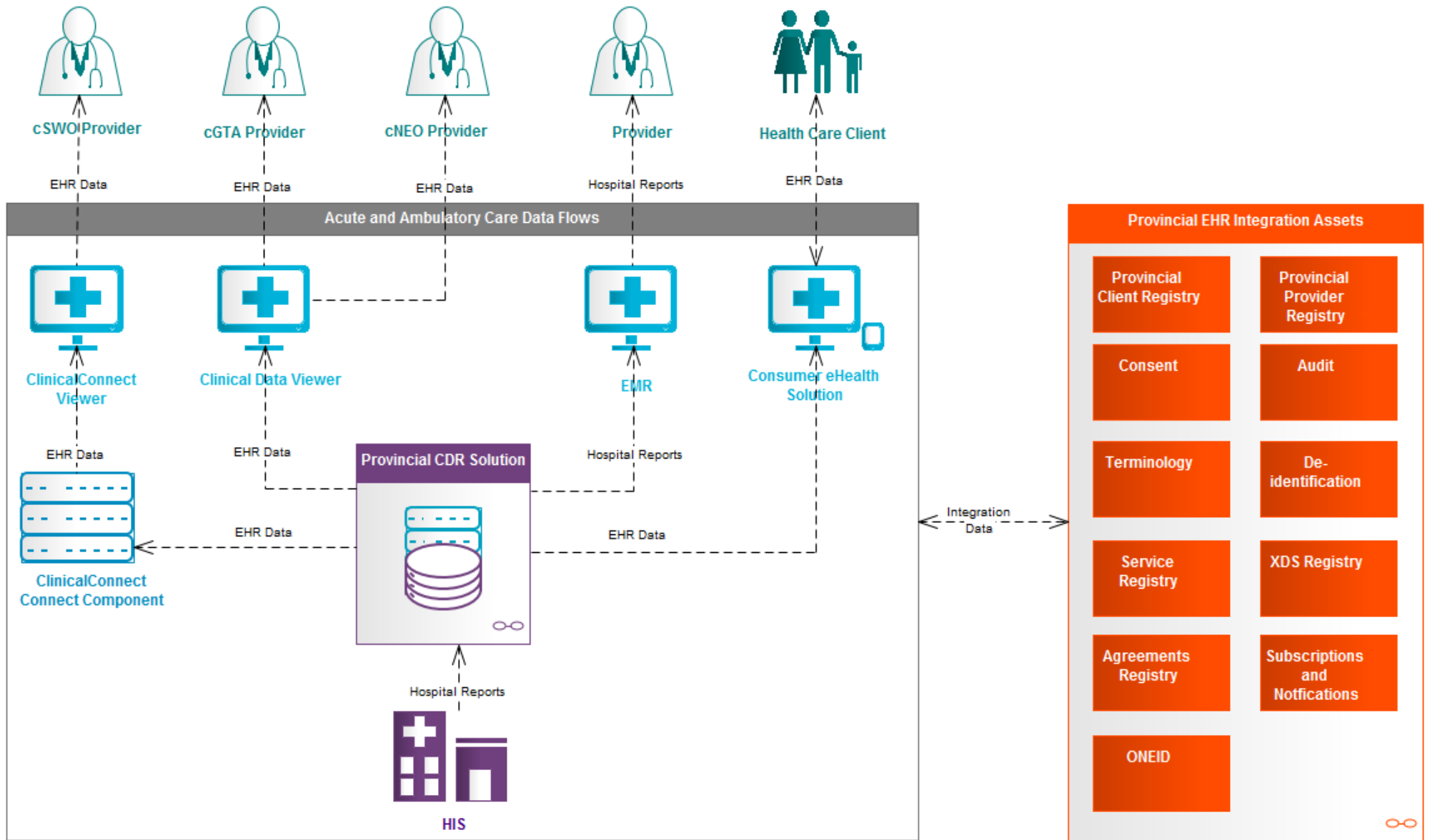


eHO Connectivity Strategy PIM - eHR Medication Current State

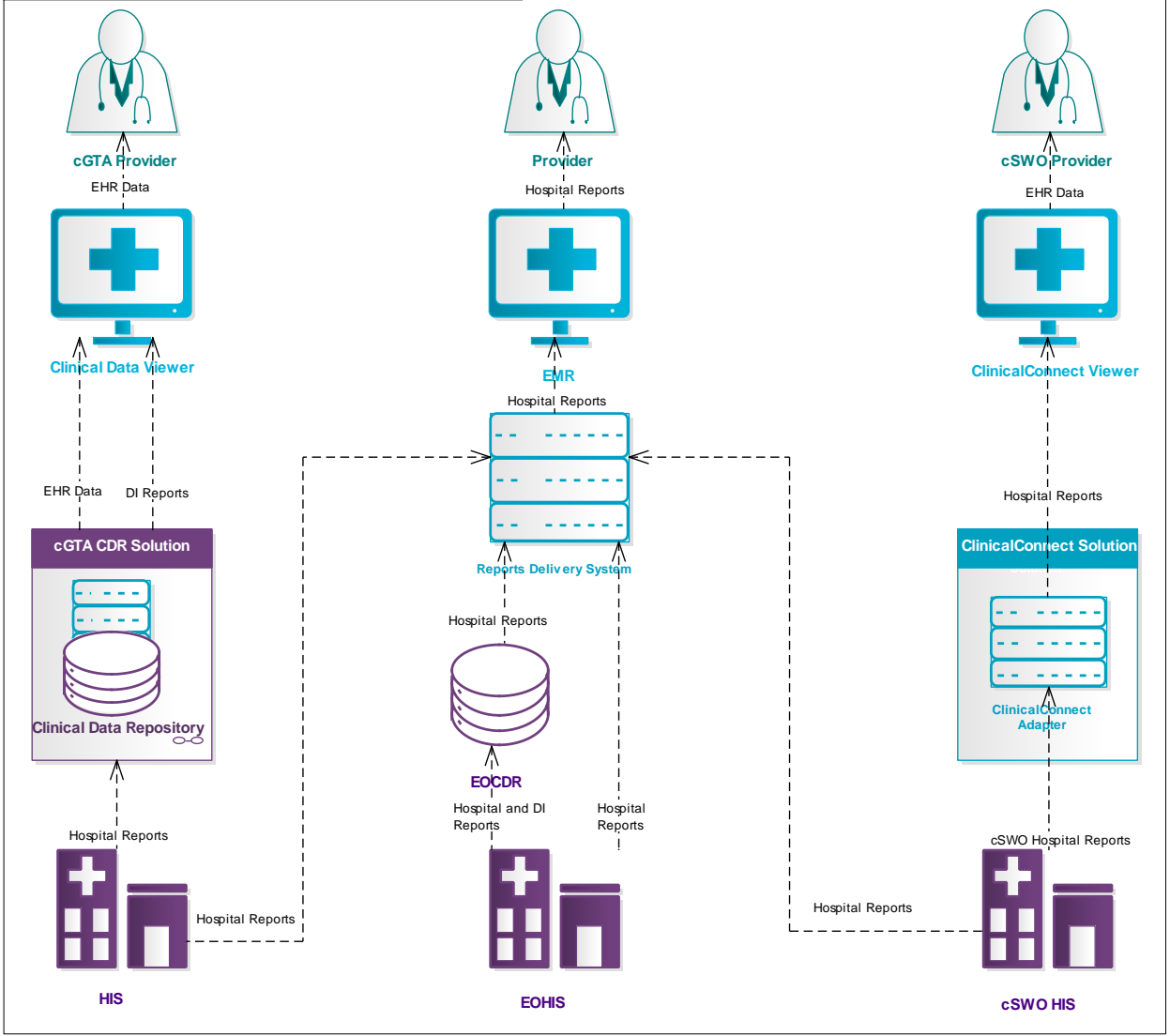


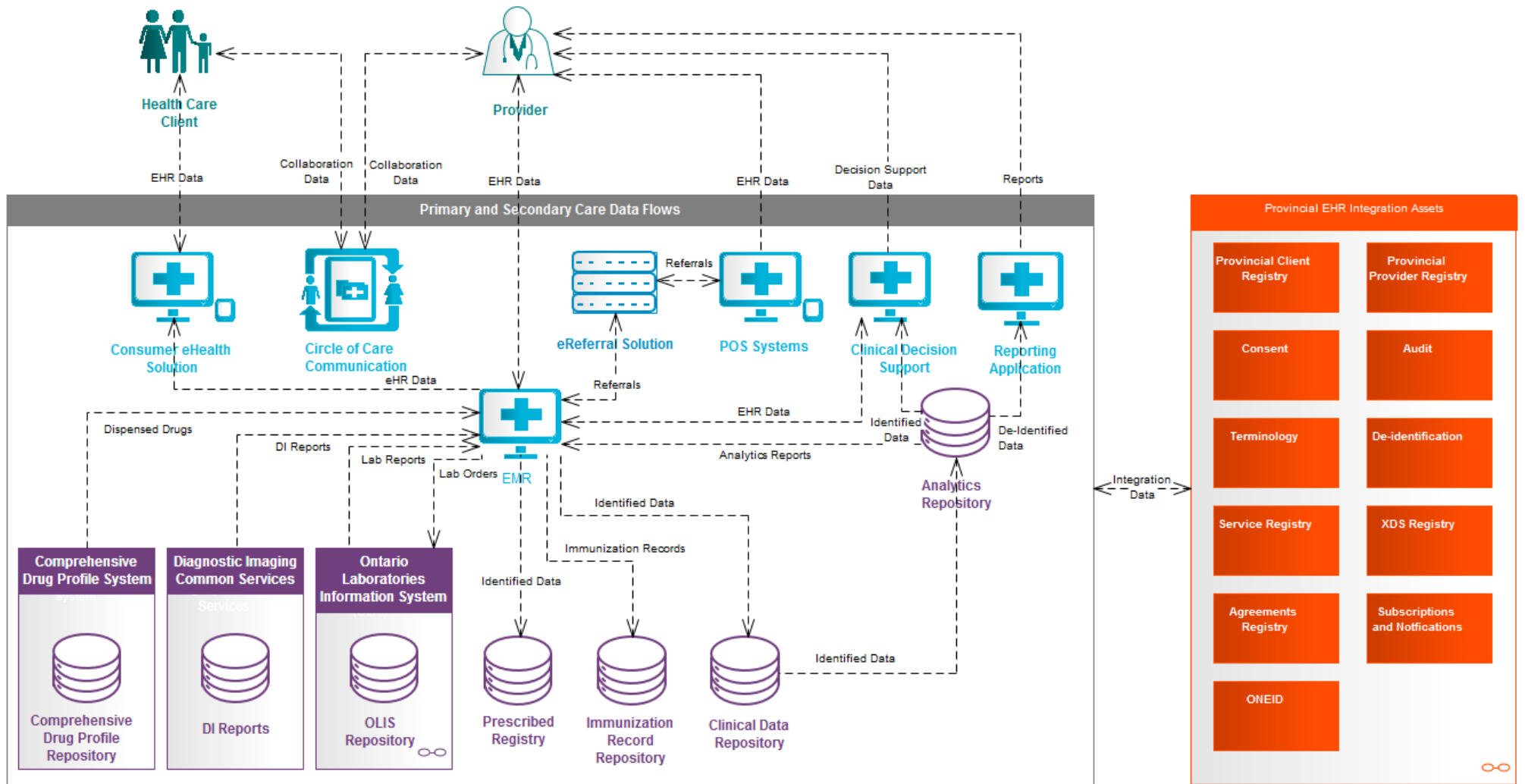






eHO Connectivity Strategy PIM - eHR Acute and Ambulatory Care Current State





eHO Connectivity Strategy PIM - eHR Primary and Secondary Care Current State

