Ontario’s eHealth Blueprint

Narration

The central themes of Ontario’s eHealth Blueprint are connectivity, innovation and a commitment to improve patient care and care outcomes. Through these themes and through collaboration we will deliver Ontario’s Electronic Health Record

The Blueprint sets the architectural scope and context for eHealth and provides a framework for the implementation of Ontario’s Electronic Health Record (or EHR).

Today, Ontario is awash in health information systems; however, most are unable to communicate or share patient information with each other.

The Blueprint seeks to improve that.

The EHR’s goal is to have a well-managed, sustainable, and cost-effective eHealth network. It must also allow patient information to be safely and securely shared with the highest level of privacy. Ultimately it must improve health care delivery and patient outcomes.

In support of that goal, the Blueprint helps Ontario's health care community in the following ways:

- It provides an overarching framework for collaboration and communication among stakeholders participating in the evolution of the EHR;
- It acts as a “map” to assist in planning and delivery of the EHR;
- It supports a governance framework that will ensure high quality, successful delivery of the EHR to the province;
- It establishes a set of standard target architectures to be used by all participants;
- It identifies the foundational components necessary to allow longitudinal patient information to be shared across the continuum of care throughout the province; and
- It illustrates the progress made thus far on each component.

The Blueprint is a provincial asset that was created based on extensive consultation with healthcare providers and delivery partners across the province. Additionally, eHealth Ontario has worked closely with the Ministry of Health and Long Term Care and Canada Health Infoway and healthcare thought leaders to ensure alignment with the national Blueprint.

eHealth Ontario would like to acknowledge all of the input it received on the Blueprint and specifically the input from Canada Health Infoway.

eHealth Ontario recognizes that only through collaboration can an EHR be achievable.

As you go through this presentation, we hope that you too will see how you can contribute.
Let’s begin by examining the challenges of building a Provincial Electronic Health Record.

The health sector in Ontario is a complex and high transaction volume environment.

Ontario is a vast geographic region in which approximately 40 per cent of Canada’s population resides. Information technology within healthcare to serve this population varies dramatically.

As the Blueprint was being designed, the existing environment was examined and evaluated.

The numbers running in the background bring to light the size and complexity of that environment.

There are over 300,000 clinicians in Ontario working within a diverse set of organizations. They create a wealth of health related data residing mainly on local computer systems.

The data is not standardized or accessible on a province wide basis. Patient information is not easily shared.

In addition to these challenges of inter-operability, the province also faces increased health care costs. These costs are arising from an aging population which has high expectations of both the quality and accessibility of their health care.

Notwithstanding these facts, Ontario is well underway in its efforts to deliver an Electronic Health Record.

Significant progress has been made both provincially, through the development and implementation of the provincial registries and repositories, and locally through the development of regional assets and innovation initiatives.

While the central theme of the eHealth Blueprint is connectivity, at the heart of the Blueprint is a commitment to improve patient care.

Information Technology transformation is the bridge for change in the health sector. Providing clinicians access to the right information at the right time can result in faster, more informed, cost effective patient care.

As a patient interfaces with the healthcare system, many episodic interactions occur. These multiple interactions may include specialists, hospitals, pharmacies and other healthcare organizations.

The information that healthcare providers need is not always readily available. Therefore delivering an EHR with a patient-centric Blueprint will be transformational.

As mentioned earlier, the healthcare environment in Ontario is complex. There are more than 150 hospital corporations in the province, over 23,000 physicians and a multitude of health care organizations.

Each may have its own computer system – but most are unable to communicate with each other because they are simply not connected.

Delivering an EHR -- available across the province -- will mean bridging the borders between institutions and providers.
As the applications necessary to create the EHR are built and deployed, eHealth Ontario will continue to recognize the need to be responsive to local mandates within the health care community.

As these challenges were examined, there was careful observation of the gaps which exist today. The connectivity necessary to achieve the EHR requires information to flow between various systems.

Based on the work of Canada Health Infoway, and from the experience of other industries, it is understood that point-to-point connections are cost prohibitive, and too time consuming to implement.

To connect 300,000 clinicians in Ontario, using 13,000 systems, in a point to point fashion is simply not an option.

Enabling connectivity requires integration. And that integration will benefit providers and patients, the health system overall and reduce point-to-point connections between systems.

Achieving this connectivity is critical. Until all these pieces of data can be connected, a complete view of the patient health record cannot be seen. And clinicians will not have the tools they need for the delivery of faster, more coordinated care.

Every day hundreds of thousands of people interact with the healthcare system.

As people move through the system, they leave a bit of themselves behind.

Here’s our current reality:

Every interaction with a doctor, a hospital, or simply a pharmacy ... creates data.

- There is limited consistency in how this information is being captured.
- Interactions and the information received may be similar but fragmented.

A consistent, standardized approach is required, regardless of the back-end systems providing this information.

The Blueprint offers a pragmatic approach to this challenge using methods such as:

- data aggregation
- master indices
- provincial standards and
- common services for data access and presentation

The Blueprint establishes how this data will be brought together -- not by connecting individual systems -- but by creating a set of common services shared by all systems.
As the Blueprint was being designed, a clear need for central registries and repositories that are timely and accurate was reinforced.

The data in these must be available in a private and secure manner whenever it is accessed.

With the need identified for central registries and repositories, several important hurdles need to be overcome. To address these, the Blueprint establishes a number of principles to ensure transparency, consistency, accessibility, security, privacy and availability.

These hurdles are analogous to those faced by other industries.

For example, advancements in the financial industry are, today, often taken for granted.

But achieving services like online banking, Interac, or the ability to use a credit card anywhere in the world, was a difficult and slow process, taking many years to achieve.

Data was not consistent from organization to organization. The industry had to create consistencies in order to interoperate.

The banking industry also had to deal with the existence of legacy systems.

But the biggest challenge the industry dealt with was that of security and privacy.

Our financial and health information are both considered highly personal, and must be well protected.

Healthcare today is dealing with the same challenges other industries have faced previously.

The good news is that their investment and experience can be leveraged to expedite health care’s journey to automation and secure information sharing.

As with other industries, there are foundational pillars that must be respected.

In health care these pillars are:

- Connectivity and Integration
- Security
- Privacy
- And Governance

The Connectivity and Integration pillar is critical to enabling data to be shared seamlessly across the Province. This pillar led to the establishment of
- Provincial Standards
• a Service Oriented Architecture (or SOA)

• and the need for an Enterprise Service Bus, as key elements of the Blueprint.

The Security and Privacy pillars are inter-related. Security protections provide the means by which the privacy of individuals whose data is stored in or shared by the EHR is protected.

Patients’ privacy is respected and maintained through the implementation of privacy practices and security protections.

Specifically, mechanisms such as encryption, access control, management of consent directives and audit logging and alerting ensure that privacy is embedded in the primary design. These ensure that only authorized persons are permitted to access and use the Personal Health Information stored in or shared by the EHR.

The Governance pillar addresses how the Blueprint will be orchestrated.

For an inter-operable EHR to achieve maximum benefit, the province needs to ensure that access to the provincial repositories and registries is highly available. It must also meet the demanding transaction volumes of Ontario. And all of this must be done in accordance with privacy standards and appropriate patient consent mechanisms.

To this end, the EHR must deliver on a number of requirements:

1. It must be available to all authorized users at any location, 24/7/three hundred and sixty-five days a year

2. The transfer of information must be timely to ensure clinicians have access to the most up to date information

3. It must embed privacy controls into its design to ensure data is automatically protected at all times.

4. The environment must support the highest standards for privacy and security of the data

5. It will make use of “Provincial grade” exchange hubs. These best in class systems have been proven in other industries --such as the financial sector. These hubs will take advantage of eHealth Ontario’s high availability network

6. It must enable business process transformation and ensure that the complex privacy requirements of this environment are addressed

7. It needs to be scalable and robust enough to handle the hundreds of millions of healthcare transactions that occur across the province, and

8. Its information must be accessible to all citizens of Ontario

This undertaking is about building scalable and robust systems that will offer access not only to the 300,000 clinicians across the province, but also to the 13 million people who call Ontario home.

The Blueprint’s approach is to foster an environment in which many partners can innovate and share their services.
The province has numerous valuable assets and a great deal of talent, scattered across its health care institutions. The province needs to be able to evaluate these assets and ensure that -- where appropriate -- components of the Blueprint are filled by what currently exists. Because the Blueprint acknowledges the myriad of valuable, existing systems, it does not call for a wholesale change in the environment. Many other industries have successfully used the same approach to solve similar problems. What appears as seamless integration of financial institutions does not mean that homogeneous systems exist in the background. Legacy systems are everywhere, and those legacy systems are here to stay. The Blueprint establishes more than just a conceptual design for the delivery of the EHR. It identifies how the agency will partner with stakeholders to create a federated system. It elaborates on components that must be in place, such as governance, to ensure that this will become a reality. Therefore the Blueprint is not just an architectural, conceptual design; it’s also a delivery partnership model. It identifies that it is necessary to have partners, to leverage the tremendous talent available in this province. At the core this is not about reinventing the wheel. It is about leveraging assets that presently exist and integrating and connecting the province. Only where there are gaps or “white space” that needs to be filled in, will new assets and capabilities be deployed.

The Blueprint vision of the future is “anytime, anywhere access to patient health records in accordance with privacy standards and with the consent of patients”.

Achieving this vision will be a challenge. But one thing is certain: If success is to be attained, all of the province’s existing assets and skill sets must be leveraged. Everyone within the health care system will need to work together. In recognition of this fact, the Blueprint maps out a framework for collaboration and innovation at all levels. The Blueprint’s sets out a federated implementation model, which allows many parties to build at the same time. It identifies standard architectures that demonstrate how everything comes together and interoperate, while protecting patients’ privacy. It builds privacy requirements and security controls into the architecture of systems and business practices to comply with privacy laws. It identifies standard architectures that demonstrate how everything comes together and interoperates.
It is an open platform for innovation, giving eHealth’s delivery partners and vendor community an opportunity to look at it and determine how they can best contribute.

It assumes strong, carefully orchestrated partnerships for collaboration.

These investments should:
Reduce costs and redundancies;
Accelerate the pace of both development and implementation and
Improve speed and access to information.

To appreciate how this multi-layer network of systems will work; the following series of diagrams illustrate integration at the highest level.

This infrastructure will allow people to connect to applications and services provided at either the provincial layer, or at one of the regional hubs.

On the left side of the diagram, are the consumers of the system, the clinician community across the province.

The first layer of the Blueprint (in orange) supports Point-of-Service Applications, such as a hospital’s patient record systems, EMRs etc.

The next layer (in green) provides for applications to be developed by regional hubs.

The third layer (in blue) is used for province wide applications implemented by eHealth Ontario itself.

All three layers adhere to consistent standards for privacy and security.

A strong governance structure helps ensure alignment to the Blueprint, including consistent use of common services.

The common privacy and security services provide for one time authentication and ensures that the users only see information they have the right to view.

This streamlines access to applications as users only need to make a single connection to access data.

Many capabilities are being created by eHealth Ontario and regions within the province through the components identified in this Blueprint.

Although development takes place in parallel at the various layers, well-defined governance provides the discipline to help ensure that applications are implemented quickly without creating redundancy.

The Blueprint identifies a set of common services that will be consistently used by the provincial layer and regional hub layer.

Technology and processes are then put in place to ensure everyone can benefit from these common services.

The top layer includes point of service applications such as: Electronic Medical Records, hospital systems, Panorama for public health, and so on.
Some of these are custom developed while others are commercially available. They may be heavily modified for the environments they support, but they are still a very key component of connectivity.

These “point-of-service” applications must be able to connect to the integration hubs and be able to expose the information within them.

The middle layer is a new layer that has been defined by the Blueprint and it’s where the majority of innovation will take place.

This layer is where the magic happens.

Here old systems will get renewed life.

As was mentioned previously, it is important to leverage the work of the past to integrate where possible and only build new networks where necessary.

The middle layer creates the opportunity to make this a reality.

This layer is often referred to as the eHealth Hub Services and includes the Health Information Access Layer -- the Enterprise Service Bus for Ontario -- Clinical Document/Data Repositories (or CDRs), regional portals and other capabilities.

This layer of the Blueprint will be fulfilled by three regional hubs, each developing applications for either their own geographic areas or even for province wide consumption.

Each regional hub has access to its own infrastructure that includes an eHealth-standard middleware layer with an Enterprise Service Bus.

The regional hubs can implement applications in parallel while adhering to the Blueprint principles and architectures.

As strategic delivery partners, they also consume common services that apply across provincial applications.

The infrastructure to support this layer of the Blueprint is the Health Information Access Layer and will be built in four segments.

They are: cGTA [pronounced see-gee-tee-eh] (connecting the Greater Toronto Area), cNEO [pronounced see-nee-oh] (connecting North & Eastern Ontario), cSWO [pronounced see-swo] (connecting South West Ontario) and a provincial Health Information Access Layer.

Together these four hubs will create an integrated Health Information Access Layer across the province connecting clinicians, registries and repositories, and other health information data sources.

The first of these hubs, which is currently being built, is cGTA.

- As in banking, where your Interactm card allows you access anytime, anywhere with a secure and private connection -the Blueprint envisions similar connectivity for health care information.

The agency will also look to these regional hubs to build regional CDRs.

There are many documents kept within the walls of hospitals to which the community needs access, such as discharge summaries.
It would take too long to build a central repository and align everyone.

It is more efficient and effective to deploy the CDRs in regions and allow the eHealth Hub Services Layer to provide this information where care happens.

This approach is similar to the agency's previous deployment of the Diagnostic Imaging Repositories -- which has been extremely successful.

The value in establishing these regional hubs is two-fold.

First it fosters innovation and second it delegates responsibility to the people who are best able to provide it.

The role that eHealth Ontario will play is to ensure that standards and interoperability are adhered to. Too much rigidity and centralization will stifle innovation -- and that is not an option.

As an example, there appears to be a plethora of portals across the province.

The Blueprint calls for the creation of four primary portals that have the same look, feel, and navigation, but different content.

One of the portals will be provincial and will give access to provincial information.

The three remaining portals are regional and provide the regions their gateway to the EHR.

The bottom layer includes the provincial registries, repositories, and other province-wide capabilities.

For example, the Ontario Lab Information System (or OLIS) is the central repository for laboratory information for the province.

It is populated by both public and private laboratories.

The Enterprise Master Patient Index -- or EMPI -- provides a central place to uniquely identify each person.

And a Consent Registry will allow individuals to control access to their information.

The data contained within these repositories is maintained in accordance with privacy laws and best practices.

For many, the patient experience within the health care system can be best described as episodic.

From a patient workflow perspective, 80 per cent of health care transactions begin with an initial visit to a primary care facility within the community -- either a family doctor or a local clinic.

It then proceeds through a series of referrals to specialists, acute care facilities and other diagnostic centres for further tests and treatment, or to a pharmacy for prescription medication.

These referrals generally occur within defined geographic regions.
Most of these acute care facilities have systems for information and discharge summary coding, and more often also have Electronic Health Record applications where richer information is kept for every patient.

The Blueprint allows portal solutions to pull data “on demand” from different connected facilities to create a consolidated view of a given patient’s clinical profile.

This leads to an act-on-demand paradigm for clinicians.

eHealth Ontario is committed to embedding the Privacy by Design Principles advocated by the province’s Information and Privacy Commissioner and has put in place a provincial privacy program.

This will enhance and expand the organization’s culture of privacy and set the stage to ensure stringent privacy practices on all components of the provincial EHR, including those developed and implemented by our delivery partners.

By creating an overarching, standardized set of security and privacy practices -- innovation can then be safely accelerated as privacy and security have been embedded into the solution. The result is that user privacy is protected whenever data is shared by or stored within any component of the provincial EHR.

Connectivity and integration are among the many components which underscore the provincial EHR.

The provincial Health Information Access Layer consists of 4 physical enterprise service bus components implemented as one logical entity. All of the enterprise service buses conform to a common set of standards to ensure application portability.

One can think of this approach as building one highway with 4 lanes on which cars can move freely between lanes because all lanes have been built to the same specifications.

The Provincial Health Information Access Layer will be the gateway to the province’s central services and be in conformance with Canada Health Infoway standards.

The three Regional Health Information Access Layer -- cGTA, cSWO and cNEO -- will be the gateway to regional services.

To ensure interoperability these will all conform to a consistent and interoperable technology stack.

Structured collaboration between eHealth Ontario and the 3 regional hubs will support sharing of good practices and adherence to standards.

From our analysis of the successes and failures of eHealth initiatives in various jurisdictions around the world, it is clear that well established and effective governance are crucial to success.

eHealth Ontario is committed to applying these learnings to the deployment of the provincial EHR in Ontario by establishing a strong, effective and efficient governance program.
We recognize that we must establish clear responsibilities to empower people, measurements to gauge effectiveness, control mechanisms to ensure compliance and deliver on commitment to keep all parties informed.

Work to support this is already underway. In close collaboration with key leaders in the province the Blueprint is establishing a pragmatic, yet effective, governance program for delivery of EHR for Ontario.

This slide identifies the life cycle for health care delivery in the province and also highlights the patient’s journey through the health care system.

Once the EHR is fully available, clinicians will be able to provide more consistent, organized and holistic care due to the timely availability of longitudinal data.

There is a responsibility to ensure that the data is secure, and that it is used only by those who need access to it, based on established policies.

In this way the EHR will become a foundational element in transforming the patient’s journey.

The focus of the EHR remains on patients and care providers.

The Blueprint defines a pragmatic approach for managing this data complexity. It makes use of data replication, master indices, provincial standards and common services for data transmission.

It ensures that key data required at the point of care is consistently available, current, private, and accurate.

In its role to foster connectivity and interoperability, the Blueprint will rely heavily on the adoption of standards.

Interoperability standards are still in a fledgling state in health care and this poses a significant challenge to achieving the full benefits of the EHR.

eHealth Ontario’s commitment is to set common interoperability standards and encourage their use across the province through an effective and efficient governance process.

The use of standards allows for the adoption of an open architecture.

It is by putting in place the various standards such as messaging, terminology, and proper nomenclature that the EHR will become an open platform capable of sharing information seamlessly among the various systems, of which it is comprised.

The Blueprint is tightly aligned to the province’s business objectives and the underlying technology platform supporting it.

Therefore, the Blueprint identifies the linkages between the conceptual business layer and the corresponding technology layer of the architecture.
The critical role that the information architecture plays is addressed with a focus on data quality, integrity and standards.

Achieving the full benefit of the EHR is not just about implementing technology, it requires a fundamental shift in business processes.

To fully achieve the vision and value of the EHR, clinicians may need to alter their business processes to incorporate electronic health records.

Knowing and better understanding what is happening in the environment -- and better understanding the information -- will assist in the provision of care by clinicians and reduce duplication in the system.

Therefore the purpose of the Blueprint is to take a holistic view of the architecture at an enterprise level, identifying technology, business, and information that will bring the EHR to fruition and transform the health sector.

The Blueprint is predicated on the belief that a federated approach is required.

Partners are necessary, especially at the community level to fully understand the environment.

Over 80 per cent of care happens in the community and the community is not connected.

The current state of the sector varies dramatically:

- From sophisticated hospitals with a lot of information and state of the art technology
- to disparate legacy information systems that are unable to communicate with each other
- Sole practitioners that are not connected
- To organizations in the community with various levels of technology or capacity.

The availability of the EHR to practitioners across the continuum of care will bridge the knowledge gap and provide the community with better tools and information to care for patients.

This placemat is a visual representation of the Blueprint and may be downloaded from the eHealth Ontario website.

The intent is to convey in a single diagram all the ground we have just covered.

This presentation is a summary view of the Blueprint.

There is a great deal of documentation which describes and elaborates precisely how the EHR will be developed and deployed.

This information is also available to delivery partners, vendors and others who wish to explore the details and to understand how they may contribute.
Now that a high level tour through eHealth Blueprint has been completed -- be assured that the Blueprint is thoroughly planned -- but it is not thoroughly prescriptive.

Delivery of the EHR is not a single event.

There is no magical date when a switch will be turned on.

The magic comes from the deployment of federated, local solutions that become integrated and connected through standards, technology and a great deal of hard work and dedication.

Elements of the EHR will be delivered incrementally as they become available in a succession of well-defined milestones to be accomplished prior to.

Let’s look at some of the exciting accomplishments that are currently underway.

The province will be moving from a one-by-one system integration, to an Health Information Access Layer-based integration of systems, connecting a myriad of systems and clinicians across the province.

We know building multiple capabilities, multiple times in a redundant manner is not an efficient use of time, resources, or funds.

An orderly execution for this Blueprint is required.

It will be highly orchestrated but extremely open in terms of its architecture and principles.

This will result in delivering and reducing the cost of ownership while increasing the speed of deployment by working together.

However the speed of deployment needs to be accelerated.

At a regional level, a regionalization or “hub” concept has been championed by eHealth Ontario.

In partnership with eHealth Ontario, three regional hubs have been formed based on business drivers.

This is a cost-effective approach to implementing regional integration services.

The first regional integration hub project is the connecting GTA -- or cGTA -- with a combined population of approximately six million -- or 48 per cent of Ontario’s population.

This region is served by a large, diverse, and complex set of approximately 700 health care providers and services.

Currently in the build and implement phase, cGTA will create a shareable infrastructure via a regional segment of the Health Information Access Layer and a portal framework.
cGTA will use common services integration, granting users access to eHealth Ontario solutions/repositories such as the Ontario Laboratories Information System (OLIS) or the Provider Registry and Client Registry. A Clinical Document Repository (CDR) will also be created; giving users shared access to a collection of discharge summaries, notes on patient consultations and other hospital diagnostic reports. Finally, the cGTA project will implement a shared provider Portal, to act as the front-end access point to the cGTA Health Information Access Layer and CDR.

cGTA will then be well positioned to support the development of Personal Health Records.

As cGTA has moved to a build and implement phase, regional planning outside of the GTA has been accelerated. Leveraging the lessons learned of the cGTA project, Connecting South West Ontario (cSWO) and Connecting North and East Ontario (cNEO) have been formed.

These hubs will also create the shareable infrastructure necessary to complete the EHR across the province, by building and implementing a regional segment of the Health Information Access Layer, as well as a regional CDR and Portal.

In order to ensure the interoperability of the provincial EHR the province needs to enable the Health Information Access Layer, which is the middleware layer.

This allows for the integration and access of the provincial repositories and registries in a high availability, high transactional environment anywhere in Ontario.

In addition this environment must ensure privacy and security of data at the highest level.

The Health Information Access Layer will provide a well-governed transaction processing and application environment.

It will be built on the principles of Service Oriented Architecture, to allow messaging to flow in a standard way between disparate e-Health IT systems, to provide access to provincial e-Health domain repositories and line of business applications.

The Health Information Access Layer sits in front and hides the mechanics of e-Health repositories, registries and other core applications.

The key concept is that e-Health services are defined by a consistent set of business interfaces (for example Return Lab Result) that remain stable over long periods of time.

The technologies which implement these interfaces are less permanent and so the Health Information Access Layer is designed to allow the business interfaces to be maintained independently from the underlying technical implementation.

Once complete the Health Information Access layer will form the foundation for delivering the EHR for clinicians across the province.

It will become the exchange hub of the information maintained at both the provincial level and at the regional level for 200 hospitals, CCACs, CHCs and other health service providers across the province, connecting the multiple systems used by these institutions.

How will all this be achieved and supported?

A governance structure is being established that will allow everyone to participate and deliver on the provincial EHR vision.

Capacity building and targeted funding are both crucial to success.

There are finite resources available, and the province needs to build capacity in the areas of technology and process.
This approach will leverage capabilities of delivery partners and the vendor community, to maximize both impact and efficiency for the healthcare community as a whole.

To bring about some of these changes, there are currently five parallel bodies of work underway.

The logical architecture is being developed to complement the conceptual design. It provides more detailed specifics for developing the technical solutions.

The assets across the environment are being reviewed. These include assets with healthcare delivery partners, hospitals, healthcare agencies, laboratories and assets within the regions.

An EHR Roadmap is being created which will define the timelines for development and deployment of all EHR components.

The communication and training material are being created to support the overall program to connect Ontario.

In closing, the EHR is like a city of the future.

Every city relies on an infrastructure consisting of highways, water, electricity and transit lines.

In a similar vein, the Blueprint has made provision for the same foundational infrastructure to build the new world of the EHR.

As this is being enabled, it will nurture innovation, create a vibrant community and connect all the different parts in this future EHR city.

This is about ensuring the right access -- to the right information -- to the right people -- at the right time.

There is no question -- These are bold objectives.

But with many of the building blocks already in place -- and the level of innovation that exists in our partner community -- they are achievable.

Ontario’s eHealth Blueprint makes this vision a reality and is a call to action for all of us.