eHealth Ontario submission to Ed Clark

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eHealth Ontario's journey in delivering the provincial EHR

More than a decade ago, when governments began looking at how to best utilize digital technologies to improve the delivery of health care services to patients, the health information systems being built were largely decentralized and used different technologies and platforms. In Ontario, thousands of systems across the province contained billions of records, many of them still on paper and locked in file cabinets. These documents could not be shared, nor easily accessed when doctors needed information to care for their patients. Faxes, mail or phone calls were the only ways to exchange medical information, though in other industries, like banking and retail, consumers were becoming accustomed to doing business on-line.

eHealth Ontario's mandate is to deliver a comprehensive, patient-focused, secure and private electronic health record (EHR) system for Ontarians. Given the thousands of systems built for many different purposes, linking the most critical ones together into a federation of systems has been the journey of the last seven years.

The ability to use technology to deliver better health care is a key enabler in support of the Minister of Health and Long-term Care's Patients First strategy. The 2015 arrival of the Patients First strategy, supported by a renewed focus at the Deputy Minister's Digital Health Board on how technology can support its delivery, has provided eHealth Ontario with the direction needed to prioritize and deliver its work. At around the same time, the Board of Directors recognized the need for renewed executive leadership at the agency to help it (and government) deliver the maximum value of the agency's many assets to support the Minister's transformation agenda and appointed a new CEO.

Health Quality Ontario has established measures by which the performance of hospitals, LHINs and doctors are assessed. These outcomes are the ones that tell us if we are doing a better job treating patients and spending money wisely, and can only be achieved using the tools technology provides – in order to achieve better, safer patient care at a more affordable cost. This is the heart of the Minister's transformation agenda, the focus of the Deputy Minister-led digital health strategy, and the grounding lens through which all eHealth Ontario work must pass to be prioritized among hundreds of competing projects.

What is an EHR?

An EHR is a secure, private and up-to-date record of an individual's medical history that can be shared electronically by authorized health care providers. It gives a patient's health care team, including family

doctors, nurses, emergency room physicians, Community Care Access Centres and long-term care homes, real-time access to a patient's most critical medical information so they can provide the best possible care.

For example, if a patient goes to their family doctor not feeling well and bloodwork is ordered, and then that patient ends up in hospital a week later when their condition worsens, the emergency room can use the EHR to call up the lab reports, avoid repeating the same tests, and begin treatment more quickly, with all the facts in hand. When that patient goes home, their discharge report is also available to their family doctor or any Community Care Access Centre. This is not a theoretical model. It is what the EHR does today for millions of patients.

In order for an EHR system to work effectively, clinicians, hospital departments, labs and other organizations involved in patient care, have to *contribute* data to the system so that all of a patient's key records are available. Authorized users also have to be able to *access t*he data when it's needed to treat a patient, whether in a doctors' office, a hospital clinic or a long-term care facility. An end goal of any EHR is that patients will have access to their own information and eHealth Ontario is ready to assist in building that final bridge to full patient engagement in their own healthcare.

The EHR system in Ontario is made up of a number of a fundamental elements:

- Databases, called repositories, to store patient information, such as lab results and diagnostic images, like x-rays or ultrasounds.
- A secure network over which the data is securely collected and delivered.
- Integration technology to allow hospitals, community care organizations, and individual practitioners to contribute their data to the EHR without having to invest in new technology.
- Identity management, consent management, monitoring, and cyber security technology to ensure sensitive health information is kept secure and only authorized individuals can access patient data.
- Access channels such as clinical viewers or points of service such as electronic medical record software in a doctor's office or a hospital IT system through which authorized users can access data.

All of these foundational elements are now in place, and the work ahead is to bring in more data, connect more sites, streamline the technology that supports all of these systems, enhance how sophisticated and fast these systems are so they always meet expectations, and run all of the systems on a 24/7 basis. eHealth Ontario, with its many partners, has set up and maintains the necessary repositories, which include receiving, sorting, and then storing billions of lab results, diagnostic images and reports, hospital admission and discharge information, immunization data and more.

Medical records are captured, secured, stored, and delivered utilizing both the OneNetwork private network operated by Hydro One for eHealth Ontario as well as secure internet connections. The collection and delivery of the data to clinicians through various access channels is orchestrated by the 'connected backbone' or HIAL (health information access layer).

These secure systems connect health organizations and sole practitioners across the province to the repositories, all anchored by solid security and privacy protocols that must be met before a site is connected. Authorized clinicians can view patient data in a variety of settings, either through clinical viewers, hospital information systems, electronic medical record software in doctors' offices or the eHealth Ontario web portal. The agency supports two 'clinical viewers' of the EHR – the ClinicalConnect viewer used in South West Ontario and the ConnectingOntario viewer used in the Greater Toronto Area and the Northern and Eastern Region. South West Ontario has fully adopted the ClinicalConnect viewer across all health provider sites; the Greater Toronto Area acute and community care access is largely connected, and the Northern and Eastern Region is launching imminently.

The core "build the EHR" commitments identified for the agency in 2010 are now 82% complete and those "build" pieces that are still being finalized will be finished in Spring 2017. The Ontario Lab Information System (OLIS) is more than 90% complete; the diagnostic imaging repository is more than 95% finished; databases that accurately identify patients and providers using appropriate privacy protections are more than 80% complete; and, portals that provide web access to key information are over 98% complete. Data contribution into these assets will continue to be increased in the years ahead. Each year, more projects have been added, either to enhance the core assets, add new services, or to provide 24/7 support to operate the systems as the amount of data and number of transactions increase.

The table below contains a description of the key elements that make up Ontario's EHR.

Key Elements of the Ontario EHR
Diagnostic Imaging Program: secure computer systems that contain patient radiology reports and images such as CT scans, ultrasounds, MRIs, mammograms and x-rays. Includes the Emergency neuro imaging transfer system (ENITS), which allows patients at any of Ontario's 100 acute care facilities across the province remote access to a neurosurgeon 24/7, and the newly launched Diagnostic Imaging Common Service which gives clinicians access to DI reports from anywhere in the province.
Drug Profile Viewer: offers care providers access to the medication history of 2.2 million patients receiving drug benefits from the ODB program or Trillium Drug program
Ontario Laboratories Information System (OLIS): a provincial repository that collects lab data from hospitals, community laboratories, and public health laboratories to enable the sharing of lab data across the province.
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 Network: province-wide telecommunications network that allows health care providers to securely share and access personal care information, using the EHR and its services.
Connected Backbone/ Health Information Access Layer (HIAL): a collection of technologies that together orchestrates EHR transactions, ensuring that they are private and secure, and implementing integration capabilities.

ConnectingOntario program: brings together local, regional and provincial assets and connects existing information technologies to improve patient care. Three regional clusters: the Greater Toronto Area; South West Ontario; and the Northern and Eastern Region work with service delivery partners in their respective areas. Ultimately, ConnectingOntario will enable province-wide information sharing by linking the regions.

Who is and is not using the EHR today

Through its ConnectingOntario program, over the past two years, 85,000 health care providers across the province have been granted access to use the EHR through the two viewers mentioned earlier, and another 20,000 are connected through other channels (such as eHealth Ontario's OnePortal). While 'active use' of the EHR remains at less than 20% of the 85,000 registered users, it is in line with the 20% 'active usage' rate that Canada Health Infoway, the federal agency that is charged with helping create a nation-wide system, has said is reasonable when EHRs are initially adopted – the so-called "ramp-up" phase. To achieve a higher "steady state" usage rate, the agency has embarked on a more ambitious 'adoption and use' plan as it learns more about the how the EHR patient information is being used in different clinical settings. We also know that as more critical data populates the EHR (such as drug data); its value to doctors will grow remarkably. This is expected to happen by June 2017. Then, we will add important data out of primary care doctors' offices to the EHR, which will yet again increase the usefulness of the EHR to even more doctors across the province. This is a big job because of how many vendors and doctors must be engaged to make it work; this is targeted to be accomplished by 2018-19.

Early EHR performance issues, resistance to changing clinical workflows in busy healthcare settings, and a reluctance to acknowledge the added value of the EHR over familiar local systems, are early barriers to high adoption and use of the EHR. Currently 75 % of clinicians can access the EHR in one to four seconds. The agency also faced lags in adoption due to some clinicians' preferences to continue to use their own local IT systems given that participation in and use of the EHR system is voluntary.

The agency has plans in place to tackle the challenges it can control, including more outreach and communications to health service provider sites when the time is right. Many clinicians who are using the EHR say that having rapid access to complete, up-to-date and accurate information puts them in a better position to provide the best possible care. Studies and anecdotal evidence from doctors and other health stakeholders in Ontario show that clinicians value the data included in the EHR and believe it is improving patient outcomes and saving taxpayers money now.

The beginnings of digital health in Ontario

The provincial government began working to digitize health records centrally in 2002 when it created the Smart Systems for Health Agency (SSHA), which was replaced by eHealth Ontario in 2008. The scope of the task was and still is daunting. Ontario has one of the largest health care systems in the world, with about 300,000 health-care professionals, including family doctors, nurses, specialists and more, and a population of nearly 14 million residents. There are more individual and hospital IT systems in Ontario than in any other province or territory. As a result, the agency is building the largest EHR system in North America**.**

Other comparably large systems built in North America have not been 'public' systems, so they have been able to design, build, and roll out new systems in a way that moved everyone along at the same pace without debate or individual preferences not to participate being considered. This is more the dynamic of a bank, where the bank decides for everyone who works for it what happens and by when. In a 'public' system, there are many partners who have the right to decide what happens and by when, and eHealth Ontario must work with all of those partners to move them as quickly as possible in a shared direction. eHealth Ontario now has the Minister's vision and the Deputy Minister's Digital Health Board's direction set for the system, and it is making a compelling difference in moving the agenda forward in new and profound ways.

In the early 2000's, millions of health care records were being created each year, from lab results to x-rays, from drug prescriptions to notes from family doctors. These paper records were generated in thousands of locations across the province and were stored in a variety of dissimilar and often incompatible computer systems. Hospitals had already begun investing in information technology, mostly for administrative purposes at first, based on their own priorities and resources. The result was an increasingly complex patchwork of different systems, built and supported by different vendors, across the province. Some of these systems were very sophisticated, while others were quite modest. The lingering effects of these early choices, which resulted in fragmented IT systems, would last a decade and is now a focus of the province's emerging digital health strategy.

Delays and doubts

The government had announced in 2008 that the EHR would be in place for all Ontarians by 2015. The early years of instability, a lack of clarity at eHealth Ontario and across the sector about roles and responsibilities, coupled with the sometimes conflicting agendas among the various stakeholders have all contributed to the situation that exists today – a system that is substantively in place, and adding value, with increasing adoption, but is about two years behind its anticipated 2015 completion date.

In late 2009, the Auditor General of Ontario published a highly critical report that documented problems with procurement rules and hiring practices. Private sector leadership unfamiliar with government practices, coupled with a sense of urgency, had resulted in a culture that did not comply with the exacting standards of the Ontario Public Service (OPS).

In the years that followed the 2009 Auditor General's report, the agency received further criticism and negative headlines when work ceased on two of the projects that were part of its original mandate. The Diabetes Registry was not completed because of project delays and, as technology rapidly evolved, the information that was to be captured in the database could now be accessed through patients' electronic medical records. Management made the decision not to sink further investments into the project. The Medication Management database was cancelled because after a lengthy procurement process, the first of its kind, no vendor would undertake the work within the funding envelope proposed by government.

In 2011/12, the agency leadership adopted new OPS procurement policies. This resulted in a consistent, transparent approach to awarding contracts and overseeing the work of vendors, an approach that continues to be front and center under today's leadership.

Other organizations have experienced growing pains as they attempt to shift to more modern, integrated IT systems as the technology rapidly evolves and new options and issues (like cyber security) emerge.

The appointments of five CEOS (two permanent and three interim) since 2010 added to the uncertainty regarding the agency's role and direction. This also affected the agency's credibility and relationships with its partners.

In 2014, significant influences came to bear on the direction and capacity of eHealth Ontario, which created a renewed focus across the healthcare sector on technology, connectivity, and working coherently to deliver better care together.

Hitting the reset button

The agency today bears little resemblance to the organization that existed six years ago. In particular, eHealth Ontario has made significant progress since the 2014 delivery of the Patient's First Strategy with its clear expectation that patients would receive better informed, faster and closer to home care – all goals only made possible with the use of technology across the province and across all healthcare settings. The Minister's focus on healthcare transformation was assisted by the June 2014 arrival of his new Deputy Minister with a commitment to integrated planning and care delivery, as well as the recruitment by the Board of Directors of a new CEO for the agency in August 2014 and her executive team recruited over the course of the following 14 months. This brought new skills and experiences to bear on how to build partnerships and deliver leading edge solutions that work well for busy clinicians and achieve better patient care. The task set for the agency were made clear in the budget and memorandum of understanding obligations directed by the Ministry to eHealth Ontario in the winter of 2014 – it was to complete the build of Ontario's electronic health record (EHR) system to deliver better healthcare and plan for a future where more data will enrich the EHR and expand its use across all clinical settings.

With new leadership in place and the tasks known, an external assessment of eHealth Ontario's capacity to deliver was subsequently undertaken at the Minister's request,beginning in November 2015. The concluding advice to the Minister from that assessment in March 2016, was that eHealth Ontario had

"turned a corner": that the addition of new members to the seasoned Board, the revitalized leadership of the agency, the maturing of significant projects to completion and a more solid direction from the Ministry had ,combined, allowed the agency to build new relationships with its partner organizations and deliver the work with financial and technical rigour. The report concludes that despite the past, all evidence points to a new cooperative approach with its healthcare partners that is enabling better clinical outcomes, improved patient experiences, and reduced healthcare costs that would not be possible without the connectivity provided by eHealth Ontario.

Since 2014, eighty percent of the leadership team is new, and includes executives who have public and private sector expertise in technology operations, strategy, client relations, and architecture and standards. This renewed leadership has energized and brought focus to a talented and hard-working group of employees who have specialized skill sets and experience unlike that found in other public sector agency. The agency is recognized for its leadership and expertise in all of the key areas necessary to build and sustain an integrated EHR.

Increased oversight by internal and external auditors, the 2015 appointment of risk and compliance officers, and more rigorous procurement policies and procedures in 2013-14 have all addressed earlier concerns about management of funds. The Board of Directors and the executive team have focused on hiring and developing expertise in all core functions in-house, where relying upon contractors would prove to be either destabilizing or too costly.

One of the critical factors for success at eHealth Ontario is developing and sustaining relationships with its stakeholders. The agency must partner with numerous health sector organizations to deliver its mandate. These include the Ministry of Health and Long-term Care, other health care agencies, 14 LHINs, 14 Community Access Centers, more than 240 hospitals, 600 long term care homes and many more.

While in the first few years of its mandate, the agency was focused on getting the technology up and running, there was a recognition reaffirmed in the Minister's Patients First strategy that if clinicians were to be convinced to use the systems the agency offers to improve patient care, they had to find it more useful in caring for their patients than what they had before, and that it would be easy to use. It had to contain valuable clinical data and easily fit into their workflow. Work then proceeded with designing EHR systems with an integrated, clinician driven set of priorities and needs to inform EHR planning and development. The agency established three regional clinical working groups and a province-wide Clinical Advisory Council in the fall of 2014, and now meets regularly with a wide variety of health care providers from all areas of practice. As clinicians became more involved, their feedback has helped make the EHR tools much more relevant and useful, but a side effect was that it meant further delays as collaborative engagement across so many stakeholders is complex and time consuming.

While working with such a broad base of stakeholders has presented challenges, the agency has turned the corner because of its commitment to listening to those who need and use our systems. It has recently restructured organizationally to ensure clients are heard, engaged and are quickly responded to. Under the new organizational model, eHealth Ontario has two new key focuses – client relations and

account management. Coupled with the agency's unique expertise in technology, technology planning, architecture and standards, and service delivery, this new focus has resulted in improved relationships. Today, eHealth Ontario is ready to play a key role in advancing the government's digital health agenda, which seeks to put patients at the centre of their care, using digital health as a driving force of that transformation.

Strategy and Clarity – Who does what?

In 2015, there began a concerted effort to start shaping an overarching digital health strategy that has as one of its cornerstones, an integrated provincial EHR strategy, led by the Deputy Minister of Health and Long-term care and supported by eHealth Ontario. The agency released its EHR Blueprint in 2014, followed by a Connectivity Strategy in 2015 that was endorsed by the Deputy Minister's Digital Health Board. The Blueprint provides the information needed for developers to meet local needs while aligning with provincial direction. The Connectivity Strategy is designed to explain how all of the components of the EHR fit together, to inform EHR investment and integration decisions across the sector, provide a framework for discussion, and offer practical guidance and resources for integration across the province. While they were well received in the healthcare community in Canada and abroad, in the absence of a province-wide digital health strategy these documents lack details on roles and responsibilities or defined timelines. The government's digital health strategy will go a long way in providing needed clarity on what comes next; who will provide what supports; and how all players will achieve outcomes and be held accountable for them.

Where does the agency go from here?

eHealth Ontario will continue to build and deliver a system that informs continuous quality improvements in health care. The work is a critical component in transforming healthcare, and the data the EHR systems collect are essential tools in understanding what opportunities the future of medicine may offer.

The data the agency gathers is robust, to inform measurements, influence clinical transformation, and to assist in continuous quality improvement across the health care system. We know the future of technology and innovation makes it essential the agency engage deeply with the IT industry and its thought leaders, so provincial assets and investments continue to generate the highest value to the most people at the lowest cost.

It is often debated whether the healthcare system and the private sector could provide equal EHR services and assets if the work of the agency subsided, and our most respectful and neutral advice is that this work must remain intact, aggregated in one place and not dispersed without protecting the 'core' of the EHR build and sustainment. There is work the agency does that is clearly of benefit to the healthcare system, such as a secure email system used millions of times by clinicians every day, but this is not a system that is 'core' to providing the EHR, even though it is valuable to Ontario's health sector. It is a service that perhaps others can provide, at a lower cost and with equal rigour. These are the opportunities the agency is examining to shed its 'non-core' functions, while allowing the 'core' EHR to

be the focus of its work, making the best use of scarce resources, and its unique expertise across a set of complex and interrelated systems that must run together to deliver, grow and protect the security of the EHR of today and tomorrow.

There are three leading goals for continuous improvement that eHealth Ontario can support.

1. **Patient safety – by providing greater access to data in order to diminish data gaps across different care settings and as a result of geographical separation**

   The EHR is a tool that enables clinicians and health care organizations to deliver their services more efficiently and ultimately results in better, safer care to patients. Use of the EHR enables:

   - Faster, more informed decisions about patient care and treatment
   - Fewer unnecessary or duplicate tests and procedures
   - Better, coordinated care between different members of a patient's care team, such as family doctor, emergency room, or community care access centre and an easier transition when moving from one to another, across the province
   - Improves the ability to monitor patient outcomes

   The information in the EHR system is used by health care providers across the province to diagnose, treat, educate and reassure their patients. It makes diagnosis and treatment easier and less invasive, for example for patients who arrive at hospital and are unable to give their medical history and the EHR means lab tests or x-rays don't have to be repeated. The fact that there have been more than 17 million searches for patient records in OLIS in the past twelve months shows the system works, and it's benefiting patients. eHealth Ontario has made a profound difference in the health care system.

   Family physicians surveyed say that using electronic medical records in their offices helps improve decision-making, patient safety, and supports patient education.

2. **Effectiveness – by promoting best practice research by making data available for data analytics or artificial intelligence**

   Now that there is a critical mass of patient data in the EHR, and the system architecture is in place to permit the flow of data, there is huge potential to use this information to improve health care for individuals, groups and populations of patients (while maintaining the privacy of individual patients). For example the data could be used:

   - To help researchers in looking for cures to diseases, or provide better treatment plans for specific health conditions, resulting in new best practices for delivery of care.
   - To improve the health of individuals or groups of patients through targeted preventive measures and strategies aimed at specific ailments or outbreaks (population health management). For example, Ontario Telemedicine Network and the agency are exploring use of secondary EHR data to identify cohorts of patients with diabetes through lab results.

- For use by the artificial intelligence community to transform what we know, how we treat, and how we plan by using predictive analytics.

In addition it allows:

- More time for patient care by reducing the amount of time spent managing paper;
- Improves the ability to manage, coordinate and plan patient care since records from a patient's whole health care team are available; and
- Provides a more complete picture of a patient's health.

3. Efficiency – by providing a health care system that makes all data available in one place that is quickly and securely accessible time and money is saved for both clinicians and patients.

Use of EHRs can lead to system efficiencies. For example they:

- Allow a more efficient transfer of accurate information;
- Provide faster access to important patient information and faster and more accurate clinical decisions;
- Avoid the need to repeat the patient's medical history when seeing a different health care provider;
- Enhance health system planning, and performance management because more complete data is available;
- Improve workflows and system efficiencies by reducing wait times and administrative paper-chasing; and
- Help determine how to best allocate scarce dollars across the health sector and improve the quality and efficiencies in delivery of healthcare in Ontario.

We are in the early days of measuring how much the Ontario Government can save by using electronic health records. However, an initial report from Canada Health Infoway (CHI), the federal agency that supports the development of EHRs across the country, shows that Ontario receives an estimated $1 billion in annual benefits as a result of the investments that have been made in eHealth in Ontario and there have been almost $6 billion in cumulative benefits since 2007. While there has been much conversation about the billions that have been invested in the EHR in Ontario, in fact, when compared to private health systems in other jurisdictions across North America who typically spend about 4% of their annual health budget on IT, Ontario has only spent 1.4% of its total Health spend on IT since 2002. More efficiency is possible, and some new business models could reduce the government funding burden by requiring laggards to pay their own cost to connect to the EHR if they have not taken advantage of eHealth Ontario supports by 2018. Labs and independent health facilities and hospital information system (HIS) or EMR vendors are solid profit centres and should be required to digitize and connect to do business in Ontario.

Key priorities going forward

The agency will continue to enable these continuous improvements as it focuses on the following key priorities going forward

1. **Improving performance, adding more sources of critical patient data and increasing adoption**

   The agency will work to bring in more data to make the system even more valuable, increasing adoption by clinicians, and laying the foundation to provide secure access to patients. This includes expanding the number of healthcare systems that are connected, as well as adding additional repositories like Panorama, which contains immunization data, a prescription drug database and key medical records currently stored in computer systems in doctor's offices. The agency has a technology and adoption roadmap that lays out their plans to deliver these priorities.

2. **Work with the IT industry to connect patients and assist in engaging them in their own healthcare**
   The interoperability solutions that eHealth Ontario has put in place to integrate and share health information with care providers can easily support contributions to and use of health information by consumers. The agency is working with partners on launching a patient portal to provide consumers with access to their information. eHealth Ontario has recognized that the system must evolve so that users can access it more easily and information can be tailored to specific needs, whether it's clinical workflow and care scenarios, or patients checking the results of their lab tests. The agency is working to make the EHR accessible to clinicians through mobile devices, and is testing use of some databases with tablets.

3. **Focusing on core assets, eliminating projects that might assist health care partners but use valuable time, resources and funding for delivering and sustaining the EHR**

   Today, eHealth Ontario provides the funding necessary to configure systems in the field to connect to the EHR, and performs most of the privacy, security, and testing diligence required to protect the privacy and quality of patient information. By providing centralized standards and specifications needed to connect with the EHR to vendors, the agency would eliminate the need to do site-by-site assessments and offer savings because upgrades would not be performed at each site individually.

4. **Focusing on future efficiencies and opportunities, such as use of a health care community cloud**

   The health care sector in Ontario includes a large number of players, using and supporting a number of applications, which are generally integrated with eHealth Ontario services and solutions. The agency could create a health care community cloud that would provide access to eHealth Ontario's high end data base computing assets for development, test, and application services as well as secured and shared access to selected cloud providers via ONE Network. The cloud and the relationships with the cloud providers would be managed by the agency, while the various players would benefit from the combined buying power, expanded suite of services, and secure access to

the services via ONE Network, and the health community as a whole would benefit from the agency's expertise in privacy, security and compliance.

5. A focus on technology planning at eHealth, in consultation with government, vendors and the health care sector

Such planning is necessary to ensure that the EHR system is keeping pace with evolving technology; to find further cost savings, for example, by shifting to innovative partners some of the work that the agency has traditionally done (e.g., 'OneMail' secure email); and to look to new solutions to overcome the disparate technology landscape in place in Ontario today.

6. A focus on innovation and new partnerships

The Ontario EHR is now substantively in place and the agency is shifting its focus from building core elements assets to improving the network, bringing in more higher quality data to make the system even more valuable, increasing adoption by clinicians, and laying the foundation to provide secure access to patients.

The agency expects to have over 100,000 health care providers connected to the EHR through its ConnectingOntario program by spring 2017. It also is working on expanding the number of healthcare systems that are connected, including systems used in hospitals, Community Care centres, long-term care homes, and clinics as well as adding additional repositories like Panorama, which contains immunization data, a prescription drug database and key medical records that are currently stored in computer systems in doctor's offices. The more systems that are connected, the more valuable data will be included, resulting in increased adoption of the EHR and a more positive impact on health outcomes.

In order to provide patients with all the advantages that evolving technology can provide in managing their own health care, and to arrive at a truly user friendly system, the involvement of the private sector is needed as well. In April of this year, eHealth Ontario launched a digital health Innovation Lab, hosted by Mohawk College**.** Innovators and solution providers can test their apps and solutions using "manufactured" data and can connect through standards-based web services and APIs (the industry best practise for allowing data to flow seamlessly between systems regardless of the underlying technology).

Currently participants can test connectivity with the provincial client registry and OLIS and more services are being added. The lab will provide the opportunity for more companies to enter the digital health market and it will help vendors who want to respond to procurement proposals to better understand the risks and costs. The idea is to encourage experimentation to help produce innovative technologies and apps aimed at helping individuals live healthier lives and prevent the onset of disease. The end goal is low-cost, user-friendly health information solutions that are available at the touch of a button and deliver demonstrable improvements to the user's health care.

7. **Focusing on better data quality and supporting use of secondary data**

Currently there is a mix of structured data (standardized fields of patient information) and unstructured data captured in the EHR (such as images or PDFs of hospital reports). Data, especially the data coming from primary care physicians' offices, is of varying quality. In order for EHR data to be used for the 'secondary' analytical purposes mentioned earlier, it must be of a certain level of quality. eHealth Ontario is exploring new technologies such as optical character recognition, natural language processing, etc., to see how it can best cleanse data and make it more useable. There are now many companies and available technologies that are expert in doing just this type of work.

8. **Open the data up to new users for the benefit of patients, consumers , clinicians and researchers**

In order to take advantage of the assets that are now up and running, the data they contain could be extended to other organizations. System wide use of these assets would result in both cost and operational efficiencies, and more importantly a more coordinated digital health system that provides better care for patients, and provides easier access for patients who want to look at their medical records. The logical endgame is that all patient data is available to all authorized clinicians.

Assets like the Provincial Provider Registry, the Provincial Patient Registry, and the Consent Management Technology Assets will deliver greater value over time as they become the definitive sources for provider data, client data, and patient consent decrees across the province. Integrating the various point-of-service clinician systems to these assets will ensure clinicians in any care setting across the province have access to the most up to date data versus the still largely siloed approach within each individual IT system. The agency is also reviewing options to extend the Monitoring and Control Technology Program to point of service systems to provide a provincial wide way to monitor who is viewing a patient's personal health data and provide real time reporting into any suspected unauthorized access. While some express privacy concerns about digital health records, this kind of monitoring would have been impossible ten years ago when anyone with access to the file cabinets could take a look at sensitive information or remove it from folders and no one would have known.

Expanding the use of EHR assets

Patients, clinicians and the health care system as a whole are benefitting from the EHR, but to get maximum value we need to look for ways to expand the use of its assets

Sharing, selling or licensing assets to other jurisdictions

The agency worked in partnership with vendors to, as one example, develop customer code to increase the speed at which new channels and data repositories can be integrated with the Connected Backbone or HIAL, which enables the secure transportation of data between systems. This intellectual property (IP) is owned by the agency and is very attractive to Ontario IT companies that are seeking to expand

their national and international growth opportunities, as access to the IP on a perpetual licensing arrangement could assist them in winning system integration work in other jurisdictions. These same assets and their IP may be of value to other provinces or even to other countries, especially those that are at a less mature stage in their design and delivery of their EHR system. This opens up the prospect of pan-Canadian arrangements between governments as well as opportunities for vendors. It is important to note that this absolutely does not involve access to or sale of Ontario patients' data; it is simply related to the technology that transports data between systems.

In addition, the agency and the Ministry of Health and Long-term Care have worked together to operate and manage the Panorama platform for Ontario immunization data. There may be the potential to offer a hosted version of Panorama to other jurisdictions, which would leverage the Ontario investment to date as well as the expertise resident in the agency and the Ministry.

Building and sustaining assets that are used by other health agencies

eHealth Ontario has been adding additional value to the health care system by partnering with other health care organizations, offering a variety of services including expertise and hosting services as well as access to data for authorized users. This has arguably increased agency costs, but has eliminated costly duplication and fragmentation across different health agencies. There are further opportunities in these kinds of agency partnerships, but the challenge has been in meeting the other agencies' expectations around resourcing, as this was not part of eHealth Ontario's original mandate or funding model. Mr. Clark's report provides some examples from health system partners that speak to the value of the EHR today and the potential value in the future.

eHealth Ontario experience and expertise

Mr. Graham Scott's report to the Minister, coupled with the goals of the Patients First strategy and Digital Health strategy, all point to the need to sustain and build eHealth Ontario core EHR offerings, while also engaging in new partnerships to take on non-core EHR work the agency has historically done for the sector.

There are roles and skills that are unique at the agency, based on the uniqueness of what Ontario has envisioned and now delivered across the province through the agency and its partnerships. We must now commit to sustain and expand the provincial EHR and its adoption and use in highest value clinical settings where patients can be better treated because of their data is shared in their greatest moment of need.

The agency employs recognized business and technical subject matter experts on EHR assets, and pushes traditional technology staff to work hand in hand with clinicians who use our systems. It is therefore ideally positioned to be the custodian for safe, secure and very large provincial systems. This expertise is vital in ensuring the province continues to derive maximum benefit from EHR assets.

Equally valuable is the agency's leadership in championing and enforcing provincial privacy and security policies and procedures, which is a critical component of maintaining and evolving an EHR. The agency

also has a mature, provincial, consensus-driven process for establishing and maintaining provincial interoperability architecture and standards which will be important in making progress on connecting more organizations going forward to deliver on Ontario's emerging digital health strategy.