Hospital Diagnostic Imaging Repository Services (HDIRS)

Report for Ed Clark

November 10, 2016

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Executive Summary

Founded in 2007, Hospital Diagnostic Imaging Repository Services (HDIRS) is a not-for-profit, independent corporation that operates one of four diagnostic imaging (DI) repositories in Ontario as part of eHealth Ontario's Diagnostic Imaging (DIR) Program. HDIRS has 23 member hospitals with 38 individual locations and also connects 23 independent health facility (IHF) clients spanning more than 100 locations. As of September 2016, HDIRS stores more than 25 million imaging exams, serving approximately 30% of Ontario's population, from Toronto to Bancroft to Brockville.

HDIRS delivers services to securely store imaging data for the members and clients in our region, promotes and enables sharing of diagnostic imaging information among health service providers, supports improvements in patient care, reduces diagnostic imaging wait times and costs, and maintains a flexible, scalable system that is sustainable into the future. Although we are member-owned, we are ultimately dedicated to providing public services. Our ultimate goal is to accelerate healthcare knowledge creation by facilitating better collaboration among health service providers. Increasing knowledge not only makes for a better a higher quality of patient care, it holds promise for a more effective and sustainable healthcare system that is capable of saving and prolonging the lives of more Ontarians.

HDIRS would not exist and could not have succeeded without the partnership and leadership of eHealth Ontario. Although HDIRS operates wholly independently of eHealth Ontario, the agency has been instrumental in the creation and ongoing operation of all four of Ontario's DIRs, including HDIRS. Looking forward as government considers the future of Ontario's electronic health care infrastructure and options for eHealth Ontario's mandate, we believe that eHealth Ontario can provide an important strategic oversight, coordination, and delivery role.

HDIRS' broad challenge is the same as other ehealth-related organizations in Ontario: we have a complex network of separate but interrelated organizations and services. This can make it difficult to coordinate and prioritize — to decide who should do what and how to make it all work together.

There is opportunity for the Ministry of Health and Long-Term Care (MOHLTC) to manage through the complex network that has been created, to reduce the complexity by defining a common strategic roadmap, and to more objectively define roles and responsibilities. Some key points to consider are as follows:

- **Development by the MOHLTC of a more detailed digital health strategy along with a renewed mandate for eHealth Ontario** that focuses the organization on specific oversight and coordination of delivery of key components of the strategy.
- **Formalization of a foundational framework of shared core services, standards, and policies** to reduce complexity and increase the ability of various systems to interconnect, collaborate, and enhance sustainability.

Building on the points above, elements of the provincial strategy to increase future value should focus on the following:

- **Expansion to ensure all relevant clinical data is securely collected and appropriately made available as part of the electronic health record.**
- **Moving from data-collection and sharing — which are the necessary first steps — to information and knowledge creation.**

- **Leveraging existing assets in the creation of the foundational framework of shared core services, policies, and standards.**
- **Enabling system agility to take advantage of new technologies as appropriate to increase performance, capability, and/or reduce cost**.
- **Enabling system innovation through implementation of standards and policies that create the framework within which parties can collaborate and integrate.**

In this context, there is significant opportunity to duplicate features of the not-for-profit HDIRS model to work in partnership with eHealth Ontario, providing focus to a number of specialized, foundational aspects of the electronic health record.

HDIRS looks forward to a refreshed eHealth Ontario mandate that builds on its successes to date and provides even greater return on investment for Ontarians.

Background: Digitization of Diagnostic Images

Most Ontarians are familiar with diagnostic imaging and have had at least one diagnostic imaging procedure — often an X-ray. In the distant past, X-ray was the only type of diagnostic imaging. Over time, technology developed to include many other types of exams — CT, MRI, ultrasound, and nuclear medicine, for example. Additionally, specialty X-ray exams enabled healthcare professionals to see specific areas of the body, such as blood vessels and the digestive system.

X-ray, CT, MRI, ultrasound, and nuclear medicine are types of imaging "modalities". For many years, X-rays and other diagnostic images were captured on film with the results interpreted by a radiologist to detect any issues and aberrations that might indicate illness or injury. Today, this work is done electronically in many parts of the world, including Canada, with radiologists able to use computer technology to display and assess images.

As diagnostic imaging continued to evolve, centralized computer systems emerged to collect, store, and distribute digital diagnostic imaging information to workstations within hospital imaging departments. These systems, known as Picture Archiving and Communications Systems (PACS), now permit access to images from anywhere in the hospital. Similar advances have been made in imaging clinics (independent health facilities) by making use of digital tools and techniques.

While the digitization of diagnostic images within the walls of healthcare organizations represented significant progress, it still left the issue of how to make them appropriately available to other organizations as a patient moved through the province or healthcare system. The need to physically transfer the images took time, occurred inconsistently, and was not practical in urgent, or emergent, situations. Even today, the need for an individual's imaging record history is often unknown until the patient sees the physician in the emergency room. In this way, diagnostic imaging is one example of the larger need for an electronic health record that includes all health information for individuals.

In the early 2000s, various Ontario healthcare organizations began to collaborate and discuss the potential to create systems that would provide more regional access to patient information, including diagnostic images. As, by that point, diagnostic imaging was largely digitized, it represented an early opportunity to form a portion of the electronic health record. Canada Health Infoway (CHI), a federal organization created to encourage the creation of digital health records, invested in a number of diagnostic imaging projects across the country, including in Ontario, where the provincial government, through a new agency called eHealth Ontario, provided investment as well.

These early electronic health initiatives led to the creation of four systems, or diagnostic imaging repositories (DIRs), in Ontario — Hospital Diagnostic Imaging Repository Services (HDIRS), Southwestern Ontario Diagnostic Imaging Network (SWODIN), GTA West Diagnostic Imaging Repository, and Northern and Eastern Ontario Diagnostic Imaging Network (NEODIN). Today, all acute care hospitals in Ontario and many independent imaging clinics (IHFs) are integrated and contributing to one of the four DIRs, creating four large "pools" of diagnostic imaging information. Increasingly, the DIR organizations are providing the ability to automatically share this information across each region and, in conjunction with eHealth Ontario, across the province.

Why Four DIRs?

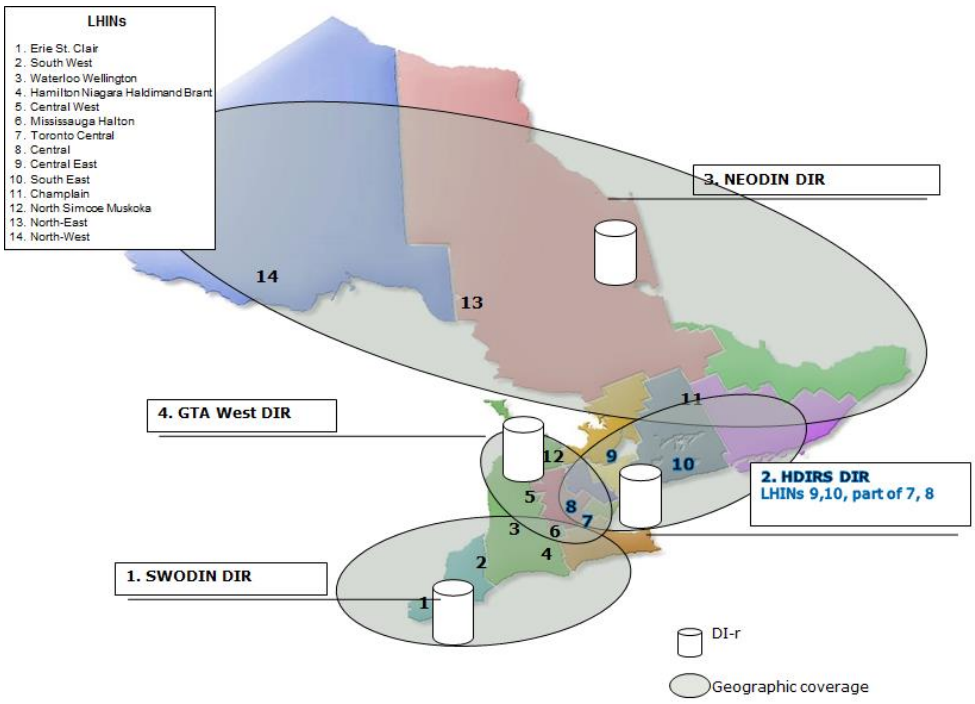
Diagnostic imaging exams can be very large. Comprised sometimes of dozens, hundreds, or even thousands of individual images, such records can be similar in size to a TV episode on a DVD or even a full feature-length movie. As such, a DIR must be able to receive thousands of these large exam files

every day, store them, retrieve them, and send them quickly and securely to those who require them. This creates the need for powerful computers with very large storage capacities. When the first of these projects was initiated around 2006, it was believed that a single system could not scale to handle the entire province of Ontario — approximately 15,000,000 diagnostic imaging procedures annually. Consequently, four regional repositories were created to ensure efficiency and utility. New technologies may make such an approach no longer necessary but, at the time, the method represented a lower-risk, logical strategy.

Linking Within and Among the DIRs

Each of the four DIRs in Ontario provides the ability to share diagnostic imaging information to some degree across their individual regions and provides significant clinical value to radiologists, other specialists and, increasingly, to family physicians. But, the job is not yet complete. While images can be shared readily by many healthcare professionals within DIRs, sending and viewing information among regions remains an issue. To address this gap, eHealth Ontario created the Diagnostic Imaging Common Services (DICS) project. The DICS project enables authorized clinicians all across Ontario to access existing DI reports through eHealth's One Portal, regardless of their location. This work is nearly complete and, when it is, diagnostic imaging information will be able to be shared among healthcare organizations across the province. In the absence of an agency such as eHealth Ontario, it is not obvious who would be motivated to complete this linking and architecture. Should eHealth Ontario's mandate go un-renewed, this is a prime example of work that must be assumed by others, such as the Ministry of Health and Long-Term Care (MOHLTC).

HDIRS is one of four DIRs in Ontario, broadly serving members and clients from Toronto to Bancroft to Brockville.



The Organization

HDIRS is a not-for-profit company created in late 2007 by a group of hospitals in the Greater Toronto Area (GTA) and southeastern Ontario. Currently composed of 23 public hospital member-owners (see the following graphic for details), HDIRS manages the diagnostic imaging repository (DIR) that serves part of the Toronto Central and Central Local Health Integration Networks (LHINs) and all of the Central East and South East LHINs.

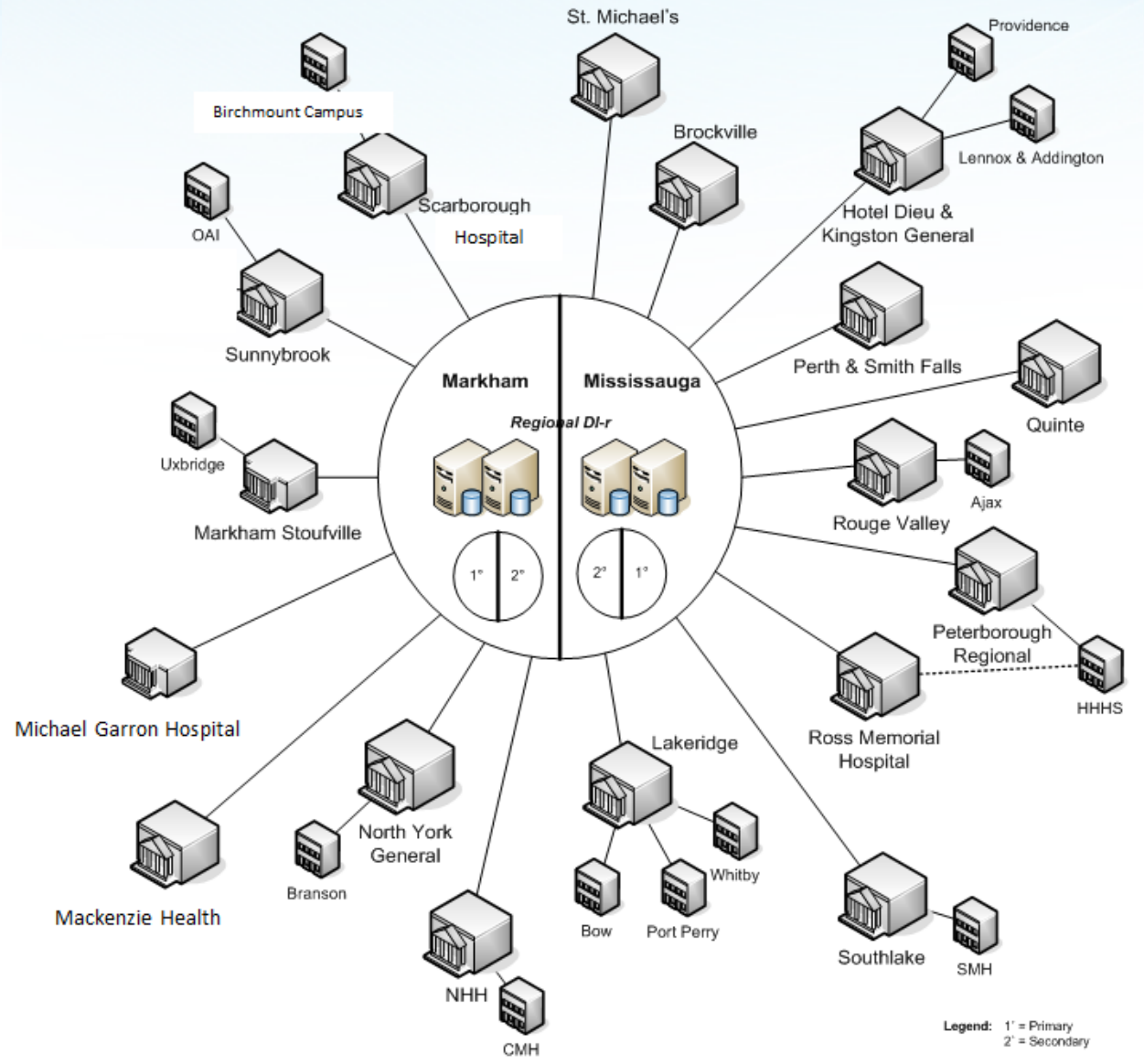
HDIRS exists to support hospital members, independent health facility (IHF) clients and, indirectly, the patients they serve. Although we are a member-owned, not-for-profit organization, we are ultimately dedicated to providing public services. Originally, HDIRS operations were focused on establishing a stable, secure, and scalable technology infrastructure and connecting members and clients. Over time, our focus has shifted to the active maintenance of the repository in terms of technical and clinical workflow as well as timely and accurate access to diagnostic imaging information for our members and clients.

While we continue to manage the ongoing operations of the DIR service, we are expanding to include other services related to diagnostic imaging that are of value to our members, clients, and the healthcare system in general, such as a peer-review solution to enhance the quality of diagnostic imaging reports. Aside from creating value for the healthcare system, our ultimate goal is to accelerate healthcare knowledge creation by facilitating better collaboration among health service providers. Increasing knowledge not only makes for a better quality of patient care, it holds promise for a more effective and sustainable healthcare system that saves and prolongs the lives of more Ontarians.

Quick Facts

- Founded in 2007, Hospital Diagnostic Imaging Repository Services (HDIRS) is a not-for-profit, independent corporation.
- HDIRS is one of four diagnostic imaging repositories operating in Ontario as part of eHealth Ontario's Diagnostic Imaging Program.
- HDIRS has 23 member hospitals, which equates to 38 individual locations.
- HDIRS has 23 connected Independent Health Facility (IHF) clients, which equates to more than 100 individual locations.
- Together, these organizations are trending to send approximately 5 million diagnostic imaging exams to HDIRS this year.
- In total, as of September 2016, HDIRS stores more than 25 million diagnostic imaging exams.
- In total, as of September 2016, HDIRS has 1.6 petabytes of data. How big is a petabyte? 1000 Terabytes, or 1,000,000 Gigabytes. 1.6 petabytes equate to more than 350,000 DVD quality movies.
- Approximately 30% of Ontario's population is being served by HDIRS.

HDIRS serves 23 member hospitals (shown)
as well as 23 independent health facility clients.



Relationship to eHealth Ontario

HDIRS and eHealth Ontario operate as wholly independent but vital partners. eHealth Ontario provides leadership, strategy, IT infrastructure, and funding to many organizations dedicated to delivering electronic health records. eHealth Ontario originally provided a significant portion of the funding to build the HDIRS DIR, along with the three other provincial DIRs. It also provides all DIRs, including HDIRS, with ongoing operating funds. In short, our success has been greatly supported by eHealth Ontario's involvement and leadership.

Value Creation: Five Propositions

HDIRS delivers core services to securely and privately store imaging data for the members and clients within our region, promote and enable sharing of diagnostic imaging information among health service providers, support improvements in patient care, reduce diagnostic imaging wait times and costs, and maintain a flexible, scalable system that is sustainable for the future.

The existence of HDIRS — as well as the other three DIRs — creates clear and tangible value to Ontario's healthcare system, to practitioners and, by extension, to all people and patients in the province. As a vital component of Ontario's health information technology network, HDIRS provides five specific value propositions to the wider system.

Value Proposition 1:

Securely Store Imaging Data

HDIRS serves as an archive for diagnostic imaging exams. Our systems are set up in secure data centres located in Ontario. There are two data centres, with every piece of information stored in both locations. Many of our hospital members use the DIR as their only diagnostic imaging archive — recognizing that to construct such secure and reliable systems individually would be highly complicated and costly.

HDIRS also serves a disaster recovery function in case of catastrophic events, such as fires, tornadoes, computer failures, etc. For member hospitals, this ensures all images are preserved and accessible. Our data centres are many kilometres apart to ensure that no single event would disable the repository.

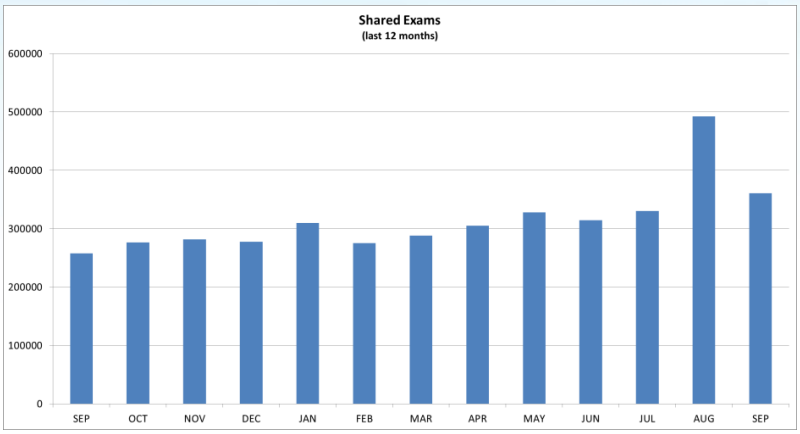
Value Proposition 2:

Promote and Enable Sharing of Diagnostic Images Among Health Service Providers

HDIRS automatically moves diagnostic imaging information between members and clients. Radiologists, and other specialists, often require access to previous diagnostic imaging exams to assist in interpreting new diagnostic imaging exams. In the past, this would rely upon patients physically transporting films and CD images between locations, creating inconvenience and delays. HDIRS has largely eliminated such challenges. Once a diagnostic imaging exam is ordered, HDIRS receives an electronic message, and the system searches and returns an appropriate set of images. This information is sent to the ordering site's PACS, so radiologists, and others, automatically have access to diagnostic imaging exam information. The transfer of information happens within minutes of an exam being ordered.

HDIRS currently contains over 25 million diagnostic imaging exams, and the number of images uploaded each month is increasing. Between October 1, 2015, and September 30, 2016, HDIRS moved over 3.8 million exams between members and clients. In September 2016 alone, HDIRS moved over 360,000 diagnostic imaging exams. The sheer volume of activity highlights the fluidity of patients and doctors regionally. People use a variety of health service providers to maintain their health, and sharing health information with the patient's preferred provider creates more effective and responsive healthcare.

HDIRS members and client share hundreds of thousands of diagnostic image exams every month.



In many instances, provincial policy — via the MOHLTC — drives such movement and practices. For some medical services, such as cancer care, regionalized centres of excellence and specialization compel patients to travel to these locations for particular expertise. Often, a patient will have ongoing care locally, with regular specialist appointments at the regional centre. This requires the easy sharing of images between institutions to support individual patients. HDIRS, and the provincial diagnostic imaging program, provides an important foundational service to support this strategy and avoid the reliance upon inefficient, manual methods.

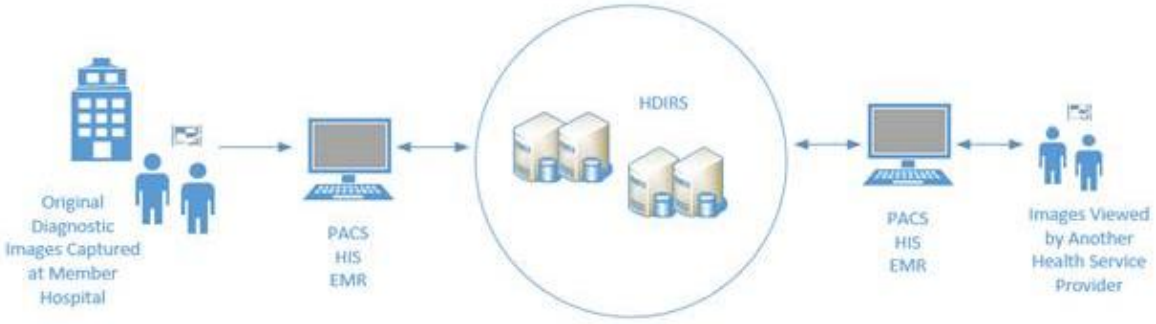
An example of HDIRS supporting the provincial strategy comes from Dr. Calvin Law, Chief, Odette Cancer Centre, Sunnybrook Health Sciences Centre – Regional Vice President, Cancer Care Ontario, Toronto Central North – Professor, University of Toronto. Dr. Law describes the benefits of using HDIRS in Appendix 1 and tells the story of a patient who travelled for several hours from a small Ontario town to her appointment at one of Toronto's cancer treatment centres. Upon arriving, the patient, already anxious and tired, realized that she had forgotten the diagnostic CT scans she had been asked to bring with her. In even more of a panic, she explained the situation to Dr. Law. Fortunately, her imaging was found in HDIRS, and immediate access to her once lost imaging resulted in the prompt development of a care plan. What used to be a 200 km, six-hour mistake became an instantaneous sigh of relief for both patient and doctor alike. Ultimately, the patient received treatment faster, underwent surgery in Toronto, and received post-surgery support closer to home. Less travel, less stress, and more timely care was the direct result of having access to HDIRS in her case — and countless others like hers.

Diagnostic imaging exams in the repository are viewed only as necessary to support patient care. Although differing computer systems and technical profiles can make exact data analysis a bit challenging, our studies suggest approximately 50,000 shared exams are viewed each month. This equates to thousands of opportunities to improve care to patients. These results highlight not only the value of HDIRS and secure sharing of diagnostic images — they underscore the potential benefits of sharing this kind of information more broadly both inside and outside hospitals.

The main way hospital teams access images from HDIRS is through their PACS systems. Some hospital teams, however, use another system to access patient information — a Hospital Information System (HIS) or Electronic Medical Record (EMR). These teams would prefer to access the information from the system they typically use, which requires that something called a DI viewer be integrated into the hospital HIS or EMR. Work is underway to make tools such as the DI viewer universal to the other tools physicians use every day, but that work requires time and resources.

For family doctors and other physicians working outside of hospitals, similar challenges arise. These health service providers can access electronic health records and information also using a variety of tools. HDIRS is not directly involved in providing access to such systems but we do provide an important piece — diagnostic imaging information — to these systems. This type of wider access is largely the responsibility of eHealth Ontario, and the eHealth Ontario team is currently doing important work on this front.

Simplified HDIRS Workflow



Legend:
PACS – Picture Archiving and Communication System (Primarily radiologist access)
HIS – Hospital Information System
EMR – Electronic Medical Record } *(Hospital-wide clinician access)*

Value Proposition 3:

Support Improvements in Patient Care

HDIRS improves patient care by equipping health service providers with timely information and inspiring collaboration and knowledge creation. HDIRS has many examples, collected from our members and clients, of how access to the DIR is improving patient care and improving the clinician's experience. For example:

- Diagnostic imaging exams obtained from the repository (i.e., regionally shared exams) that are integrated directly into radiologist workflows provide a more complete history of the patient and lead to significant improvement in patient diagnosis.
- Shared exams leveraged in regional cancer centres provide more timely treatment of patients and reduction of unnecessary reimaging. Multidisciplinary cancer conference rounds also rely on the use of shared exams for discussion of suitable treatment options for individual cancer patients.
- Stroke clinics set up with the Ontario Telemedicine Network (OTN) and working with offsite physicians use the ability to access regionally shared exams through their local PACS for remote patient consults.
- Hospitals with close relationships to certain IHFs rely and use the seamless access to IHF exams to reduce the number of CD transfers between hospitals and IHFs and improve the speed of access to these studies.
- Surgeons make use of shared diagnostic imaging exams obtained from HDIRS during surgical consults.

Emergency room physicians also rely on exams completed at other hospitals and as key influencers of how to treat patients, including decisions around surgeries. In one real-life example, a patient arrived at a Toronto hospital emergency room with what appeared to be significant gastrointestinal/stomach

bleeding. The doctor on call considered surgery. As the patient was getting prepared for the operating room, accessing a regional shared CT exam from the HDIRS repository showed that the patient had a pre-existing condition in the head/neck area. This condition proved to be the source of the bleeding, and the physician called off what would have been an unnecessary surgery.

In terms of other examples, a radiologist working with one IHF has used images in the repository to prevent administration of further diagnostic imaging exams and improve care. In one case, the doctor at the IHF used an existing exam taken at a hospital to reassure a worried patient in the early stages of pregnancy that all was normal and that an additional ultrasound was not required. As a result of finding a past exam through HDIRS, the mother-to-be avoided taking time away from work and had her fears calmed quickly. In another case, a senior visited the doctor for an ultrasound that showed a large, unidentifiable mass. The senior did not remember ever having another test related to this issue. However, as the lab prepared to write its report to recommend additional tests, including an MRI and other expensive tests, the HDIRS workflow process, in fact, showed that the same mass existed five years prior and there had been no change. Thanks to HDIRS, this patient also avoided needless tests, excessive exposure to radiation, unnecessary anxiety, and inconveniences.

Value Proposition 4:

Reduce Diagnostic Imaging Wait Times and Costs

HDIRS is actively working to strengthen our ability to capture and measure the value and benefits of the repository. While data and statistics are difficult to obtain, there is evidence that HDIRS is helping to reduce the number of diagnostic exams required, reduce wait times to obtain treatment, and reduce costs. All of these benefits, in turn, are supported and enabled by the involvement of eHealth Ontario.

At their multi-disciplinary rounds to discuss cancer treatment for patients, physicians at Sunnybrook Health Sciences Centre have reported that access to regional imaging information via HDIRS allows them to review more cases in less time, increasing their efficiency and reducing time to treatment for the patient.

HDIRS can help avoid unnecessary re-examinations. Studies conducted at another member site validate that improved access to exams through HDIRS in the Emergency Department has resulted in fewer re-imaging tests, saving costs and reducing unnecessary exposure to radiation for patients. If these studies from 2014 and 2015 are extrapolated across all HDIRS sites, it would mean that thousands of unnecessary exams are being avoided annually. Extended further, this represents a potential province-wide benefit equivalent to millions of dollars each year.

In an October 2016, Canada Health Infoway (CHI) assessed Ontario's progress related digital health information availability and revealed the cost benefits of select digital health investments in Ontario[1]. The analysis indicated that Ontario's share of benefits delivered by electronic medical records and diagnostic imaging information systems is proportional to its population size. CHI also calculated that diagnostic imaging systems province-wide saved $345 million in 2015 and $2.2 billion since 2007, amounting to the biggest cost benefit among all the digital health systems measured. Diagnostic imaging repositories are a major electronic health record success story and, since HDIRS' scope spans approximately 30% of Ontario's population, a substantial share of these cost savings could be attributed to HDIRS.

[1] (http://www.health.gov.on.ca/en/common/ministry/publications/reports/digital_health/digital_health_briefing_note.aspx)

Value Proposition 5:

Maintain a Flexible, Scalable System

HDIRS actively maintains a secure, flexible, scalable system that is prepared for the future. In creating HDIRS, our members created an organization that is specialized in providing large-scale information technology (IT) services, specifically around healthcare and imaging. This lends us specialized knowledge necessary to manage technology, people, and processes for today and the expertise and vision to build systems for the future. Our team includes core IT operations, technical support, diagnostic imaging workflow (clinical), privacy and security, project management, and financial and vendor management specialists focused on providing member — and, indirectly, patient — value. Taking advantage of advancing technology to benefit our members, clients and, ultimately, the people of Ontario by improving service and reducing cost is a key area of focus for HDIRS. In this context, eHealth Ontario provides an important oversight and coordination role, leveraging HDIRS (and the other DIRs) to provide the infrastructure and services for the diagnostic imaging program. Given the size and complexity of diagnostic imaging, this is a reasonable approach.

Challenges and Opportunities

It is important to understand that, while enormous value has been created with the establishment of HDIRS and the other DIRs, there remains much more work to be done. Integration of systems is needed, access can be widened, and coordination of patchwork architecture can be completed.

HDIRS' broad challenge is the same as other ehealth-related organizations in Ontario: we have a complex network of separate but interrelated organizations and services. This can make it difficult to coordinate and prioritize — to decide who should do what and how to make it all work together. As we define roles and set priorities, we must preserve the good and valuable work that has been done. We must ensure we continue to serve the thousands of physicians and other healthcare workers already getting daily value from what we have built — while finding new ways to expand those benefits.

The opportunity is for the MOHLTC to manage through this complex network, reduce the complexity by defining a common strategic roadmap, and more objectively define roles and responsibilities. One way to approach this is through a renewed mandate for eHealth Ontario. However this is accomplished, we look forward to realignment along these lines, with an emphasis on these priorities and an eye to expanding system benefits. Some key points to consider are:

- Development by the MOHLTC of a more detailed digital health strategy with a renewed mandate for eHealth Ontario that focuses the organization on specific oversight and coordination of delivery of key components of the strategy.
- Formalization of a foundational framework of shared core services, standards, and policies to reduce complexity and increase the ability of various systems to interconnect, collaborate, and enhance sustainability.

Future Value

The value we have discussed so far is related to our DIR services to date. We think there are other great opportunities ahead to provide value for Ontarians.

Building on the points above, elements of the provincial strategy to deliver future value should focus on the following:

- **Expansion to ensure all relevant clinical data is securely collected and appropriately made available as part of the electronic health record.** For example, DI does not represent all forms of imaging used in healthcare. There are many areas — cardiology, pathology, ophthalmology to name a few — that fall outside of DI and that are currently not part of the current DIR infrastructure. We see this as an evolution from a provincial DI Program to a provincial Imaging Program.
- **Moving from data-collection and sharing — which are the necessary first steps — to information and knowledge.** This involves leveraging the large pools of data collected to generate clinical value through appropriate secondary use. For DI, this may involve such services as radiology peer review, regional/provincial radiation dose management, and systems to support clinical decision making.
- **Leveraging existing assets in the creation of the foundational framework of shared core services, policies and standards to increase efficiency.** This includes such things as a regional strategy for data archiving.
- **Enabling system agility to take advantage of new technologies as appropriate to increase performance, capability, and/or reduce cost.** There are many examples of this — most people are familiar with the evolution of personal/home data storage and how costs have continually fallen over the years.
- **Enabling system innovation through implementation of standards and policies that create the framework within which parties can collaborate and integrate.** This also requires the creation of a core set of services that provide secure, private access to all relevant data.

As a not-for-profit company created for the sole purpose of providing valuable information technology services to our members and to execute elements of the provincial digital health strategy, we are naturally aligned to provincial policy goals. As we move forward, there is a spectrum of options to advance those goals. At one end exists the option of outsourcing all functions and services to the private sector. At the other end is relying entirely upon government to achieve these same objectives. The Ontario system is large and complex and will need involvement of organizations from across the spectrum. We believe that HDIRS offers value in occupying a middle ground, employing the best aspects of a private organization along with the best features of a public sector entity — such as an overriding mission to serve the public interest and patient health.

The key features of the HDIRS organizational model include:

- Not-for-profit status with strong governance and business focus that drives accountability.
- Bringing business focus to bear on the delivery of objectives that generate clinical and financial value for Ontario (i.e., alignment to provincial strategy).
- Building the required capacity and capability in the organization to deliver on specific objectives. This requires a combination of clinical and healthcare knowledge, IT knowledge, and business operations knowledge.
- Rigorous financial controllership and reporting.

At HDIRS, we remain optimistic that the challenges we live with each day have within them opportunities to build a better system for all. We are proud of what we have accomplished and recognize what more remains to be done.

Digital health systems are critical to address the challenges facing healthcare today, both to deliver the quality of care people deserve and to address challenges of cost and sustainability. Whatever decisions are taken with respect to eHealth Ontario, these needs will persist and must be addressed.

Appendix 1 – Letter from Dr. C. Law

Calvin H.L. Law MD. MPH. FRCSC.

CHIEF	The Edmond Odette Cancer Centre
	Sunnybrook Health Sciences Centre
REGIONAL VICE PRESIDENT	Toronto Central North, Cancer Care Ontario
PROFESSOR	Department of Surgery
	The Institute of Health Policy, Management and Evaluation
	University of Toronto
AFFILIATE SCIENTIST	Sunnybrook Research Institute
SURGICAL ONCOLOGY	Hepato-Pancreatic Biliary & Gastrointestinal Surgical Oncology

Sunnybrook
ODETTE CANCER CENTRE
A Cancer Care Ontario Partner when it matters MOST

Thursday, October 27, 2016

Dear Mr. MacDonald (David) –

Thank-you for asking me to discuss the real world impact of HDIRs on front line patient care here at the Odette Cancer Centre.

I will speak to you both as a practicing hepatobiliary-pancreatic surgical oncologist and as the Chief of the Odette Cancer Centre.

The Odette Cancer Centre is one of the largest regional cancer centres in North America and services approximately 20,000 new patient assessments per annum resulting in 125,000 radiation treatments delivered; 25,000 new cycles of chemotherapy started and planning of almost 2,000 complex cancer surgeries each year. The focus of the cancer centre is to offer tertiary and quaternary level cancer care as part of Sunnybrook Health Sciences Centre.

We are also the largest regional cancer centre within the HDIRs network and in this region, we are the only regional cancer centre to offer highly specialized treatments. Examples include: stereotactic ablative body radiotherapy (SABR), hepatic arterial infusion pump chemotherapy (HAIP) and complex surgeries such as head and neck, pancreatic and liver reconstructive cancer surgery.

HDIRs is a critical part of the success of this work from the perspective of the regional cancer centre, from our partner sites and from the technology that has developed as a results.

From the regional cancer centre perspective, HDIRs has allowed the cancer teams here to reliably and immediately visualize regional imaging, improving our patient care efficiencies. When patients brought their own imaging on disc, we were constantly plagued by disc errors, disc content errors, disc damage and of course, forgotten discs. Furthermore, the minutes (not seconds) it took to load up each disc cost precious time that could have been dedicated to the patient. Finally, HDIRs has allowed the regional centres to best use and also best organize future imaging related to complex care that has included facilitating returning some of our patients closer to home for care. We believe we are only at the beginning of this potential, and that more can be accomplished in the near future.

From our partner sites point of view, HDIRs imaging has allowed us to now directly interface with radiologists from our referring and partner sites, allowing for a new interaction that will lead to ongoing improvements in the quality of imaging in the communities, particularly as related to specialized and regionalized cancer care. Simply put, we spent years building centres of excellence in focused locations to improve patient care, and now, HDIRs is part of the puzzle for which these focused centres become focused

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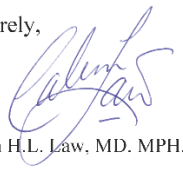
HDIRS Hospital Diagnostic Imaging Repository Services

networks of care, a critical element to the future when every Ontarian can receive expert care, but with much of it closer to home.

HDIRs has also fostered the creation of new technology particularly in the field of interfaces at Sunnybrook. Having access to a regionalized repository of imaging has inspired and created an opportunity to create pre-fetched images that display in-line and in a native format within the local electronic medical record used by clinicians at Sunnybrook. This is the 'magic' behind the efficiencies introduced to our clinical care here, as well as enhanced accuracy and safety in patient care. Patients' most recent imaging, in their full resolution and with an associated report – are at the point of care at all times, whether they be at their local institution in the HDIRs network, or here at the tertiary/quaternary regional cancer centre. It's a wonderful example of technology at the heart of patient centred care initiatives.

The Odette Cancer Centre has been a grateful and proud partner of HDIRs over the last few years, and are excited about the burgeoning potential of a "repository of imaging" evolving into a "circulatory system" that enhances the flow of clinical care, clinical decision making, and clinical expertise within our healthcare system and to each and every one of our patients in Ontario.

Sincerely,



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