Hospital Information System Renewal in Ontario

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1. HIS renewal: The case for action

Hospital Information System (HIS) renewal is an opportunity to transform Ontario's fragmented HIS landscape into a platform for a high-performing, patient-centred health care system.

Patients First: Action Plan for Health Care is the next phase of Ontario's plan for changing and improving Ontario's health system, building on the progress that's been made since 2012 under the original *Action Plan for Health Care*. It exemplifies the commitment to put people and patients at the centre of the system by focusing on putting patients' needs first.

In support of the *Patients First* plan and acknowledging the significant changes in the health sector and the opportunities created by advances in technology since the original 2008/09 ehealth strategy, the ministry has initiated the Digital Health Strategy (DHS) as an initiative to enhance how ehealth effectively supports and enables the Ministry's business priorities and the next phase of health system transformation. It will also establish and provide a clear understanding of the government's key ehealth directions and priorities.

As a leading element of the eHealth 2.0 strategy initiative, HIS renewal represents an opportunity to advance Ontario's Patients First objectives by helping transform Ontario's fragmented HISs into a platform for a high-performing, better connected, more integrated, and patient-centred health care system. This is especially important given the fact that HISs represent approximately 75% of the health care system's capacity relating to information systems and associated resources.

HIS investments to-date have provided hospital-specific improvements in service quality and efficiency, but from a system perspective, it has also generated duplication of effort and resources across hospitals, and a lack of standardization.

The first generation of HIS investments were made independently by hospital organizations to create hospital-specific value focusing on efficiencies and quality improvements through automation:

- This resulted in a high degree of variability among hospitals with respect to levels of investment, capacity, maturity of implementation, and utilization and benefits realized with respect to internal efficiencies and patient outcomes.

- As a result, duplication of effort and resources across hospitals, and internally a lack of standardization with respect to data and clinical models, emerged. This is reflected in significant change management costs which contribute a sizeable part of the HIS total cost of ownership (TCO).

2. Work of the HIS Renewal Advisory Panel

The HIS Renewal Advisory Panel ("the panel") was established in August 2015 to make specific recommendations to support Ontario's hospitals HIS renewals.

The panel was mandated by the Digital Health Board ("the board") to provide recommendations to that would maximize patient benefits and value for money derived from current and future HIS investments in Ontario.

Key objectives included:
- Defining the scope of issues requiring provincial support
- Identifying the external policies and programs impacting HIS renewal,
- Assessing approaches taken by other jurisdictions, and
- Recommending a select number of integrated approaches to support Ontario's hospitals.

The panel was led by hospital sector representatives, and included a broad membership.

The board selected two co-chairs:
- Donna Cripps, CEO of the Hamilton Niagara Haldimand Brant Local Health Integration Network, and
- Murray Glendining, President and CEO of London Health Sciences Centre.

The panel membership was selected to include diverse representation from the acute care sector, across all domains of care delivery (e.g. clinical, administration and finance) as well as ministry leadership, supply chain expertise and clinical representation from community and primary care.

The panel made specific set of recommendations to optimize HIS renewal activities in Ontario that have been approved by the board and are now at implementation stage.

The panel set out to achieve its mandate within a six-month term, thus necessitating a focused analysis of the most urgent HIS renewal issues.

The panel also committed to making note of future areas of work that may be needed to fully realize

the potential of HIS investments in Ontario.

The recommendations made by the panel have now been approved by the board and implementation planning is underway.

With support from the board, the panel has now commenced a subsequent phase of work, initiated in May 2016, to continue development of a broader, long-term strategy while overseeing implementation of the short-term recommendations.

2.1. HIS clusters and hubs ***

HIS cluster
Definition: A group of hospitals that have partnered to support patients through the use of a common HIS instance.

An HIS cluster focuses on patient outcomes, quality of care and health system integration. Moving on to a common HIS is a means to advance these interests.

Hospitals within a cluster typically share an affinity that is conducive to maximizing the potential benefits of a common HIS.

Such affinities include:
- shared patient population and referral patterns,
- part of an integrated regional health network, and
- common areas of clinical specialization.

Sharing a common HIS would result in increased benefits associated with patient outcomes and health system integration. Additional benefits of HIS clustering can realized from adopting common cluster solutions beyond core HIS services, for example: DI/PACS, eReferral, ePrescribing, medication management, care planning, decision support and advanced analytics, as well as extending these solutions across the continuum of care, all of which become more tractable where there is a common HIS.

There are already several HIS clusters in Ontario. The common or shared HIS of each cluster is provisioned by a host hospital within the cluster (typically a larger hospital with a critical mass of IT capability and a mature HIS instance).

As the establishment of HIS clusters advances in Ontario, the panel has recognized the need for the

delivery of HIS services to evolve beyond the "host hospital" model.

- Emerging HIS clusters may not have the critical mass, existing mature HIS instance or capacity to establish a new HIS instance that is required to provision a common HIS. Furthermore, from a sustainability perspective, the optimal number of HIS instances for Ontario is significantly less than the number of HIS clusters that are likely to emerge.
- Some existing cluster "host hospitals" are already being approached to provision HIS services to hospitals/clusters with which they have no "affinity". Current governance and delivery models associated with the "host hospital" model make this kind of service expansion difficult.

HIS hub

Definition: A more formal HIS delivery arrangement that facilitates the expanded use of a small number of shared HIS instances in Ontario, along with distinct governance and well-defined accountabilities of all parties.

An HIS hub focuses on the delivery of highly available, reliable, serviceable, secure, affordable and relevant HIS services to hospitals and clusters.

The hub model involves a clear delineation of HIS hub governance distinct from participating hospitals/clusters, and with well-defined accountabilities of all parties, in order to avoid potential conflict of interests.

An HIS hub would typically be spawned by a larger cluster host hospital, leveraging the advances and critical mass that larger hospitals have been able to achieve with respect to HIS implementations.

HIS hubs would represent a scale and concentration of specialized resources that would offer a balance of efficiencies and economies of scale while still reflecting regional variability inherent in Ontario's health care system. They would represent a critical mass and advanced state of maturity capable of driving ehealth innovation and adoption on an ongoing basis.

2.2. Future state and benefits to be realized through HIS renewal

Most Ontario hospitals will be part of HIS clusters. Some HIS cluster "host hospitals" are expected to morph into or spawn HIS hubs. All the while, the number of distinct HIS vendor solutions and instances will be reduced from their current levels.

The panel envisions a future state where Ontario hospitals participate in HIS clusters and HIS hubs:

- The large majority of hospitals will be part of a HIS cluster on the basis of common patient population or clinical affinity, for the purposes of adopting/utilizing a common HIS service. However, some of the largest hospitals are likely to retain single HIS instances.

- The majority of HIS clusters will have completed their transition to a common HIS instance or be well on the way. As a result, most hospitals will be out of the business of operating core HISs.

- Some HIS cluster host hospitals will have morphed into or spawn more advanced HIS hubs.

- HIS hubs will be an integral part of a mature provincial ehealth program and have an increasing role in addressing the ehealth and health informatics requirements of patients and health service providers.

- The number of distinct HIS vendor solutions and HIS instances is expected to be reduced from current levels.

HIS investment benefits include:
- *Enhanced patient outcomes*
- *Better health system integration*
- *Greater economies of scale*
- *Advanced HIMSS EMRAM maturity level*
- *HIS ecosystem open to consumers and clinicians*

Hospitals will fully benefit from HIS investments:

- The value from HIS investments will have increased significantly as a result of enhanced patient outcomes, greater health system integration, increased efficiencies and better economies of scale.

- All hospitals will be utilizing appropriate HIS services at a higher maturity level on the HIMSS Analytics Electronic Medical Record Adoption Model (EMRAM) scale with respect to their utilization of standardized / best practices associated with electronic health information and clinical applications.

- Hospitals, affiliated health service providers

(HSP) and their patients/clients will be able to easily access and utilize the emerging ecosystem of consumer and clinician applications in conjunction with their core HIS services via a wide range of channels, devices and solution providers, thereby ensuring flexibility, responsiveness and innovation at all scales.

Standardized HIS services:
- *Standardized with respect to evidence-based best practices*
- *Standardized infrastructure with predictable costs and performance*
- *Integration with provincial ehealth assets*
- *Active community of practice(CoP) to facilitate adoption*
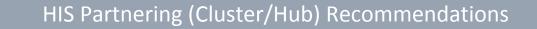- *Comprehensive measurement models for benefits and outcomes*

Hospitals will fully leverage standardized HIS services:
- HIS services will be standardized with respect to evidence-based best practices (business and clinical), helping to ensure province-wide, equal access to quality health care services.

- HIS services will have evolved into standardized infrastructure-type services with predictable and measurable costs and performance.

- Province-wide sharing of health information will be achieved through integration of HIS clusters and HIS hubs with provincial ehealth assets, which becomes tractable (technically and financially) as a result of fewer points of integration; this also contemplates integration opportunities with other sectors.

- There will be an active community of practice (CoP) that will facilitate the ongoing adoption of evidence-based best practices with respect to the application of IT and health informatics.

- Hospital clusters will be well down the path of working with LHINs and other HSPs towards integrated health care networks more generally, contributing to the patient-centred health care system envisioned in the ministry's Patients First and LHIN Renewal initiatives.

- Comprehensive models for the measurement of benefits and outcomes associated with investments in and application of HIS and other eHealth services will have been developed and implemented.

- Performance measurement and related funding of HSPs with respect to the effective application of IT and health informatics is fully integrated with performance measurement and funding related to patient and health system outcomes more broadly.

2.3. HIS Renewal Advisory Panel Recommendations ***

In order to achieve the future state described above, the panel tabled the following recommendations as advice to the Digital Health Board to advance the objectives of *Patients First* and of the Digital Health Strategy. The board approved the recommendations in the Spring of 2016.

HIS Partnering (Cluster/Hub) Recommendations

C1 When undertaking HIS renewal, hospitals must form HIS clusters to maximize the value of current and future investments.

The panel will develop a framework to define the value proposition, with a focus on measurable patient benefits to be achieved as a result of HIS investments.

C2 Hospitals must work with Local Health Integration Networks (LHINs) and other partners to assess geographic clustering options and non-geographic alternatives as supported by patient referral patterns and a comprehensive, value-based analysis.

C3 Prior to initiating a return to market, clusters must leverage existing HIS installations where informed by the results of a comprehensive value-based analysis.

C4 The ministry should set an expectation that very few exemption requests will be considered for recommendations C1-C3 and that hospitals pursuing a related exemption will need to meet a high approval threshold from the eHealth Investment and Sustainment Board (renamed Digital Health Board).

C5 The panel will develop a provincial strategy to define a maturity path that fosters the capacity for high-performing hubs to ensure a sustainable, long-term approach to managing HIS investments.

HIS Clinical Adoption & Outcomes Recommendations

A1   The ministry will work with hospitals to draw on existing resources and networks of health care professions to formalize an HIS Community of Practice that supports the acquisition, implementation, and optimization of HIS systems.

This HIS Community of Practice, once established, will share high-value clinical and business assets that support the evidence-based standardization of clinical practices within hospitals.

A2   The panel will propose strategies to better deploy and share the knowledge and expertise of clinical, IT, and decision-support professionals through on-the-ground support and training.

HIS Procurement Recommendations

P1   The ministry should make it a top priority to seek appropriate policy approval to enable hospitals to join existing peer HIS installations, where there is a strong clinical and financial business case for doing so.

P2   The ministry should promote general HIS procurement best practices by releasing a provincial HIS Renewal Guideline that supports the sector in structuring multi-tenancy procurements, while clarifying best practices on data and interoperability standards as promoted by the Canadian Institute for Health Information and eHealth Ontario.

P3   The ministry should create opportunities for meaningful dialogue between hospitals and the vendor community to accelerate innovation.

HIS Financing Recommendations

F1   The Panel will develop cost standards for hospital accounting and coding to allow for more accurate projections of HIS-related expenses, and in turn support the effectiveness of ministry funding models.

F2   The OHA, with the support of the ministry, should modify the current Health System Funding Reform Predictor Tool so that hospitals can better understand local impacts that may result from HIS investments, while also validating these impacts at a provincial level.

F3   The Panel will support the development, approval, and use of a standardized tool to calculate the Total Cost of Ownership of HIS renewal activities.

F4   The panel will continue to explore how the Health Based Allocation Model (HBAM) and other funding models can support the adoption of evidence-informed practices related to HIS investments.

HIS General Recommendations

G1   The ministry should, with the continued support of health system partners, provide clear direction to the sector that coordinated Hospital Information System (HIS) investments are integral to effective patient-centred health care services, cross-sector integration and provincial connectivity.

G2   The ministry should, with the continuing support of health system partners, extend the mandate of the HIS Renewal Advisory Panel to create an implementation plan for these short-term recommendations, and to develop additional medium-term recommendations for consideration by the eHealth Investment and Sustainment Board (renamed Digital Health Board).

G3   The ministry should, with the continuing support of health system partners, work with the Ontario Hospital Association (OHA) to engage its members on the implementation plan for HIS renewal, as endorsed by the eHealth Investment and Sustainment Board (renamed Digital Health Board).

The panel was asked to extend their mandate to a second phase in order to oversee the implementation of these recommendations. As a key component of the panel's implementation plan, this guidebook focuses mainly on the HIS clustering recommendations (C1 to C5) and the HIS procurement recommendations (P1 to P3).

3. Implementing the recommendations: Ontario's approach to HIS renewal

Ontario's approach to HIS renewal is evolutionary and is rooted in building partnerships:

- Focuses on accelerating maturity in three key interdependent areas
- Must be supported by key policy enablers

There are four major components to HIS renewal as shown in the diagram on the left and described briefly below.

Figure 3-1 - Ontario HIS Renewal

3.1. HIS clustering maturity ***

An HIS cluster focuses on patient outcomes, quality of care and health system integration. Forming HIS clusters and moving on to a common HIS is a means to advance these interests. The HIS clustering evolution path is captured in the following 4-level "HIS clustering maturity model":

HIS clustering maturity level	Description
C0	A hospital has not undertaken any significant partnering with respect to HIS renewal.
C1	A hospital undertaking HIS renewal partners with another hospital with which it has an affinity related to patient care (region or specialty) to leverage that hospitals existing instance.
	If no such partner exists, the hospital undertakes renewal of its HIS in a manner which creates downstream opportunities for leverage by other hospitals.

C2	All (or most) of the hospitals that have an affinity related to a geographic or specialty patient population have established the prerequisite governance and are moving down the path towards a common HIS. This activity is based on a strong business plan, anchored in well-defined outcomes related to enhanced patient and health system outcomes. In some cases, these HIS clusters may cross LHIN boundaries
	As HIS service delivery matures in Ontario, the IT interests of HIS clusters in support of their patient and health system outcome goals will increasingly focus on:
	<ol type="a"> - the consolidation of a greater array of ehealth and IT related services, - service management for services increasingly provided outside of the cluster, and - aligning health information resources and their performance with local, regional and provincial business objectives.
C3	The HIS cluster extends beyond hospitals collaborating towards a common HIS, to include other sectors with the objective of collectively addressing the integrated health information system needs of an integrated, patient-centred health care system, and may bring together multiple level C2 clusters.

3.2. HIS shared service delivery maturity ***

As HIS partnerships evolve, a further consolidation of HIS solutions will occur within the province where HIS services, instead of being provided by a host hospital within a HIS cluster, will be delivered by a dedicated, technology-focussed business entity, that is, an HIS hub. Such an entity will be capable of delivering HIS services anywhere in the province (perhaps even beyond), but may initially have a regional or specialty focus.

The evolution of HIS service delivery has been formalized into an "HIS shared service delivery maturity model" described as follows:

HIS shared service delivery maturity level	Description
SD0	A hospital operates a stand-alone HIS, typically through a blend of in-house and outsourced services.
SD1	A host hospital provides HIS services to other hospitals within an HIS cluster, typically through a blend of in-house and outsourced services.
	HIS service delivery governance and HIS cluster governance are usually synonymous.
SD2	A host hospital provides HIS services to hospitals outside of its cluster (potentially other hospital clusters).
	Although this model may have some short-term utility in addressing urgent renewal needs in Ontario, it is recognized as having significant risks associated with governance, funding and operations (e.g. availability, integrity, security, change management, conflict of interest).

SD3	HIS services are delivered by a dedicated, distinct business entity: an HIS Hub.
	Such an entity is capable of delivering HIS services anywhere in the province (perhaps even beyond).
	Services are increasingly internet/cloud-based and involve a substantial degree of vendor managed services as a way to stay up to date on technology, have access to necessary skills and address a range of issues related to cost, quality of service and risk.
	This level of maturity is characterized by a clear delineation between HIS cluster and HIS hub governance, the two being bridged through strong contractual and service level agreements.
	It is envisioned that there will be a small number of these HIS hubs, representative of the key HIS products in use in Ontario, all based on a standard reference model (information, clinical, business), positioned to be "vendors of record" within a provincial ehealth services framework.

3.3. HIS community of practice maturity

HIS "community of practice" (CoP): It refers to the people and processes which are established to define HIS standards and best practices and support their implementation and utilization.

An HIS represents the clinical and business practices and associated information utilized by a hospital. The implementation and maturation of an HIS involves the explicit design/definition of these practices and information repositories on an ongoing basis as well as the change management associated with operationalizing them

A significant portion of the effort and cost associated with HIS implementation and maturation are associated with these activities.

Communities of practice have existed at the hospital and, more recently, at the cluster level. The result has been a significant duplication of cost and effort as well as significant variability in clinical and business practices and information specifications.

HIS community of practice and the evolution of HIS partnerships

As Ontario evolves towards:

a. Groups of hospitals utilizing a common HIS instance (HIS clusters), and
b. Fewer instances of HISs delivered by dedicated HIS shared service delivery entities (HIS hubs),

it is important that this evolution be supported by a community of practice that can establish and support standards and best practices province-wide on an ongoing basis. This community of practice should by fully intertwined with organizations and activities already established for

advancing clinical best practices, health system quality, etc.

3.4. HIS renewal policy enablers

Policy enablers are critical to the success of the HIS renewal program

It is recognized that moving forward with this approach to HIS renewal requires supportive funding/financing and procurement policies.

The BPS Procurement Directive exemption (see Section 4) is the first of these policy enablers specifically targeted at HIS renewal activities.

There are also several provincial initiatives underway that are highly inter-related with HIS renewal

These provincial initiatives include:
- • Patients First: Action Plan for Health Care
- • LHIN Renewal
- • eHealth Strategy 2.0
- • Supply Chain / Shared Services Review

Proceeding with HIS renewal in a manner that aligns with these initiatives represents both a challenge and an opportunity with respect to influencing the broader health care landscape in Ontario.

3.5. Short-term maturity level priorities (1-5 years) ***

HIS Cluster Maturity Level C2

Advancing all Ontario hospitals to at least HIS Cluster Maturity Level C2.
- • Includes creating the supports necessary to enable clustering.

HIS Shared Services Delivery Maturity SD1/SD2

Promoting additional hospitals/HIS instances to Shared Services Delivery Maturity SD1 (HIS cluster host hospital) and a select few to SD2 as appropriate, including appropriate procurement policy supports.

Strategy for HIS Shared Services Delivery Maturity SD3

Developing and implementing a strategy for Provincial HIS hubs (SD3):
- • Assess current HIS service delivery capability in Ontario with a view to identifying candidates to promote/create HIS Hubs
- • Assess alternative governance, service delivery and funding models
- • Propose a recommended model(s) and implementation strategy

Strategy for HIS Community of Practice

Developing and implementing a strategy for a Provincial HIS Community of Practice, beginning with some early pilot initiatives:

- Launch early pilots for change management
- Inventory existing activities and assets
- Develop a conceptual CoP Framework
- Identify priorities/opportunities
- Identify additional pilots/quick wins
- Develop strategy and implementation plan

HIS Renewal Policy Enablers implementation

Implementing the required HIS Renewal Policy Enablers:

- Develop and implement processes and guidelines relating to hospital HIS procurement
- Develop standard models for HIS TCO and tracking costs/benefits
- Continue assessment of hospital funding models within the context of HIS expenditures

4. Implementing the panel recommendations: Roadmap

An HIS renewal recommendations implementation project has been set in place to address the panel priorities and a task force (see Acknowledgement section for membership) has been put in place to support its execution. The Gantt chart and table below provide a summary of the eight workstreams making the implementation plan.

#	Workgroup Name	Month											
		1	2	3	4	5	6	7	8	9	10	11	12
1	HIS Renewal Integrated Project Management	Phase II Planning, Resourcing, Project Coordination & Reporting											
2	HIS Stakeholder Communication & Engagement (C&E)	Communication & Engagement Coordination across all Projects											
3	HIS Partnership Support	HIS Partnership Guidelines & Urgent Issues Resolution			HIS Partnership Opportunity Support								
4	HIS Partnership Long-Term Strategy	Vision, Principles,Target State & Maturity Path			HIS IT Hub Deployment Strategy					Regional Health Information Integration Deployment Strategy			
5	HIS Community of Practice		HIS CoP Governance & Recruitment		CoP Assets Repository & Existing Assets Collection					CoP Assets Development			
6	HIS Renewal Procurement Policy & Planning	TB/MBC Submission & Communication		Procurement Approval Process		Procurement Business Case Development Guidelines Phase 1			Procurement Business Case Development Guidelines Phase 2				
7	HIS Costing Standard & TCO Tool		Costing Stds & TCO Framework Dev.		HIS Costing Standard Development & Roll-Out				HIS TCO Tool Development & Roll-Out				
8	HBAM Impact Analysis & HSFR Predictor Tool Update				HBAM Impact Analysis				HSFR Predictor Tool Update				

Workstream	Objective
HIS Renewal Integrated Project Management	To ensure that all implementation project activities, dependencies, resources, and deliverables are managed effectively across all projects, and that the panel and board are informed on progress and critical issues and decisions required.
HIS Stakeholder Communication & Engagement	To coordinate and streamline all stakeholder communication and engagement activities across all projects to optimize the use of the stakeholder's time and optimize their contribution to the projects.
HIS Partnership Support	To support HIS partnership activities in the province by providing hospitals and LHINs with an initial set of partnership guidelines, assistance with urgent issue resolution, and ongoing support through the implementation of their partnership.
HIS Partnership Long-Term Strategy	To provide a concrete path for the evolution of HIS partnerships from HIS clusters to high-performing HIS hubs and regional health information integration programs.
HIS Community of Practice (CoP)	To implement a HIS Community of Practice as a tangible and effective mean of sharing scarce HIS knowledge and assets across the sector.
HIS Renewal Procurement Policy & Planning	To submit for TB/MBC approval short-term and long-term changes to the BPS procurement directive to enable HIS partnerships, and to develop a HIS provincial VOR as long-term HIS procurement mechanism.
HIS Costing Standard & TCO Tool	To implement an up-to-date and relevant HIS costing standard and TCO tool that address their current deficiencies, and are positioned to support the planning, implementation and ongoing operation of HIS partnerships.
HBAM Impact Analysis & HSFR Predictor Tool Update	To understand and address the impact of HIS partnerships on hospital funding models, and to update the HSFR predictor tool accordingly.

5. BPS Procurement Directive exemption

What is the BPS Procurement Directive exemption?

The BPS Procurement Directive exemption is a policy decision approved by Treasury Board and ratified by Cabinet that allows, when specific conditions are met (as described in this document), an exemption from the open competitive requirements of the Broader Public Sector Procurement Directive, for extending or upgrading of existing Hospital Information Systems by Ontario hospitals, for the duration of the HIS Renewal Strategy implementation.

What is the purpose of the BPS Procurement Directive exemption?

The exemption is intended, for HIS clusters, to:

- Allow an existing HIS host hospital to procure, on behalf of the cluster, additional licenses to share its HIS instance ("as-is" or with a software upgrade) with peer hospitals within the cluster without competitive procurement
- Ensure that HIS host hospitals remain compliant with the BPS Procurement Directive by virtue of the exemption

Note that the use of the exemption is conditional to the adoption of a rigorous, auditable process requiring a strong business case and hospital boards/LHIN approvals consistent with the HIS cluster's formal MOU.

In order to access the exemption, hospitals will be required to follow the process guidelines described later in this section.

Why do we need an exemption from the Directive?

- This exemption will benefit hospitals joining an existing HIS cluster or forming a new HIS cluster that will leverage a host hospital's existing HIS instance.
- An HIS cluster needs the ability to retrospectively set up a multi-tenancy agreement in its HIS host hospital contract with the supplier in order to enable the provisioning of HIS services to peer hospitals within the cluster.
- The Directive requires a competitive procurement except where there is an applicable exemption, exception or non-application clause that exists under the trade agreements, all of which were determined to be unlikely to apply to procurements leveraging existing HIS instances.
- Without the exemption, hospitals would be deemed as non-compliant with their obligations set out in the Broader Public Sector Accountability Act (BPSAA) and Ministry/LHIN accountability agreements.

Who can submit an exemption request?   The exemption request is submitted by the HIS host hospital on behalf of the HIS cluster.