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WHITE PAPER

CANADIAN NATIONAL HEALTH INTEROPERABILITY STANDARDS

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PURPOSE / GOALS

This white paper recommends best practices for interoperability between healthcare IT systems. These recommendations are explored through history of interoperability in Canada, defining and providing context for the current state of interoperability within Canada, and then recommending paths that can be taken through open dialogue and adequate vendor engagement in system architecture and standards selection/design.

The paper provides insight for healthcare IT funders, vendors, and implementers within the healthcare industry by defining and advocating for best practices in interoperability.

HISTORY OF INTEROPERABILITY STANDARDS IN CANADA

Federal and provincial governments have been working on interoperability for over 20 years. Between 2005 and 2015, governments established various types of standards working groups and committees that ultimately had a responsibility to approve interoperability standards. The prevalent thinking was that once approved, it would naturally lead to standardized data exchange.

Unfortunately, this didn't come to fruition. Interoperability requires people to be motivated to exchange data using technology. While interoperability standards often address the structure and syntax of the data to be exchanged, they don't address the business drivers that motivate people to exchange data, nor do they specify the broader architecture of the technological components involved in the data exchange.

Another issue was that many of these standards bodies approved a single, new standard for a particular data exchange (e.g., lab orders and results). While this would make life easier for the system integrator in the middle, it was unrealistic to expect the end points in the data exchange (e.g., primary care EMRs, community lab's information systems, etc.) to change, especially if they already supported different standards.

Jurisdictions that attempted to procure applications that supported their approved standards often encountered a 'chicken and the egg' problem, which was that commercially available products didn't support the new standards because there was no evidence of a market demand for them. In turn, the Jurisdictions were reluctant to require interoperability standards as part of their procurements because of the lack of vendor support.

There was also a hubris that every potential data exchange need could be identified, modeled, and standardized on a global scale, and likewise at a national and jurisdictional level. This led to very rigid and complex standards with long development lifecycles that didn't keep pace with the needs of implementers, who's development cycles were becoming simpler, shorter and more agile.

The other thing we all got wrong was re-use and collaboration. There was lots of pan-Canadian collaboration on new standards, but there was minimal vendor participation to provide balance to the discussion about what was realistic, nor did the Canadian vendor community self-organize to define standards they would commit to supporting. Likewise, the collaboration discussions often focused on common needs for new standards, instead of focusing on existing workflows, architectures and supporting standards that could be re-used across jurisdictions.

Data and information governance that spans across multiple health organizations has been a critical success factor for those jurisdictions that have had success in standardized data exchange. Beyond technology, the trust between data contributors and their commitment to a shared vision is key to resolving many of the business barriers to interoperability. Effective governance and leadership are the success factors that enable trust and support for a common vision for interoperability and the data usage to support the quadruple aim of care. For many Jurisdictions, digital health governance is still a work in progress. However, the last decade produced numerous frameworks and best practices to help organizations mature their governance practices.

CURRENT STATE: WHERE WE ARE TODAY AND DRIVERS OF CHANGE

Canada has made great progress towards interoperability. One bright spot is the fact that Integration Engines (IE) have been deployed both within the hospital sector and more broadly across some Jurisdictions. There is a healthy competitive marketplace for IE products, with expanded functionality that has resulted in reduced cost for integration for client organizations. Following the demand for increased interoperability, many of the major EHR/EMR vendors have developed a broad spectrum of traditional messaging interfaces and more modern RESTful based APIs which use industry standards such as HL7 (v2, v3/CDA and FHIR).

There are several drivers of change for interoperability within Canada. These include:

- **Vaccine passports** (currently in use within the European Union due to the COVID-19 pandemic)
- **National immunization registries**
- **National digital identities**, and
- **Discussions on the creation of national formularies** for bulk purchasing of drugs and medicine for all Canadians (national pharmacare), and consumer access to data.

The global pandemic has also highlighted the lack of integration between digital health assets and the lack of structured data to support analytics. As an example, community and primary care EMR data is often not available to decision makers and other parts of healthcare industry providing care (e.g., Acute Care, Long Term Care, etc.). There are various business barriers that impede integration with EMRs, such as clinician concerns about how the data will be used, and even when integrated the prevalence of free text data capture in EMRs prevents the ability to use the data for analytics. However, it is encouraging to see Canada Health Infoway and provinces like Ontario and Alberta working on patient summaries that source at least some of the data from primary care.

The TECHNATION National Health IT Survey respondents echoed these themes as can be seen in the diagram below:

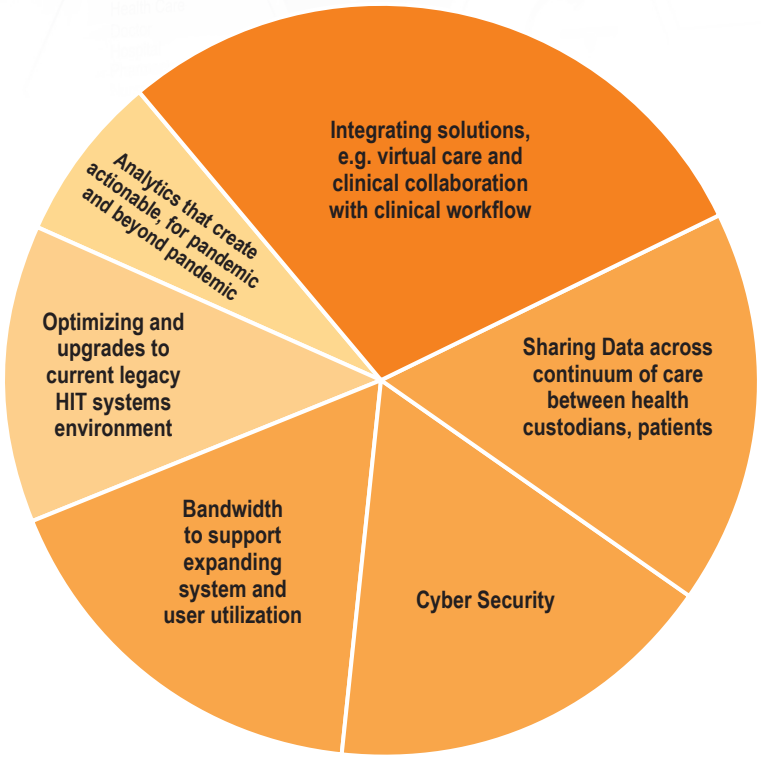


Figure 1 - What is the most pressing IMIT Issue that your organization is dealing with that the Health Information Technology Vendor Community can assist with?

The shift to a modernized labour in healthcare is another driver for change. Clinicians that were resistant to moving away from paper in healthcare have retired or adapted to this change. In parallel, a younger, more technically savvy workforce has an increased demand for data through digitization of healthcare, which leads to increased demand for interoperability as no single system contains all data about a patient.

There is also a shift towards interoperability and decentralization of data rather than ownership between jurisdiction and Health Information Exchange (HIE) organizations. These discussions have evolved with new models of identity and access management.

However, despite improvements in interoperability and an increased demand for data, many gaps/silos still exist within jurisdictional health systems, and more acutely across jurisdictional health systems.

RECOMMENDATIONS

Looking back at Canada's EHR efforts over the last 20 years it's clear that interoperability can be complex. The following recommendations are intended to address some of that complexity and help interoperability initiatives be more successful. They're broken down into three categories:

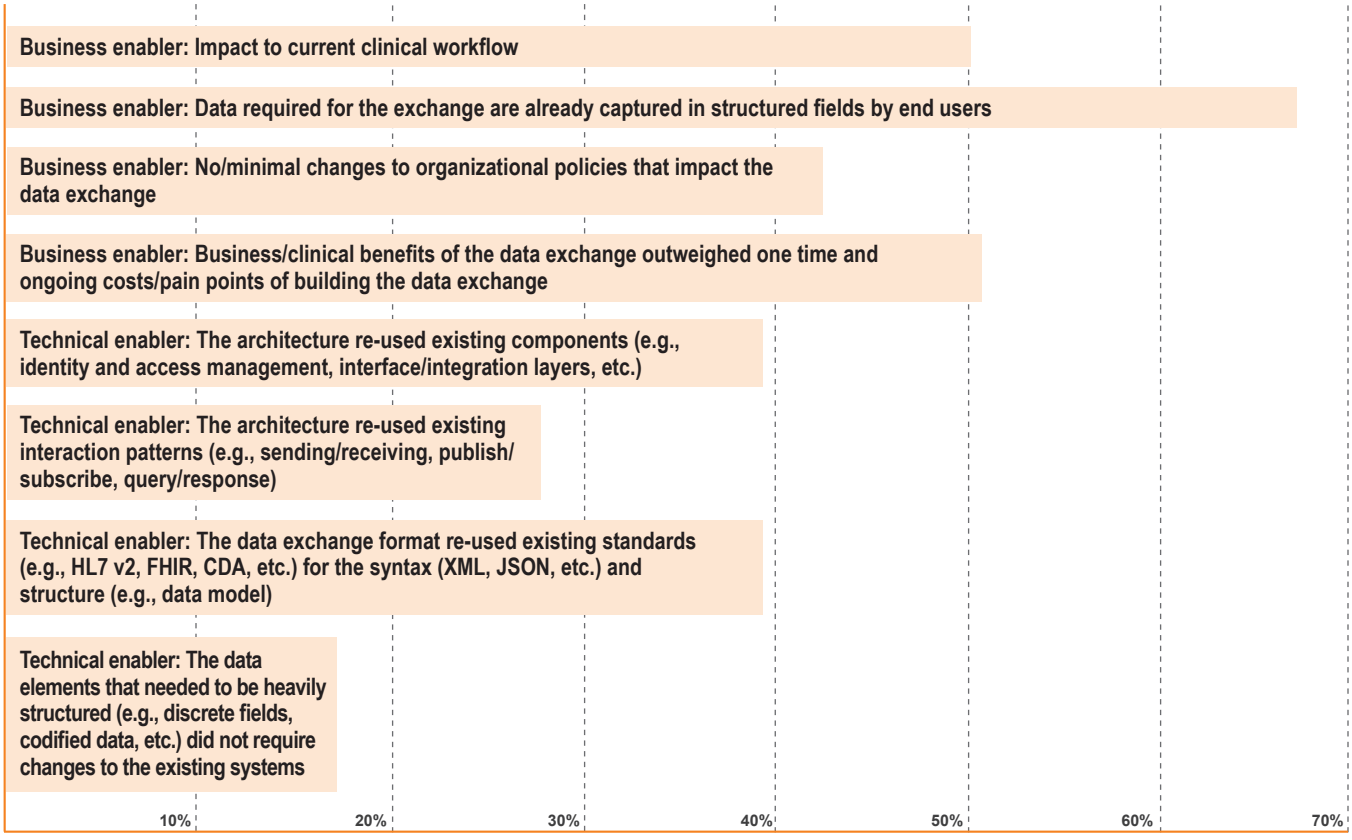
1. **Business** – these recommendations address the human barriers to interoperability
2. **System Design/Architecture** – these recommendations address the barriers to interoperability that arise from application and system architecture
3. **Standards** – these recommendations address interoperability barriers related to the selection, development and implementation of interoperability standards

1. Business

Figure out the adoption model for clinicians capturing/consuming the data, and the adoption model for vendors developing the data exchange capability in their products.

Many interoperability initiatives in the past failed to understand the people side of what appeared to be a technical problem to solve. The TECHNATION National Health IT Survey found that the majority of respondents cited business barriers as the key reasons interoperability initiatives have been unsuccessful.

Figure 2 (responses by percentage) – What are the business and technical barriers that you have encountered that contribute to unsuccessful health data exchange?



Interoperability often involves capturing clinical data in one point of service system and making it available to other clinicians using different systems. All too often these different clinicians are incorrectly treated as single groups with common needs.

In reality, the benefits of interoperability often accrue to data consumers (i.e., the people that access the data) and as such data contributors need incentives to share the data. Both groups want the ability to contribute or consume the data using existing systems and workflow, but the actual systems and workflow will differ between the two groups.

Similarly, incentives for vendors and system implementers also need to be determined – particularly for vendors of point of service systems. There are lots of different incentive models, a common one is paying a few vendors to develop the required changes to their products (carrot) and then making it a requirement for all subsequent vendors (stick). A similar approach can be applied to incentivising data contributors.

Jurisdictional governments should engage the vendor community frequently to share their longer-range interoperability goals...

Payment can help but it's not the only incentive. Product roadmaps and customer demands also have a big impact on vendor ability to participate in the development of new data exchange capabilities. Jurisdictional governments should engage the vendor community frequently to share their longer-range interoperability goals, and near-term plans for updating existing integrations or building new ones. Vendors can in turn provide valuable feedback to the jurisdictions to help inform their plans and likewise, the vendors can incorporate jurisdictional plans into their own product roadmaps.

2. System Design/Architecture

Favour agility and speed over perfection in architecture and standards. In the past, the focus was on documenting everything related to the technical design and business use of a system. This focused efforts on perfecting documents prior to building and deploying systems. Projects could spend years in the design phase with nothing to show for it. Projects that completed the build phase found that deployment took even longer.

Modern approaches focus on getting a minimum viable product (MVP) into end users hands as quickly as possible, iterating, and growing from there. Design documentation is still important, but it doesn't need to be perfect.

Resilient and sustainable architecture. Building MVPs that can evolve to meet new needs requires applying design principles such as open architecture and open API. Systems that apply these principles tend to be highly configurable and extensible so that changes can be introduced with little to no impact to the end points in the system. This often requires visioning the future state and the complete set of potential users and data requirements, and then designing the MVP so that well defined current needs are met and the capability to meet future needs are built as configurations that can be turned on/off as required.

Engage others with similar needs and implementation experiences. The goal is to find out what has been implemented elsewhere to determine what can be re-used – this applies to everything from system architecture down to the re-use of messaging and terminology standards, and even the re-use of software. The more interoperability initiatives can align their requirements, workflows, and applications, the closer the industry moves towards interoperability.

If you don't know where to find other implementers, Infoway's Infocentral has numerous working groups with representatives from across Canada. Likewise, Standards Development Organizations (e.g., HL7, SNOMED International) and industry associations (e.g., TECHNATION Health) are great places to post questions to see who else has done something similar or has similar needs.

If the interoperability initiative requires changes to vendors' products, then vendors also need to be engaged in architecture and standards design discussions. This helps ensure system design and adoption models survive contact with the reality of what vendors' products currently support, future product capabilities (i.e., product roadmaps), and other constraints (e.g., resource availability). Due to competition amongst vendors, its best to arrange separate meetings with each vendor if they are expected to share detailed information about their products. Industry associations like TECHNATION can help identify vendors to contact.

Privacy and security are everyone's responsibility. Interoperability introduces complexity regarding accountability for privacy and security of data at rest and in transit. All parties, including vendors, need to be prepared to do TRAs and PIAs on interoperability projects within their scope of accountability. This often means being prepared to clarify accountabilities and demarcation lines with clients and their data exchange partners.

3. Standards

Systems integrator mentality. Previously, the prevailing mindset was that jurisdictions could establish a single standard for all end points involved in data exchange. Instead, the systems that sit in the middle of data exchange need to support the messaging and terminology standards favored by the end points. This often means there could be different standards for data contributors and data consumers. For example, most community lab information systems can easily send lab results using HL7 v2. Whereas a patient facing mobile app might want to consume that data using HL7 FHIR. Instead of forcing one of the end points to change, the systems in the middle should be designed to support the different standards.

Reuse common standards *and* workflows. This applies to standards used within healthcare (e.g., coding and terminology standards) and those from outside of healthcare (e.g., OAuth 2 for authentication). It also extends beyond the standards themselves to how they are implemented to support a specific workflow. For example, lab results can be expressed in FHIR, but still be implemented in different ways. One lab system could be designed to send FHIR lab

result message automatically to a receiving clinician's EMR. Another lab system could be designed to store the lab result as a FHIR document with a notification sent to the receiving clinician's EMR that it is available to download if they want it. The lab result "payload" in FHIR can be the same in either approach, but the end user workflow and application interfaces can be vastly different due to the different workflows. Minimizing differences in workflow and standards reduces barriers to interoperability.

Provide Reference Systems and Connectathons for Developers. Developers need reference systems that they can exchange data with as they develop their code. This allows them to quickly address misinterpretations of the standards implementation guides and see if their code is working as expected. Reference systems can also support connectathons, which bring together implementers to test and demonstrate that their products are capable of exchanging data according to specific standards. Purchasers and implementers can monitor the outputs of these connectathons to get a sense of vendor community support for specific standards. This helps address the "chicken and egg" issue identified earlier, whereby purchasers don't ask for standards in procurements because they don't know if vendors support them, and vendors don't support them because customers don't ask.

Building reference systems is easier than ever with newer standards such as FHIR that have a large community of support and numerous opensource tools for everything from servers and repositories to automated testing tools.

TECHNATION Health is happy to work with any organization that wants to establish connectathons and engage the vendor community and their client organizations.

CONCLUSION

The healthcare IT industry has matured significantly over the past 20 years. Examination of our past interoperability successes and failures, coupled with leading practices and technologies from the broader IT industry and a deep understanding of the change drivers will position the Canadian healthcare IT industry to do a better job of providing healthcare data for clinicians and policy makers through increased interoperability between point of care systems and provincial digital health assets.

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