A Hitchhiker's Guide to an Interoperability Projectathon

What is it that you need to know?

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Canada Health Infoway
Inforoute Santé du Canada

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Foreword

Welcome to the newest addition of health care interoperability testing in Canada, the Projectathon! We hope that your participation in the upcoming events will deliver value for you and your organization and will help to pave the way to a more predictable future for Canadian health care interoperability.

Integrating the Healthcare Enterprise (IHE) Connectathons have long been viewed as a staple of technical interoperability testing around the world. In fact, in the United States under Healthcare Information and Management Systems Society (HIMSS) leadership, ever-increasing showcases of health care connectivity have been organized for many years. More recently Europe, South America, Asia Pacific and other parts of the world have also started adopting this testing approach. A key benefit of Connectathons is the ability to provide objective evaluation of technical specifications and to demonstrate solution portability and encapsulation.

Canada Health Infoway will leverage and further enhance the baseline of IHE tools, methodology and specifications for accelerating interoperability in Canada.

Connectathon Background

IHE International, the organization that introduced the concept of the Connectathon, broke down complex interoperability scenarios into the so-called Integration Profiles. These profiles (as they are referred to by the health information technology industry) are detailed technical specifications that describe and clarify how to use standards in an unambiguous way to solve a particular interoperability challenge.

The technology platform at the core of the Connectathon is called Gazelle and it represents a technical rendering of the integration profiles. The platform allows vendors to test and prove that their products align with the published specifications. This brings many benefits to both digital health solution providers and to implementers wishing to invest in a particular capability. Products can be selected based on listed interoperability capabilities that have been proven in these connectivity events.

Connectathon Objectives

Connectathons represents a high quality, technical conformity assessment event (quality label) where participants prove that their products have implemented industry grade integration profiles (standardized pieces of core interoperability) and that their products can successfully carry out data exchanges with other systems (concepts of plug & play). Successful participation in a Connectathon event allows vendors to proudly and confidently represent that their product(s) conform to published interoperability patterns. This offers system integrators and health data custodians the opportunity to design data infrastructures and distribution networks by choosing standardized capabilities from products that display these seals of successful connectivity.

It is much easier to design a complex eco-system from standardized pieces of functionality than it is to describe every single aspect of systems in isolation. Just like the most complex electronic systems are built from catalogs of discrete elements, integration profiles break down the complexity into manageable pieces of core functionality. System integrators, who are responsible for designing

strategies and architectures that deliver interoperability ecosystems, can use this approach in their system design.

Projectathon objectives

Projectathons are the workshop versions of the Connectathons. Typically, these events are organized for specifications under development or specifications focused on a limited realm (national/regional). The Projectathon brings together vendors to test and collaborate on these specific use cases. The key difference between the Connectathon and the Projectathon is that the outcome of the Projectathon does not result in a conformance stamp of approval for products. The intent of Projectathons is to accelerate product development, bring developers and implementers together and help identify and bridge difficult conditions in specification development that have the potential of becoming insurmountable, threats to clinical and business workflows.

Projectathon Lifecycle

Participation in a Projectathon connectivity event includes three distinct phases:

1. Registration - vendors register their organizations, systems, identify which Profiles their systems support, etc.,
2. Pre-Projectathon Testing – vendors perform pre-event testing to check that their systems can interoperate with the platform simulators, and,
3. Projectathon Execution – vendors participate in the event itself where testing will be done against other live systems, simulating actual implementation environments.

For a detailed description of each of these phases please see Appendix A: Getting Ready for the Projectathon.

Interoperability in Canada

The Canadian Patient Summary (PS-CA) project is a great opportunity for Canada Health Infoway to advocate and proactively lobby for the adoption of these best practices in technical interoperability, embracing proven methodologies for the development of the PS-CA specification package.

Adopting the profiling approach, Infoway has extended the integration choices available to digital health solution developers by introducing the Canadian FHIR Exchange (CA:FeX) integration profile.

There is a strong belief that these patient summaries will be more than just FHIR©® documents. They carry the opportunity for broader data exchange, breaking down barriers of distribution and bring patients closer to their own data and care. As such, it is important to recognize that successful implementation of these specifications will have to solve a number of challenges, some being outside the realm of the summary itself.

The first Canadian Projectathon is a no-fee event organized and sponsored by Canada Health Infoway, designed to be a first in a line of events that will introduce increasingly more complex scenarios to the market, work with vendors and stakeholders to identify, test and solve typical data exchange and workflow challenges that hinder current integration efforts.

Thank you for showing interest in building a more proactive and predictable path for the future of health care interoperability in Canada.

March 2022 Projectathon

Infoway organized a pre-Projectathon program aimed at attracting, informing, training and supporting vendors in getting their products ready for the Projectathon.

The focus of the March 2022 Projectathon will be placed on:

- Testing the readiness and completeness of the PS-CA specification package,
- Providing vendors the opportunity to test their product development in support of patient summaries,
- Providing opportunities for live interaction with other industry participants, clinical & business leads,
- Interacting with the PS-CA and the Canadian FHIR Exchange (CA:FeX) specification development team for Q&As; and
- Giving feedback on how to improve the specifications and identifying perceived gaps.

With these goals in mind, the Projectathon is scheduled to run over a period of three days during which it will have two distinct parts:

Part 1: March 21 & 22: Peer to Peer Testing	Part 2: March 23 - Demonstrations and Business Focus
In this phase of testing, participating vendors can work with partners to execute the test steps for the desired profiles	In this phase of testing, more complex testing scenarios and facilitated discussions focusing on clinical and business needs and opportunities will be covered

To support participants, a daily schedule highlighting important details and related communications will be provided in advance.

The following resources and reference links are also available to support Projectathon participants:

- Moodle Platform: Training videos and other supporting resources available here.
- InfoCentral Patient Summary Working Group: Announcements and instructions available here.
- InfoScribe: Overview and milestone dates available here. In addition, links to several webinars that were held to give the industry a better chance to learn, stay informed and get ready for participation are available within the Projectathon Schedule, available here.

Projectathon Logistics

Pre-pandemic, Connectathons were large technical events where vendors brought their own systems and sizeable teams. More recently (last two years), many of these events have moved to the virtual space.

The March 2022 Projectathon will be held as a virtual event with the proposed daily schedule:

Time (EST)	Activity
10:00am – 10:15 am	Daily briefing
10:15am – 1:00pm	Testing/Debugging
1:00pm – 1:30pm	Lunch
1:30pm – 4:00pm	Testing/Debugging
4:00pm – 4:15pm	Debrief and wrap up

The Projectathon Event

All testing and configuration activities described in the Getting Ready for the Projectathon are necessary to prepare vendors and their systems for the Projectathon. The testing approach will be:

Gazelle system configuration:

- Based on the vendor system configuration, Gazelle will generate the table of end points for the platform proxy. This will allow Gazelle to identify and connect various actors to one another during the Projectathon. Vendors will recognize the test cases they signed up for and use Gazelle's control interface to identify compatible actors from the available pool and initiate a testing session.

Communication:

- User accounts created during the registration phase will have mirror user ids in the communication platform RocketChat. Vendors will be using these channels to contact their peers on the system they would like to test with. Special virtual channels will also be set up to contact Projectathon Test Managers for any questions concerning the test scenarios Details for communications will be distributed before the event.

Testing between systems:

- Once a testing session is initiated between two test systems, Gazelle will display the entire list of steps that need to be carried out by the two systems. This list of steps includes sequence diagrams to guide participants. At various points in the test, vendors may be asked to collect the evidence of successful execution of the steps. These items will be

automatically submitted by Gazelle to Projectathon Monitors once the test is finished and marked “To be verified”. Upon completion of the test, vendors can start working on the next test case. Test cases can be temporarily paused to allow testing flexibility. This would typically happen if a vendor is experiencing issues with their system and requires some investigation. In such cases the alternate party does not need to stop their testing. Rather, they can identify another actor and proceed with execution of another test.

Outcomes:

Under ideal conditions:

1) Vendors will finish tests assigned to them and submit their results for validation.
2) Projectathon Monitors will start the process of grading the results and place the tests in the appropriate state:
    a. Successful ones will be marked complete
    b. If issues are encountered, Monitors will contact the vendor for clarification. In some cases, test results will be rejected and an explanation will be added in the comment section. Vendors can then decide to repeat the test to remedy the issue or abandon the test case.

For large events, not all test results can be graded during the event. Typically, all results are graded within a week of completion and results are announced in the event report.

Testing Objectives - Day 1&2

First two days are focused on peer-to-peer testing exploring the interoperability aspects of the specification. Under ideal conditions, depending on the number of vendors signing up for the event and their system capabilities, tests would offer a high degree of coverage for all profiles represented in the PS-CA Companion Guide to Reference Architecture. There are two categories of integration profiles:

1. Core integration profiles: MHD, CA:FeX
2. Supporting integration profiles: e.g., IUA, ATNA, CT, PIXm/PDQm, etc.

Core Integration Profiles

The recommended, core integration profiles for PS-CA are MHD and CA:FeX. The main objective of the Projectathon is to assess their alignment and ability to support a PS-CA FHIR document exchange between parties. They are marked as Required in the specification with the expectation that either MHD or CA:FeX should be supported for a true FHIR exchange of these structured documents.

Supporting Profiles

While future integration models will likely employ native FHIR servers to exchange FHIR documents, Patient Summaries can also be viewed as binary documents which can allow for an exchange using more generic document management systems such as XDS.b. For vendors that would like to explore

how their XDS capabilities can be applied to Patient Summaries, the XDS option is also available during the Projectathon.

During the development of the PS-CA specification package, requirements gathering indicated that summaries will likely be exchanged in eco-systems where a number of conditions will be required. These could cover, securing applications, identifying users and their access levels, identifying patients and their identifiers, etc. Some of these business problems have already been solved for by IHE International. The integration profiles that showed promise in offering out of the box solutions for consideration by vendors and implementers alike have been gathered in the Companion Guide to Reference Architecture and are included in the list of available Profiles for testing. Vendors that have these capabilities built into their systems can demonstrate them at the main event.

PIXm/PDQm, PMIR

Patient identification in a summary might need to represent the jurisdictional context. These Profiles have pre-defined capabilities listing how to retrieve a patient identifier. Vendors with capabilities in these areas may want to demonstrate their abilities.

Internet User Authorization (IUA)

Access to exchanging patient summaries will very likely be governed by internet-based access tokens. While the current version of the PS-CA does not yet cover details surrounding these aspects, IUA is an IHE Profile developed for such cases. Vendors that have system capabilities in this area are encouraged to bring them forward to demonstrate how these integration profiles work.

ATNA, CT

The concept that all nodes participating in over-the-web exchange of information shall be secure and log their activities are core to any security framework. There are a number of integration profiles that IHE developed over the years that offer basic support in this area. These profiles are usually prerequisites to testing anything else, however, given that the main focus of the PS-CA specification is on the core data model and its exchange, this version of the specification expects that security aspects will be handled by the implementing organizations, as such lists Profiles as optional. Vendors that have capabilities in these areas are encouraged to test and demonstrate them.

Testing Objectives – Day 3

Day three will focus beyond peer-to-peer testing. Observers will be invited to discuss clinical/business scenarios, share lessons learned and explore potential short term next steps for the evolution of the PS-CA specification.

Depending on vendor capabilities, group testing could occur and organize multiple vendors into groups to carry out more complex scenarios. Additionally, there could be opportunities for vendors to demonstrate a specific profile and generate discussion on optimal integration choices to best address clinical/business needs. New candidate profiles for future integration patterns could also be explored as part of this day's session.

Test Data and Tools

As mentioned above, one of the objectives of the Projectathon is to evaluate the vendor systems' ability to compose a well-formed, complete Patient Summary (PS-CA) as defined in the published specification package.

To aid in this effort, Infoway has prepared a number of realistic clinical scenarios for both EMR and HIS environments. These scenarios present a plausible patient history and the associated data that would likely be captured in the aforementioned clinical systems. The intent is for vendors to take these spreadsheets and using their user interfaces to populate the core data into their databases. This will then allow for the generation of a Patient Summary document for these test patients. This way, generated document can be compared against a source of truth for both coverage and content.

While the above data set paints a realistic clinical scenario, there is value in also trying to test for all possible data points that could be included into a PS-CA document. A second dataset was created for this purpose. This latter one includes properly coded values for all elements of a well-formed Patient Summary document. Vendors are encouraged to try to enter this data into their core systems and generate a Patient Summary in an attempt to include all synthetic data.

To aid with the analysis and rendering efforts, Infoway has prepared a tool that accepts a JSON instance of the vendor generated Patient Summary and renders it on the screen for human consumption. Vendors should export a JSON or XML instance of the exchanged PS-CA and upload it to the tool here. The results can then be discussed.

The project team is also looking for feedback on the level of difficulty in mapping the test data to the vendor schemas and that associated with representing them in the generated document. Bring your feedback to this segment of Day 3.

What's next

What comes after the three-day Projectathon? Once the event has concluded, lessons learned have been shared and summary reports have been written, what comes next?

Once the event has concluded, Infoway will work with participants and additional stakeholders to document lessons learned and key findings from the session. These insights will help to inform a variety of outputs such as:

- Enhancements to the next versions of the PS-CA and CA:FeX;
- Additional use cases that should be prioritized to further support adoption of the profiles;
- Opportunities for strengthened and continued stakeholder engagement;
- Assessing the value and timing of future events

Moving forward, Infoway will continue to collaborate with its partners to identify opportunities to scale and spread awareness and adoption of the PS-CA.

Please continue to check here for regular updates.

Appendix A

Getting Ready for the Projectathon

The primary purpose of the Registration and pre-Projectathon testing phase is to:

- focus vendors on analyzing their system capabilities to identify alignment with target Profiles
- register and configure these systems to connect to the Gazelle platform
- test their systems against simulators exposed by the platform (where applicable), to confirm the self-identified alignment
- gain familiarity with Gazelle's control interface and learn about the tools used during the actual testing event.

Registration

Typically, organizations that participate in Connectathons will bring multiple products to these events.

To make management of these systems more convenient, Gazelle defines an internal information model where the top of the pyramid is the Organization.

Organizations

Organizations are entities that group together all content associated with a vendor. The staff, systems, primary contact information, financial representatives (for broader events where participation fees are collected), payment schedules and contracting (where applicable).

Organizations are created by the person that registers them who also becomes the Administrator.

System users

Administrators, who are also users, have the right to create other users and assign them roles within the organization. Some will become operators of their products (user-role), others will interact with other vendors and organizers to run the tests and discuss results (vendor-role). Administrators are also responsible for setting the main organizational technical contact and financial contact (where the events are fee based). Administrators will typically also define and start configuring their systems.

Systems

Vendor products participating in a connectivity event are referred to as Systems. They are identified by a system keyword and have technical configurations (typically hostnames, IP addresses, ports).

Given that vendor products are often very complex systems geared towards supporting a particular business area (EMRs, HISs, HIE, Apps, etc.), they are designed with user workflows and interfaces in mind. Implicitly, these systems rarely have a marked focus on advertising their capabilities in terms of

IHE or other integrations Profiles. While marketing may not highlight these aspects, the specifications behind these products often rely on integration profiles as core design elements.

System Configuration is the step meant to identify product capabilities by requiring administrators to state which integration profiles their products support. As an example, an HIS is performing a vast array of functions, however, for the purposes of this testing event, the system could be listed to demonstrate its capabilities as a Secure Node (ATNA profile), time synchronization (CT), assembly and distribution of a Canadian Patient Summary (PS-CA) document through an MHD or CA:FeX transaction set.

The vendor's desire to showcase and test for these capabilities is realized through a selection choice when configuring their systems in Gazelle where the claimed integration profile(s) are associated with their system. It is these associations that will allow pairing of compatible vendor systems during the actual event. This is how a Document Source and Document Recipient for an MHD profile, for example, can end up finding one another in the actual event and start peer-to-peer testing.

When a vendor finishes configuring all the systems they brought to the event, the registration process is considered complete and it is marked by a status change ("Complete").

Pre-Projectathon Testing

Systems that are configured as complete are ready for the next phase, pre-Projectathon testing. This is equivalent to a dress rehearsal before the main event. It helps vendors confirm that their configurations are sound and that their products can indeed execute the transactions they signed up for.

Gazelle has a wide array of simulators for various Profiles, but not all of them. As such, there may be roles that systems have signed up for that will not be able to benefit from pre-event testing. In these few cases, the recommendation is to double check that your systems are as aligned to the technical specification as possible so that you are ready for the peer-to-peer testing where Profile transactions will be possible against other live systems.

Considering that both the PS-CA and CA:FeX specification packages are still under development, Gazelle does not currently have simulators for them. However, the technical development team at Infoway has prepared an openAPI rendering of the MHD and CA:FeX integration profiles with an added ability to use these tools as client and server simulators in the pre-Projectathon testing. More information is available on the event page.

The pre-event testing is expected to collect proof of vendor self-assessment that the systems are capable and have passed the preliminary tests. This step is a professional courtesy to other Projectathon participants so that time is not wasted in the actual event debugging fundamental connectivity problems. Please make the effort to get your systems ready for the main event.

Projectathon Testing

All testing and configuration activities mentioned thus far are necessary to prepare vendors and their systems for the main event. The March 2022 Projectathon peer-to-peer testing will be conducted over the first two days.

Based on the vendor system configuration, Gazelle will generate the table of end points for the platform proxy. This will allow Gazelle to identify and connect various actors to one another during the Projectathon.

Vendors will recognize the test cases they signed up for and use Gazelle's control interface to identify compatible actors from the available pool and initiate a testing session. User accounts created during the registration phase will have mirror user ids in the communication platform RocketChat. Vendors will be using these channels to contact their peers on the system they would like to test with. Special virtual channels will also be set up to contact Projectathon Test Managers for any questions concerning the test scenarios.

Once a testing session is initiated between two test systems, Gazelle will display the entire list of steps that need to be carried out by the two systems. This list of steps includes sequence diagrams to guide participants. At various points in the test, vendors may be asked to collect the evidence of successful execution of the steps. These items will be automatically submitted by Gazelle to Projectathon Monitors once the test is finished and marked "To be verified".

Upon completion of the test, vendors can start working on the next test case. Test cases can be temporarily paused to allow testing flexibility. This would typically happen if a vendor is experiencing issues with their system and requires some investigation. In such cases the alternate party does not need to stop their testing. Rather, they can identify another actor and proceed with execution of another test.

In the end, under ideal conditions, all vendors will finish all the tests assigned against the claimed Profiles and submit their results for verification. Projectathon Monitors will start the process of grading the results and place the tests in the appropriate state. Successful ones will be marked complete, whereas if issues are encountered, Monitors will contact the vendor for clarification. In some cases, test results will be rejected and an explanation will be added in the comment section. Vendors can then decide to repeat the test to remedy the issue or abandon the test case.

Based on the number of participants, for large events not all test results can be graded during the event. Typically, all results are graded within a week of completion and results are announced in the event report. Connectathon results (for a quality label event) can be used by vendors to represent standardized capabilities in their product sheets. Projectathons are mainly focused on specification testing and improvements, as such they do not rise to the level of a quality label. Results are still very useful for vendors and interested parties to get a sense of product alignment with the new specification.

Appendix B

Testing Objectives – Day 3

Day three will focus beyond peer-to-peer testing. Observers will be invited to discuss clinical/business scenarios, share lessons learned and explore potential short term next steps for the evolution of the PS-CA specification.

Depending on vendor capabilities, group testing could occur and organize multiple vendors into groups to carry out more complex scenarios. Additionally, there could be opportunities for vendors to demonstrate a specific profile and generate discussion on optimal integration choices to best address clinical/business needs. New candidate profiles for future integration patterns could also be explored as part of this day's session.

The following paragraphs present a number of potential threads for Day 3. They are listed as ideas for discussion sessions. The project team is in the process of reaching out to event participants to finalize day 3 schedule.

FHIR Content Data Model

In addition to the core interoperability objectives covered by the peer-to-peer testing, the content of the Patient Summary and the challenges associated with its assembly are another high priority objective.

The project team has prepared a number of Clinical Scenarios and the data associated with them to try to simulate a realistic environment that could exercise most, if not all, of the data points possible in the PS-CA specification. The hope was that source systems (e.g., EMRs, HISs) could take these scenarios and enter data into their data stores to generate patient summaries with measurable results.

The test data, being synthetic in nature will be distributed to all participants. Systems that claim capabilities of creating a PS-CA document should use the information in these sheets to populate their systems and generate a JSON or XML document. These are the documents that will be exchanged during the Projectathon.

In addition to data definition, the team has also prepared a tool that can render these FHIR document formats into human readable, organized groupings. On day three, there will be focused activities dedicated to analyzing produced patient summaries from vendors systems and compare them to the original, distributed data sets. The purpose of this stream is to gain insight into any challenges associated with collecting and reproducing this information and whether the FHIR data model matches clinical workflow.

Access Controls and Their Role in the Exchange

One of the more advanced topics of interest for the Patient Summary specification is the future state where access controls are laid over the specification. Currently, the main focus is on the data build and physical exchange, however, data exchanges of the future will have to allow for this data flow based on access tokens that are highly secure, reliable and represent the level of access of the user. Day 3 could have a dedicated track to investigate how these access tokens should be arrived at, how well

does IUA support them, what additional aspects will be needed and how can data stores (Resource Servers) be made sensitive to them.

Approaches to Document Management

It is believed that a healthy data exchange has the right balance of discreet data and data collected in focused healthcare documents. These documents come in a variety of formats, some structured, based on modern standards (FHIR, CDA) others digital copies of paper documents or just digital blobs of data that only make sense in a specific context. The collection of all these elements might be making up the Patient record, as such, designing an eco-system that caters to this diversity of formats is not only a good idea, it seems to be a necessity. A Day 3 track could be dedicated to examining the various data handling alternative when it comes to “documents” in their most generic form. Vendors could have an opportunity to showcase techniques for collecting documents for a Patient record in such ways that formats, diversity or even location of records can be accommodated. This track will focus on exploring these alternatives and experience with them.

Clinical and Business Scenarios

PS-CA is a step forward towards grouping Patient data in such a way that it can be ported from system to system in both planned and unplanned care scenarios. While this is a worthwhile objective (giving patients the power to access and carry their own data), there are far reaching implications of this approach. Just as it is the case with any data cache, becoming stale the moment it is created, Patient Summaries will not be immune from creation/exchange/maintenance challenges. This track is imagined to support a dialog that brings together vendors, clinical experts, data custodians to discuss and capture areas of absolute focus going forward, areas where the specification will have to adapt to better support clinical/business flows.

Other Opportunities

Finally, Day 3 could be the place to start a number of tracks that could grow over time, in future connectivity events, tracks that could represent your topic of interest, be that technical, business, clinical. Infoway will reach out to Projectathon participants to assess their level of interest in better defining these opportunities for the final program.