

Getting the most out of your integration investments



Orion Health - White Paper
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Introduction

Historically, integration of patients' health data and information was confined to the walls of their healthcare organization. Today, hospitals, Family Health Teams (FHT) and leaders in the healthcare space recognize that it is vitally important to integrate aspects of their patient's health data. Spanning the continuum of care, beyond those walls of a single healthcare organization, into the community and in some instances moving that data into a patient's home.

As healthcare organizations merge to become more efficient from an operations perspective, it is critical to have a robust, scalable and proven integration engine. The right partnership with a company that understands how to leverage existing assets, and how to integrate legacy systems is first priority and critical in order to take health data beyond the hospital walls.

Some challenges and opportunities exist around:

- Emerging technical and interoperability standards.
- Using FHIR APIs to accelerate healthcare IT integration.
- Moving beyond institutional procurement to innovative Public Private Partnerships with shared risk.
- Getting the most from your Electronic Medical Record (EMR) investment by integrating point of care EMR data into jurisdictional Electronic Health Records (EHR) and Health Information Exchanges (HIEs).
- Expanding beyond healthcare integration into education, social services and other government institutions.

Within this paper, we explore each of these themes through specific Use Case Studies. These case studies support the assertion that, when effective partnership and integration strategy leads the transformation of healthcare organizations, the future needs of care delivery can change the quality of patient care across the entire care continuum.

Emerging Technical and Interoperability Challenges

Over the next few years, some integration engine solutions will fall behind supporting emerging technical and interoperability standards. Support for all versions of HL7, including v3.x and the emerging FHIR specification, are basic requirements to ensure that ad hoc or non-standard data is not exchanged in the healthcare IT infosphere.

Moving beyond the basic standards, the use of RESTful APIs, JSON and enhanced use of XML will ensure that we achieve semantic interoperability and not just basic integration. These innovations will evolve quickly as progressive vendors adopt continuous delivery to rapidly evolve their technical solutions, which in turn will provide healthcare organizations the opportunity to avoid outdated or unsupported code in their solutions.

As cloud and mobile technologies make information portability and access becomes available 'at the right place, at the right time and at the correct level' clinicians will be able to modify and extend their workflows to better support patient care, wherever that may be. This will require vendors to ensure their solutions undergo more rigorous testing and quality assurance, work in high availability deployments, and be scalable to manage high transaction volumes.

By keeping up to date with these emerging technical and interoperability challenges, healthcare IT organizations will be in a better position to support research studies, higher education and the policy branches of provincial governments as they carry out their mandates into the next decade of the 21st century.

FHIR APIs

Healthcare providers have found unique ways to improve user experience by leveraging technologies like Rhapsody in exploring Proof of Concept (PoC) projects. These PoC projects focus on the development of FHIR APIs that will enable external systems to query for patient information as well as enabling our clinical viewer to query external repositories.

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The enhancements will ultimately benefit the end user experience. As an example, clinicians are then able to view patient medication along with any existing hospital information together all part of their patient's history. This comprehensive view provides a fit for service perspective that targets specific user needs. From a technology perspective, this is achieved using Rhapsody as the FHIR API gateway through which external systems will access the exposed API's to retrieve clinical data across sources. The clinical viewer integration capabilities help to facilitate the retrieval of clinical data from the necessary external repositories.

Private Public Partnerships

EllisDon, a global construction services leader, engaged an integration engine to modernize Joseph Brant Hospital's (JBH) ageing communication infrastructure. The integration engine powers all communications and data processing for JBH's newest patient tower. Designed for rapid interoperability between healthcare IT systems, the engine will deliver secure patient information among healthcare clinicians, collaborators and patients and will tie together existing hospital IT systems, including building control, clinical systems and back-office HR systems.

Rhapsody will be a key component of improving the workflow and communication among the various departments within the hospital, as well as improving the quality of real-time patient information available to clinicians. This greater access to secure patient data will result in more timely care and better coordination of care.

Orion Health offers the healthcare information technology solutions to address the needs of both patients and healthcare professionals – now and into the future.

Rhapsody will help transform JBH into the pinnacle of healthcare delivery, ushering in a new wave of smart hospitals, while allowing the companies to combine their expertise in healthcare integration with their innovative approach to healthcare planning and design.

Procurement Innovation, Optimization for Integration

Plexxus serves a diverse group of 20 specialty, community based, academic and research hospitals. While they have been historically focused on rationalizing contracts and consolidation of spend for procurement of medical and surgical supplies and services, there is recognized need for innovation and improvement on the acquisition of IMIT solutions across Ontario hospitals, including solutions for integration engine replacement technology.

Member hospitals include North York General; St. Joseph's Health Centre; Scarborough and Rouge Hospital; Sunnybrook Health Sciences Centre; University Health Network; Sinai Health System, Lakeridge Health, Holland Bloorview Kids Rehabilitation Hospital, Michael Garron Hospital and Women's College Hospital, among others. In 2017, Plexxus expanded their operations to include customer hospitals such as Mackenzie Health, Royal Victoria Regional Health Centre, Markham-Stouffville Hospital, Peterborough Regional Health Centre, Ross Memorial Hospital, and Southlake Regional Health Centre.

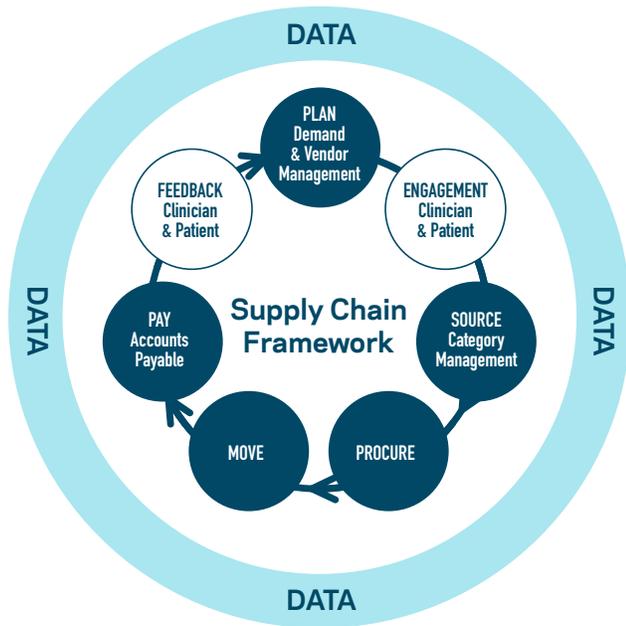
Recently, the provincial health ministry has reinforced the importance of procurement in addressing the challenges faced by hospitals in the provincial healthcare system and identified the opportunities that exist for Shared Services Organizations (SSO) to work more collaboratively together.

In place of only marketing integration services to individual hospitals, there is an opportunity to accelerate marketing by being 'pre-qualified' or developed a more strategic relationship for vendor supply to member and customer hospitals for SSO such as Plexxus in Ontario. Advantages are more ease of procurement by affiliated hospitals, with standardized contracts and pricing models.

In same vein as the SSO concept, it is possible to look at the future when integration services are being

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offered as a Rhapsody managed service that could span the range of all hospitals who participate in an organization such as Plexxus.



patient scheduling and billing functions. Until now, patient information in the primary care clinic EMRs was not readily available to providers outside of the primary care clinic location. The CII Hub creates a CED report in PDF format for each patient based on the validated discrete data elements. The CED report is then sent to Alberta Netcare Clinical Repository (NCR) and is viewed by 50,000 authorized healthcare providers through Netcare (Alberta's Electronic Health Record). With this information on the EHR, it will help minimize and bridge the current information gap. Here is an example of a CED (all data is fictitious)

Community Encounter Digest
Listing Encounters Submitted between 2016-Jan-18 and 2017-Jan-18

Person: TEST, Everest PHN/ULI: 20001716: Alberta DOB: 1943-Jan-16 Gender: M

Encounter Date (D3)	Service Delivery Location (C2)	Provider Last Name (B1), First Name (B2)	Provider Role (B7), Expertise (B8)	Patient Reason for Encounter (D2)	Clinician Encounter Clinical Assessment (E34)
2017-Jan-18	Calgary Medical Clinic	Dr. King, James	Physician, General Practice	Testicular pain and swelling	
2017-Jan-09	South Calgary Medical Clinic	Dr. Wade, Zack	Physician, Urology	Testicular swelling	Edema of scrotum [608.86AC]
2016-Dec-05	Westmont Medical Clinic	Dr. Douglas, Adam	Physician, General Practice	Asthma - follow-up - F/C spec	Obstructive sleep apnea [327.23D]
2016-Nov-21	Chinook Family Clinic	Dr. King, James	Physician, General Practice	Breathing Problem - chest pain	Asthma exacerbation [493.92M]
2016-Sep-26	Calgary Medical Clinic	Dr. King, James	Physician, General Practice	Wheezing - cough, chest congestion	Gout [274.9H]
2016-Aug-29	Calgary Medical Clinic	Dr. King, James	Physician, Consultant	Medication Management	Drug [786.09EC]

EMR Connectivity into EHR platforms

Alberta's Community Information Integration (CII) Program is in production as a Limited Production Roll-Out (LPR). Patient information used in CII, is now flowing from an early adopter primary care clinic, powered securely from a remote cloud infrastructure by Orion Health's Software as a Service (SaaS) in a managed private cloud with Rhapsody as the integration solution for this project. Along with Rhapsody, the over solution is based on the Orion Health Platform comprised of a repository and registry.

CII will provide a longitudinal patient record in Netcare by including primary care information, including the Community Clinic Encounter Digest (CED) along with some consult reports. It closes the knowledge gap by tapping into the wealth of patient information held in the local Electronic Medical Record (EMR) systems. The EMR provides the Primary Health Care clinical team a transactional system to support both clinical episodes and clinic business operations including

The CII project will improve continuity of care for Albertans through the sharing of patient information and by creating a culture of collective responsibility in the gathering and sharing of health information. Over time, the project will help address gaps in patient's health information and will assist clinicians in having better clinical outcomes all by having timely, relevant clinical data available. In addition, there will be continuity of care for patients as they move across the care continuum from one care provider to another, decreasing potential complications and adverse reactions. Finally, analysts in the Business Intelligence Environment (BIE) at Alberta Health, will use this information to support health system planning and quality improvement.

Other Canadian jurisdictions are looking for EMR integration with jurisdiction Digital Health eco-system, whether it is EHR or CIS based. Leveraging a similar approach to Alberta's community integration model will aid in accelerating solution development, perhaps 80% of the way to meeting jurisdictional requirements.

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Comprehensive integration of patient health information has been a significant challenge, especially outside of hospital domain. Alberta, in collaboration with its organizational partners, is working to achieve this integration in a realistic timeframe that will address patient and family, provider and organizational concerns.

Research and Academics

Healthcare technology can be adaptable to academia to enable researchers access to targeted clinical data that until now has been very difficult to access.

For researchers, a pressing challenge is coming up with breakthroughs in developing treatments for many types of pathologies and improving clinical decision support in the management of these diseases including improving overall prevention.

Traditional methods of obtaining or accessing clinical data are very time and resource intensive. To enroll sufficient patient numbers, especially in the setting of complex diseases such as immunotherapy when dealing in palliative care or working in clinical trials, this can take up to decades to complete and maintaining consistency over long periods can be very difficult.

Paper-based records and even EMRs can involve several steps: (1) finding patients who may be suitable for a complex trial by searching through paper or electronic charts; (2) enrolling patients on the relevant clinical trial(s); (3) Carrying out the trial and generating relevant data; (4) Finding the relevant data by manual chart review after the trial has been completed. For large multi-centered trials, this is a long complex process that relies heavily on manual effort by researchers and their assistants.

Challenges include finding suitable patients for specific trials, rapidly finding key clinical data indicating eligibility when it is often scattered around the health system, anonymizing the data and making it available to clinical and public health researchers. Once patients are entered onto a clinical trial, there is the prolonged period of data capture required. Rhapsody allows a user to check eligibility of the patient against a data base of clinical trials, and then provide the clinical data.

In most situations, there is no electronic integration between Clinical Information Systems (typically EMRs and EHRs) and the researchers clinical data systems (typically these are either clinical trial management systems, or population level data warehouses.)

Characteristics of such an integration include:

- Real time or as near to real time as possible – patients with complex disease states can evolve or deteriorate rapidly.
- Able to extract data from a very wide range of information systems with varying capabilities, normalization and standardization of the data for use in the clinical trial system.
- Follow a wide range of existing and emerging data standards to ensure high-quality results and the ability to integrate across institutions, organizations, pathways, and diseases.
- Confirm that the patient's consent has been obtained for secondary data use.
- Enable consistent anonymization of the data and where appropriate, tagging of the data with the trial patient ID used by the clinical trial
 - The anonymization process needs to not remove important information about patients of interest to researchers
- Enable a level of clinical decision support – for example, enable the use of algorithms to cull out ineligible subjects.
- Automatic grading of adverse events.
- Handle a broad range of data types including traditional clinical data, and also IoT data, genomic data, social and economic data.

By using Rhapsody there are several key advantages over traditional methods especially when it comes to collecting and anonymizing data, extracting data from data stores but also accessing data from all manner of other data sources such as IoT devices, laboratory systems. Rhapsody's broad range of tools including messaging data integration, CCDA exchange and FHIR APIs enable it to interact with systems of all manner of integration capabilities. Data may not have to be captured by the researchers – they could piggy back on existing provincial data.

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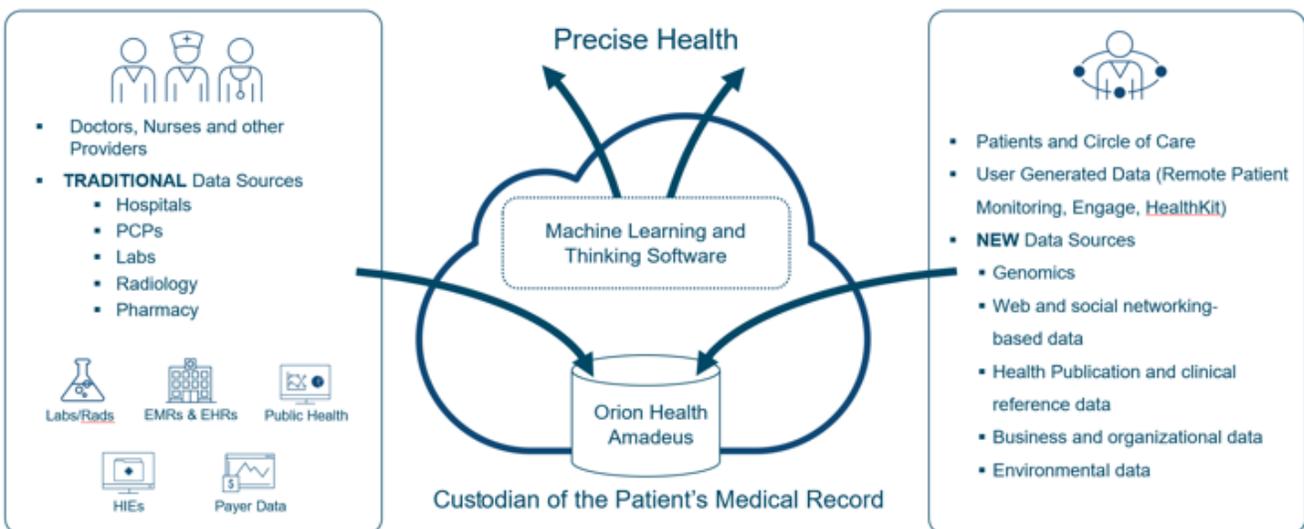
There is a tension between the desire of researchers to compile all the available data on an individual patient, the needs of a specific current research project or clinical trial and acceptable use of clinical data from a privacy perspective.

When the cost in time and money to obtain and manage needed data is high, there is a natural tendency to capture as much as possible even though that brings increased scrutiny from privacy and patient protection perspectives. Using Rhapsody to easily obtain the necessary data, enables researchers to balance the privacy requirements and the research requirements more accurately. Automated data capture via Rhapsody provides certainty to reviewing bodies that required or specific data (and not all data on the patient) has been captured – as approved by the committee.

There is particular interest in obtaining data from mobile devices and the IoT, which patients are using. Rhapsody's integration tools enable access to the data via Open APIs, directly from devices, or from aggregation approaches such as Apple as well as selectively pulling data from clinical systems.

- a. What can an integration engine accomplish?
 - a. Proving the ability to capture specific patient clinical data from existing systems.
 - b. Enabling the data to be used correctly in research projects including improved management of complex chronic conditions such as Diabetes and Inflammatory Bowel Disease.
 - c. Handling of genomic data along with the clinical data.
- b. What are the benefits realized by deploying an advanced integration engine?
 - a. Time savings.
 - b. Appropriate access to data as its moved from clinical systems to research systems.
 - c. Integrating data from a wide range of sources.
 - d. Data anonymization.
 - e. Ability to improve the implementation of clinical trials
- c. What is the future direction for integration engines?
 - a. Addition of further data types, including expanded genomic data, socio economic and IoT data.
 - b. Application to additional areas of clinical interest.

Healthcare is changing from a closed community into an ecosystem centered around the patient and their record which will include many elements not traditionally captured.



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Conclusion

As healthcare organizations strive to mature their integration and strategies, it is evident through these Use Case studies that they must move beyond static interfaces and adopt technology that enables current and future standards. Technology must be robust, available anytime/anywhere, and capable to handle ever-increasing transaction volumes.

Adopting an advanced integration engine, such as Rhapsody will enable stakeholders to incorporate new data streams including: genomic, social determinants of health, Personal Health Information (PHI) and beyond, making the longitudinal patient record more reliable and complete than ever before. Adopting FHIR APIs can speed up solution development and reduce the time it takes to make richer data sets available to clinicians and patients alike.

Looking beyond healthcare toward higher education and other agencies of government, there are exciting

new opportunities to align government spending when targeting mental health and wellness and ensuring continuity of care during transitions in life from childhood to school, higher education and into and out of social services.

This will require innovative procurement practices in which risk is shared between public and private organisations in partnership to bring new solutions to market in times of fiscal restraint and shifting budget allocations. By joining these organizations in partnership, new connections between EMR and EHR investments, as well as research and academia will be possible, further enriching patients' lives.

To mature the healthcare organizations of tomorrow, it will take modern technology deployed by vendors accustomed to this work in order to go beyond the walls of the hospital.



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