



Manitoba Healthcare System Information Management and Analytics (IM&A) Study



July 2016

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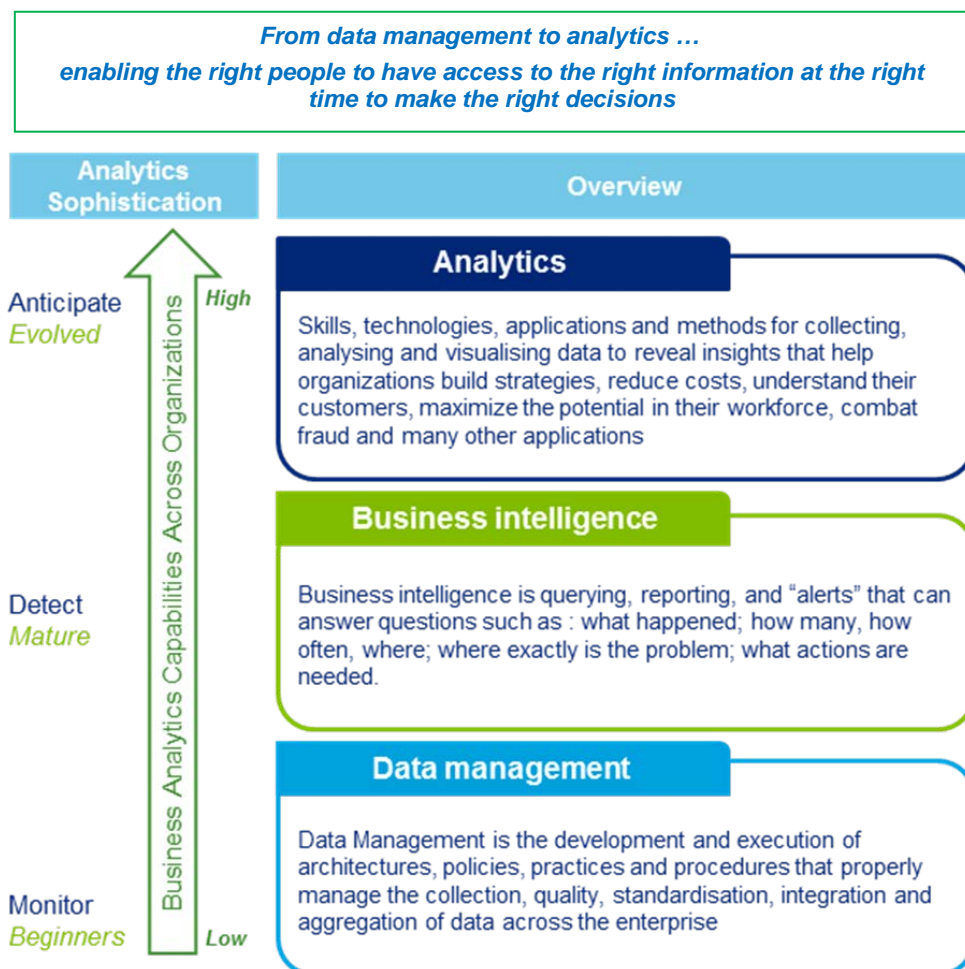
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1 Executive summary

1. Overview

Increasingly, the delivery of healthcare is undergoing transformation and leaders are recognizing data as a valuable asset that can be harnessed to strengthen planning and performance. As more data is captured and compiled from sources like electronic health records, drug claims, medical devices, and patient-provided input, analytics can help detect hidden patterns in information, delivering actionable insights and enabling systems to sense, predict, infer, and conceive alternatives that might not otherwise be obvious. Such insights play a major role in helping healthcare systems to improve costs and quality, identify at-risk populations, connect with consumers, and better plan and understand performance.

To position the Manitoba healthcare system for the future, the Health Senior Leadership Council engaged Deloitte to work with leaders across the healthcare system on an Information Management and Analytics (IM&A) Study, to define a strong, made in Manitoba vision for the governance and use of data, and to provide high level recommendations and a roadmap to achieve the desired future state. The study's aim is to help position the Manitoba healthcare system to collect, use and share data and information to support quality care, evidence-informed decision making, research, policy development and planning, and the accomplishment of healthcare system objectives. The study encompassed both information management - *the collection, use and sharing of data and information* – and analytics – *the transformation of data into insights to inform decisions*.



Through this study, healthcare leaders from across the province developed a patient-centred IM&A vision, driven by the needs of providers and decision makers within the Manitoba healthcare system today and in the future. The study involved extensive consultation across the health system with a broad range of healthcare leaders including researchers, planners, information managers, administrators, and clinicians. The consultations provided insights into the current state of information and analytics and helped to inform perspectives on governance, priorities and the roadmap recommendations that are intended to assist the Manitoba healthcare system to achieve its future vision for healthcare information management and analytics.

Deloitte would like to acknowledge the commitment and guidance of the IM&A Study Committee, led by Deborah Malazdrewicz. Study Committee members were engaged and actively participated over the course of the study, from September 2015 to May 2016, and were instrumental in the success of this engagement.

2. Approach

This study applies Deloitte's Insight Driven Organization (IDO) methodology, which has been developed to support organizations in achieving a state where decision making is continuously informed by robust data management, business intelligence, and analytics, operating across the enterprise. Becoming an IDO relies on the following fundamental building blocks: Strategy, People, Process, Data, and Technology.

The study draws heavily on the Canadian Institute for Health Information (CIHI) report 'Better Information for Improved Health: A Vision for Health System Use of Data in Canada'. (https://www.cihi.ca/en/hsu_vision_report_en.pdf). In 2013, federal, provincial and territorial Deputy Ministers of Health endorsed the CIHI vision and guiding principles, as well as its recommendations for moving forward with the health system's use of data. That document provides a common Canadian understanding of the value and benefits of a strategy, the building blocks needed to succeed and recommended areas of focus in moving forward. The CIHI *Better Information for Improved Health Report* provided a starting point for the development of the Manitoba healthcare system's IM&A vision.

The study followed a consultation-heavy process from October 2015 to March 2016. Information and input was gathered during a five-step consultative process. The work during these five steps drew heavily upon the expertise, experience and perspectives of a broad set of stakeholders across the Manitoba healthcare system. Three large working sessions were convened to develop a vision, document and validate the current state of IM&A in the province and define and prioritize the target state. Additionally, broad consultations were conducted with groups and individuals across the health system and a Target State Survey was widely distributed to gather perspectives on those target state initiatives that should be pursued.

3. Overview of current state findings

1.3.1 Current state strengths

Throughout the consultations, a number of strengths in the IM&A space were identified by leaders. Six core strengths emerged, as represented below. These strengths represent the type of capacity, capability and willingness necessary to achieve the vision

A number of high-quality datasets and rich amount of data collected - volumes of data collected; concerted efforts to collect data at both administrative and point of care levels even when there is no supporting information technology solution

Dedicated, resourceful and pragmatic staff - staff creatively and efficiently provide valuable insights and analysis in pockets across the health system; network of partnerships that indicate some sharing of IM&A capability and capacity

Value placed on research - strong operational and strategic support for research initiatives across the province; Manitoba Centre for Health Policy (MCHP) recognized as a provincial resource producing behaviour-changing research

Desire and willingness to be progressive - large number of IM&A initiatives across the province; entrepreneurial attitude towards capability and behaviours articulated in the vision; e.g., Provincial Healthcare System Performance Indicator Portal (PHSPIP), activities of the Centre for Health Innovation (CHI)

Support for enterprise-wide support and coordination - multiple provincially-minded initiatives across Manitoba, such as support for/coordination of Community Health Assessments

Continued implementation of provincial systems - several provincial systems rolled/rolling out (e.g. eHR, Emergency Department Information System)

1.3.2 Current State Themes – gaps to be addressed

Throughout the consultation process, insights into the IM&A current state were identified, reviewed and validated with healthcare leaders, resulting in the identification of the following current state themes. These themes, which represent significant gaps affecting the management of information and/or use of analytics are explored in detail in the Current state section of this study report.

Strategy	<ul style="list-style-type: none"> • There is no overall strategy for IM&A investments and efforts • IM&A efforts are not well positioned to inform overall healthcare system strategy • Continued usage of legacy data, systems and processes is a challenge
Process	<ul style="list-style-type: none"> • No authoritative voice that can make decisions with regards to IM&A • The existing distributed governance structure impedes decision-making • Most IM&A processes and practices are not standardized across the system
People	<ul style="list-style-type: none"> • A range of collaboration challenges impede effective IM&A6 • IM&A capacity and capability are not distributed evenly across the system • Culture generally encourages data-driven approaches but does not demand data and analytics to justify decisions
Data	<ul style="list-style-type: none"> • Data collection efforts are not tied to decision-making • There is a significant amount of data gathered, but it is not well integrated or standardized across the system • There are pervasive data quality issues and inconsistent data across the system
Technology	<ul style="list-style-type: none"> • The technology environment that supports IM&A is highly fragmented • There is low IM&A activity automation
Other	<ul style="list-style-type: none"> • Strong support (need) for empowered province-wide leadership • Need for increased understanding, training and communication of PHIA • Strong appetite to have integrated data sets pushed out • Support for establishing some province-wide technical IM&A functions • Significant communication challenges around IM&A • New technology investments do not fully consider IM&A capability and functions, or a province-wide perspective

4. Overview of recommendations

The objective of the IM&A Study is to define a strong vision for the Manitoba healthcare system’s governance and use of data, driven by a patient-centred strategy that considers the needs of providers and decision-makers, and to provide high level recommendations to achieve the desired future state. Through the consultative process, a common vision was developed.

VISION STATEMENT

We enable an integrated provincial system that provides timely, accurate, and relevant information and innovative analysis to inform the actions and decisions of the public, patients, providers, policy-makers, administrators, and planners.

This study identified six recommendations and associated initiatives to address the current state gaps outlined above and to promote the realization of the future state vision for IM&A across the Manitoba healthcare system. These initiatives are designed to address the current state gaps and challenges, as identified during the stakeholder consultations and working sessions. The initiatives are interdependent, and together form a strategy that will support the evolution of IM&A in the Manitoba healthcare system in moving towards its desired target state over the next five years.

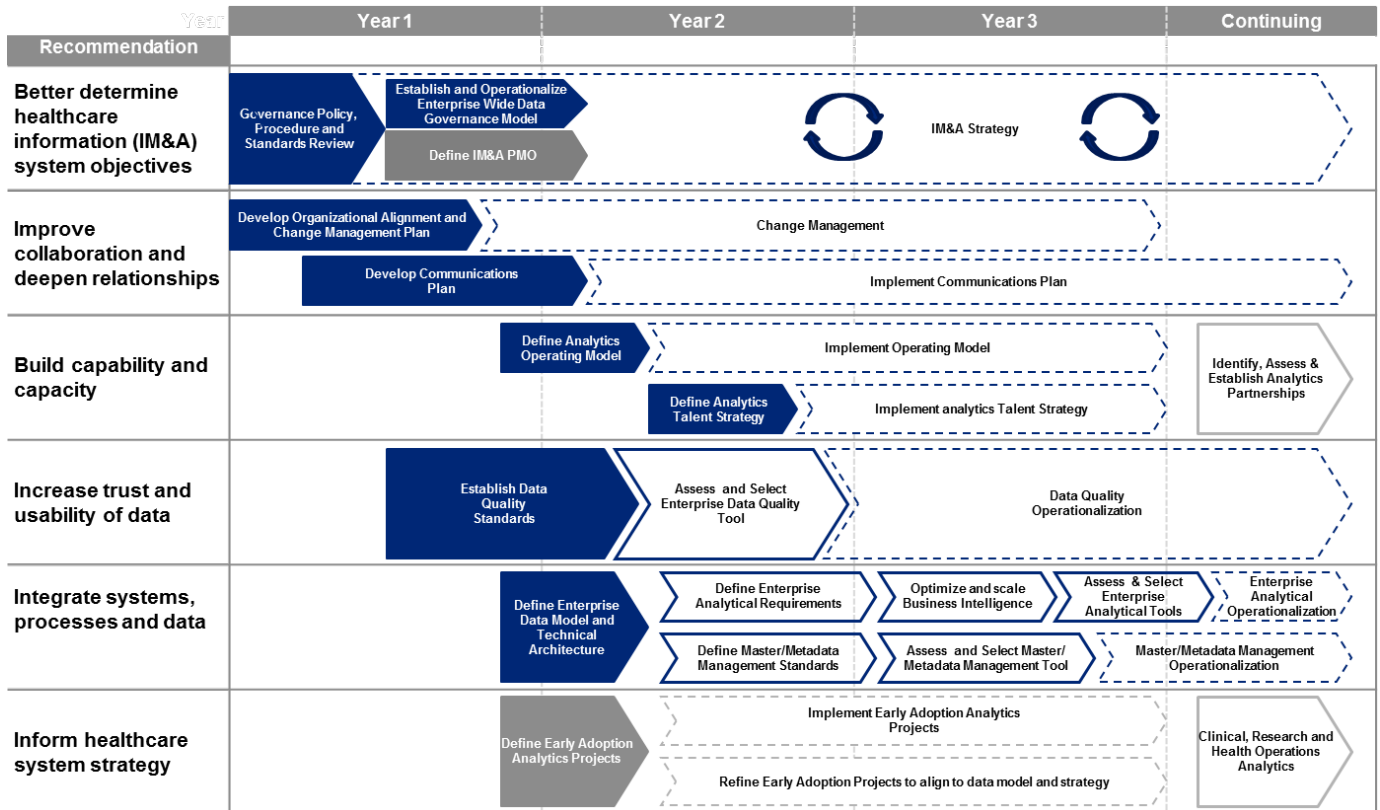
An overview of the recommendations and initiatives is provided below. Details of the action items for each of the initiatives that are included in the proposed roadmap are provided in Section 5.3.

Recommendation	Initiatives
1 Better determine healthcare system information (IM&A) objectives	<ul style="list-style-type: none"> • Develop and implement an effective IM&A governance framework and model, with supporting policies, processes and practices aligned with the vision and desired target state: <ul style="list-style-type: none"> – Designate Provincial Leadership Role for IM&A – Review Governance Policy, Procedures and Standards – Establish and operationalize enterprise wide data governance model • Establish a Project Management lead with responsibility for implementation, monitoring and management of the roadmap (define IM&A PMO) • Refresh the strategy at least annually • Develop and implement enterprise-wide training and communications related to <i>The Personal Health Information Act</i>
2 Improve collaboration and deepen relationships	<ul style="list-style-type: none"> • Develop and implement Organization Alignment and Change Management Plan • Develop and implement Communications Plan
3 Build capability and capacity	<ul style="list-style-type: none"> • Define IM&A Operating Model <ul style="list-style-type: none"> – Implement IM&A Operating Model • Define and implement Analytics Talent Strategy <ul style="list-style-type: none"> – Implement Analytics Talent Strategy • Identify, Assess and Establish Analytics Partnerships
4 Increase trust and usability of data	<ul style="list-style-type: none"> • Establish Data Quality Standards <ul style="list-style-type: none"> – Assess and Select Enterprise Data Quality Tool(s) – Operationalize Data Quality
5 Integrate systems, processes and data	<ul style="list-style-type: none"> • Define Enterprise Data Model and Technical Architecture <ul style="list-style-type: none"> – Define Enterprise Analytical Requirements – Optimize and Scale Business Intelligence – Assess and Select Master/Metadata Management Standards and Tools – Operationalize Master/Metadata Management
6 Inform health system strategy	<ul style="list-style-type: none"> • Define Early Adoption Analytics Projects <ul style="list-style-type: none"> – Implement Early Adoption Analytics Projects – Refine Early Adoption Analytics Projects to align to data model and strategy – Undertake Clinical, Research and/or Health Operations Analytics

5. Moving forward – the roadmap

The six recommendations and related initiatives represent a tangible high level plan to transform present IM&A capabilities to align to the vision. The roadmap sets out the high-level sequencing and logic of these initiatives, their proposed timing, and proposed timing and sequencing of the recommended follow-on initiatives that will be required to continue the journey toward the IM&A vision.

Throughout the study, and particularly throughout the consultation process, **development of effective governance to lead the IM&A function was repeatedly expressed as a key gap that needs to be addressed if the healthcare system is to move forward.** Accordingly, the first key step in the execution of the roadmap is developing an effective governance framework.



2 Introduction

1. Study background and mandate

The effective collection, use and sharing of health information are key building blocks of the provincial healthcare system, and are critical to the achievement of the Province's goals for the system. The Health Senior Leadership Council engaged Deloitte to work with leaders across the healthcare system on an Information Management and Analytics Study (hereafter the study). The study is intended to define a strong vision for the Manitoba healthcare system's governance and use of data.

The study mandate is to review the current state of information management and analytics within the Manitoba healthcare system and to provide feedback on governance, priorities and the future vision of Information Management and Analytics for the province. The goal is to provide a documented common vision for health information management leaders that is driven by a patient-centred strategy which considers the needs of providers and decision makers within the Manitoba healthcare system today and in the future. The aim of the study is to help position the Manitoba healthcare system to collect, use and share the information it needs to support quality care and evidence-informed decision making, research, policy and planning, and to support the accomplishment of the following healthcare system objectives:

- ensure standardized, minimum, and reliable data is available for health system use;
- manage data systemically, to plan for future processes and solutions and provide all healthcare system partners with access to the data they need;
- strengthen reporting and analytics capability and capacity;
- integrate data and information across the system;
- make informed systemic investments;
- improve access to information in support of healthcare system activities.

Deloitte has worked collaboratively with leaders to articulate the Manitoba healthcare system's vision for IM&A, review the current state and identify the gaps between the current state and the target state vision, and guide the development of a provincial plan that will help the Manitoba healthcare system align with and achieve the target state IM&A vision.

This study report captures the vision, findings and recommendations.

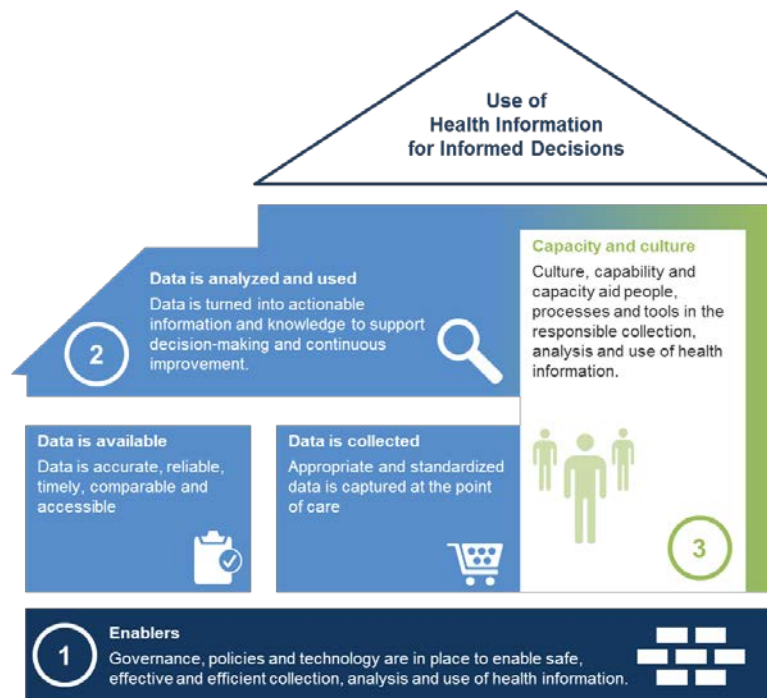
2. Study frameworks

2.2.1 Canadian Institute for Health Information (CIHI)

This study draws heavily on the Canadian Institute for Health Information (CIHI) report 'Better Information for Improved Health: A Vision for Health System Use of Data in Canada'. (https://www.cihi.ca/en/hsu_vision_report_en.pdf). The report was developed through consultations with health leaders across the country. In 2013, federal, provincial and territorial Deputy Ministers of Health endorsed the CIHI vision and guiding principles, as well as its recommendations for moving forward with the health system's use of data. That document provides a common Canadian understanding of the value and benefits of a strategy, the building blocks needed to succeed and recommended areas of focus in moving forward.

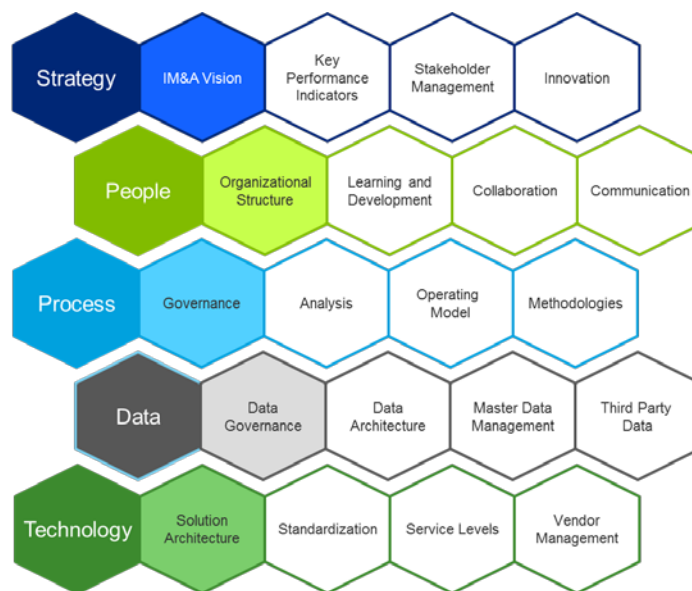
The Better Information for Improved Health Report provided a starting point for the development of a Made-in-Manitoba vision (hereafter Vision). The Vision developed through this study (set out in Section 4 of this study report) is aligned to the report's recommendations; however, through this study, the input and guidance of Manitoba healthcare system leaders has been captured to tailor the CIHI framework to reflect the views of the Manitoba healthcare system, ensure relevance, and recognize Manitoba priorities.

The diagram below captures the enablers and dimensions CIHI has deemed essential to capturing and using health information to make informed decisions.



2.2.2 Insight Driven Organization methodology (IDO)

This study also applies Deloitte’s Insight Driven Organization (IDO) methodology. The methodology is used to support organizations in achieving a state where decision making is continuously informed by robust data management, business intelligence, and analytics operating across the whole organization. Becoming an IDO relies on a foundation of the fundamental building blocks of Strategy, People, Process, Data, and Technology. The five blocks and constituent themes are captured in the figure below. This study focuses primarily on the leftmost themes to provide directional insight and support to the Manitoba healthcare system.



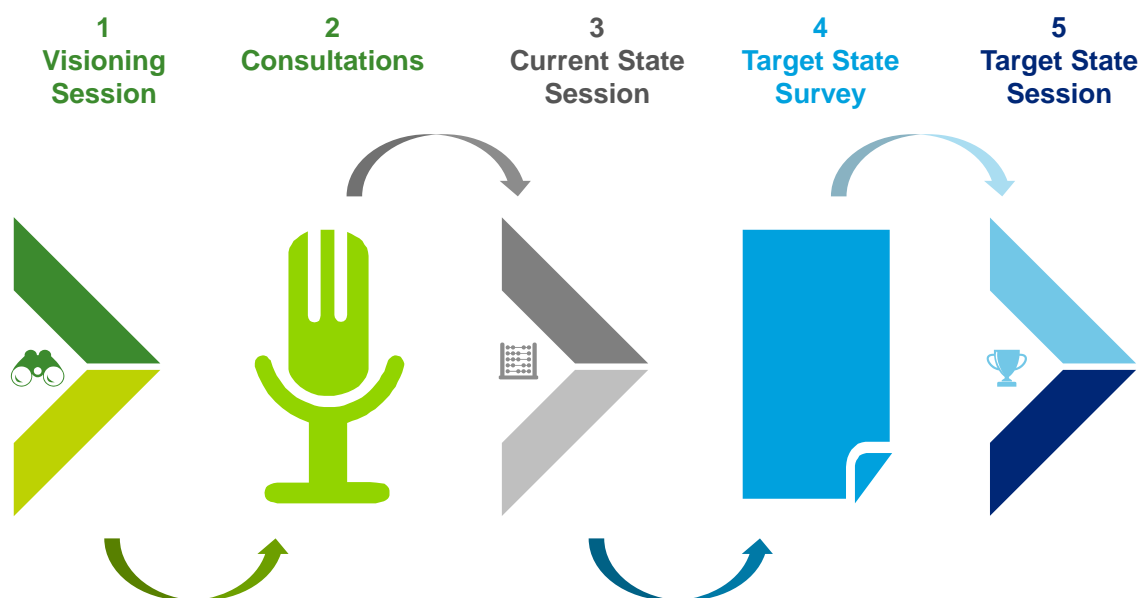
These themes are used to organize the current state findings and target state initiatives in the Current state and Target state sections of this report.

3. Study approach

To achieve the objectives outlined above, the study followed a consultation-heavy process from October 2015 to March 2016. During fall 2015, the project team ensured that relevant documentation was gathered and the Deloitte team was provided with sufficient context through a series of guiding consultations with leadership. Appendix B provides details of the groups consulted during this early part of the project.

Following the documentation review and guiding consultations, information and input was gathered during a five-step consultative process. The work during these five steps drew heavily upon the expertise, experience and perspectives of a broad set of stakeholders across the Manitoba healthcare system. Three large working sessions were convened to develop a vision, document and validate the current state and define and prioritize the target state. Additionally, broad consultations were conducted with groups and individuals across the System and a Target State Survey was widely distributed to gather perspectives on those target state initiatives that should be pursued.

Throughout the project, a polling software tool was used to quickly and anonymously gather insight and feedback from participants. These responses have been collated and the numerical charts found throughout this report display the direct quantitative results of responses gathered using the tool.



Each of the steps is described below.

2.3.1 Visioning Session

A project kick-off and visioning session was held November 3, 2015 with more than 50 participants from across the Manitoba healthcare system. See Appendix B for a listing of individuals invited to the session. Invitees represented a broad range of leaders including providers, clinicians, administrators, planners, researchers, and allied health professionals.

The objective of the visioning session was to begin to develop a shared vision for IM&A across the Manitoba healthcare system aligned with the system's goals and priorities and considering the needs of providers and decision makers for today and into the future. The session explored the CIHI Report, 'Better Information for Improved Health: A Vision for Health System Use of Data in Canada', the resonance of the CIHI framework and vision within the Manitoba healthcare system, and what participants believe should guide the development of IM&A across the Manitoba healthcare system.

The results of the session indicated that while there was strong alignment with CIHI principles, participants felt that the Manitoba healthcare system is not yet aligned with the CIHI framework. Participants also provided some valuable insight into what areas of opportunity exist within the Manitoba healthcare system and what steps would be particularly valuable. Detailed results can be found in the Vision section of this study report.

The themes and findings gathered during the session were used to inform the development of the materials for the consultations step of the study.

2.3.2 Consultations

From November 2015 to December 2015, Deloitte conducted over 30 group and individual interviews, including more than 225 stakeholders in the healthcare system. Interviews were conducted with Health Senior Leadership Council and select Provincial Councils, functional groups (Health Information Services and Analytics, ICT, Surveillance, Governance and Privacy, Quality Improvement, and Research and Evaluation), Regional Health Authorities, provincial health organizations, and several key leaders.

The consultations focused on understanding and defining:

- The vision and key success factors necessary to achieving that vision.
- The current state of information management and analytics across the Manitoba healthcare system, including information about: strengths/weaknesses, risks, governance, analytic capabilities, best practices, barriers, and gaps.
- The future state of information management and analytics across the Manitoba healthcare system to more clearly define gaps that need be bridged, barriers that need to be overcome, and key strengths and best practices that should continue in the future state.

Comments and feedback received during the consultations have not been attributed to any individual or group, and will remain confidential. A summary of the information gathered during the consultations informed both the Current State and Target State Sessions and a consolidation of the data gathered has been presented back in the Current state and Future state sections of this study report.

See Appendix B for a full listing of the groups consulted during the study. See Appendix C for the Interview Guide followed throughout the consultations.

2.3.3 Current State Session

A current state findings session was held January 8, 2016 with more than 50 participants from across the Manitoba healthcare system. See Appendix B for a listing of those individuals invited to the session.

The objectives of the current state session were to continue to build a vision for IM&A in the Manitoba healthcare system and to review, refine and validate the current state themes gathered during the consultation step of the project.

The results of the session confirmed that the themes that emerged during the current state consultations were broadly true across the Manitoba healthcare system. These themes, which represent significant gaps affecting the management of information and/or use of analytics are explored in detail in the Current State section of this study report. Additionally, the session concluded with broad agreement of a made-in-Manitoba vision that is shown in detail in the Vision section of this study report.

2.3.4 Target State Survey

Between February and March 2016 a comprehensive survey was circulated to stakeholders across the Manitoba healthcare system who had participated in large group working sessions and/or consultation interviews. The survey was structured to gather input on and prioritize potential future state initiatives to address high priority current state themes, and begin to close the most significant gaps between the current state and the target state vision.

The results of the survey were compiled and used for the Target State Session. The results have been presented in the Target State section of this study report. See Appendix E for the complete Target State Survey questionnaire.

2.3.5 Target State Session

The third and final working session was convened on March 17, 2016 with approximately 40 participants from across the Manitoba healthcare system. See Appendix B for a listing of those individuals invited to the session. The purpose of the Target State Session was to review the initiatives and the findings of the prioritization survey, validate the initiatives, and gain a high level consensus on the top initiatives to pursue in the short, medium, and long term.

The results of the Target State Session can be found in the Vision, Target State and Future State recommendations sections of this study report.

3 Vision

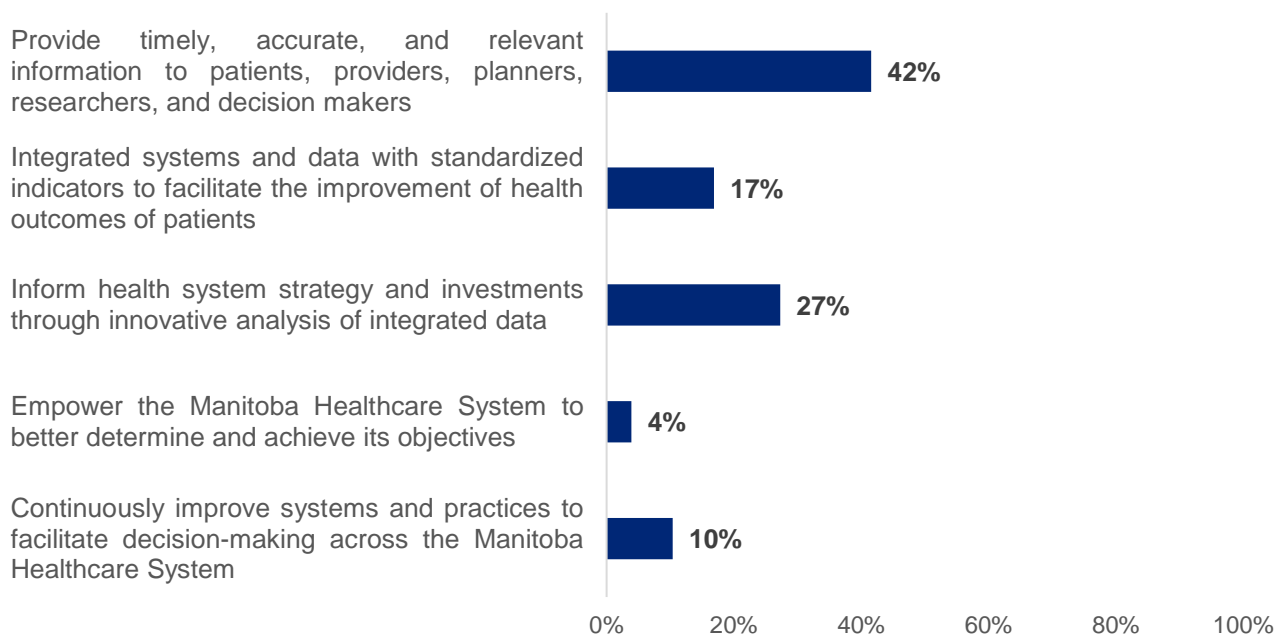
During the five-step process outlined above, a Made-in-Manitoba IM&A vision (Vision) was developed to help guide the future of the Manitoba healthcare system IM&A function. The foundation of the vision was provided by CIHI and developed in a six-month iterative process with input and feedback from over 200 participants across the Manitoba healthcare system.

From the onset of the project, the objective was to build on the CIHI enablers and behaviours, as well as develop a single vision statement to provide overall direction.

1. Building the vision statement

During the current state consultations, participants were asked to identify guiding principles as well as other elements they would like to see represented in an overall vision statement. From these consultations, five guiding principles capturing consistent themes were distilled. These guiding principles were tested during the current state session, with two principles resonating strongly among the diverse set of stakeholders.

Chart 1: Percentage of participant votes in support of distilled guiding principles

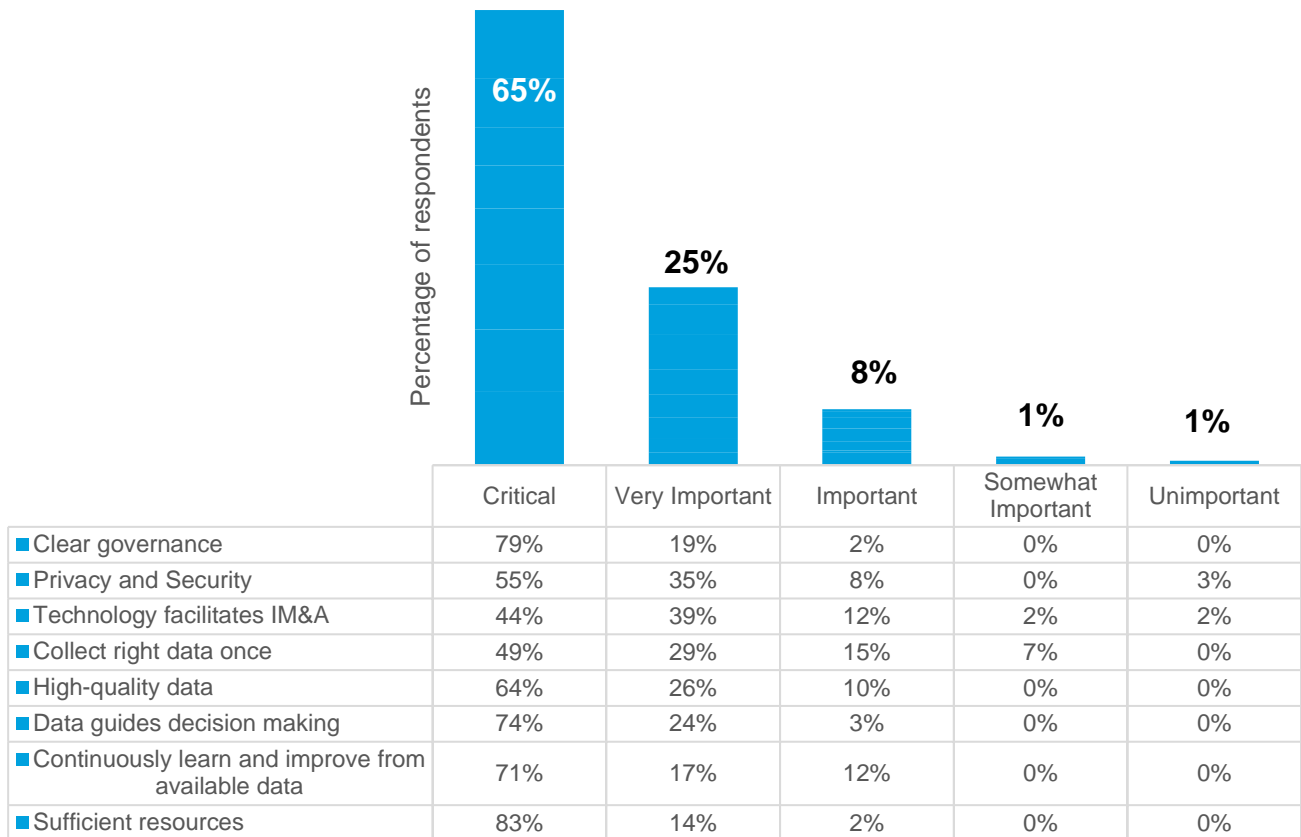


These guiding principles were then further refined during a visioning exercise and built into a single vision statement that was shared at the conclusion of the session. Several adjustments were made by consensus amongst the group. This vision statement was presented once more during the target state session and a final round of minor modifications were made.

2. Building the enablers and behaviours

During the visioning session, participants reviewed CIHI's model for health system use of data, "Better Information for Improved Health", and provided their perspectives on the applicability of the CIHI model for the Manitoba healthcare system. Participants were asked whether the principles of the CIHI framework align with the Manitoba healthcare system's perspectives. All eight enablers, data considerations, and people dimensions were considered to be critical or very important for high-performing IM&A for the Manitoba healthcare system

Chart 2: Percentage of participant votes by CIHI enablers and behaviours



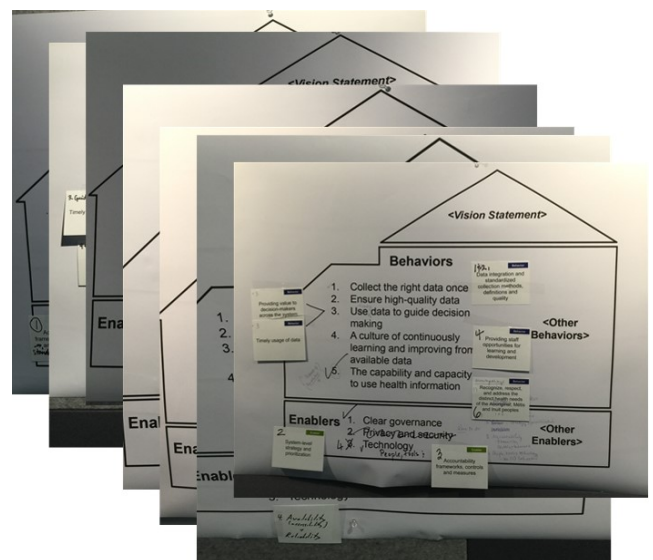
While there was strong agreement that the eight enablers, data considerations, and people dimensions were relevant, participants identified additional elements and desired behaviours that should be considered in a Manitoba model. In a visioning exercise in the current state session, participants “built” a Vision on top of the CIHI foundation using these additional behaviours and enablers. The results from this exercise were collated and presented back at the conclusion of the current state session. Several adjustments were made by consensus amongst the group. These behaviours and enablers were presented once more during the target state session with no further changes.

Additional enablers included:

- System-level strategy and prioritization;
- Accountability frameworks, controls and measures; and
- Standardized processes

Additional behaviours included:

- Collaboration, transparency, and integrity;
- Gathering of both quantitative and qualitative data;
- Timely usage of data;
- Continuously examining and integrating best practices;
- Focused on improving the user experience for patients and staff;
- Providing patients access to their information;



- Providing value to decision makers across the system;
- Providing staff opportunities for learning and development; and
- Data integration and standardized collection methods, definitions and quality.

3. Made-in-Manitoba vision

The following Vision consists of a single vision statement, eight behaviors and four enablers. This Vision represents the collective insight of many stakeholders into what is needed for a high performing IM&A function across the Manitoba healthcare system and has been used to inform the target state design and target state recommendations and roadmap.

Vision statement	We enable an integrated provincial system that provides timely, accurate, and relevant information and innovative analysis to inform the actions and decisions of the public, patients, providers, policy-makers, administrators, and planners
Behaviors	<ul style="list-style-type: none"> • Collect the right data once in a standardized manner • Cultivate high-quality integrated data • Collect and use data in a timely manner to guide decision making across the Manitoba healthcare system • A culture of continuously learning, evaluating, and improving from available data • A culture of collaboration, transparency and integrity • The capability and capacity to use health information • Recognize, respect and address the distinct health information needs of First Nations, Metis and Inuit people • Focus on security of personal health information through understanding and consistently applying legislation
Enablers	<ul style="list-style-type: none"> • Continuous engagement with the patient and provider community • Clear responsive governance, including accountability frameworks, controls and measures • Processes, technologies and tools that support available and reliable access to information • System-level Health Information Strategy

For the purposes of this Vision statement, “information” is an all-inclusive term that represents data collected from across the Manitoba healthcare system for all healthcare system uses, including, but not limited to:

- Clinical
- Health system management (e.g., quality improvement and performance measurement)
- Population health objectives (e.g., surveillance)
- Policy and program design
- Innovation/Research/Evaluation

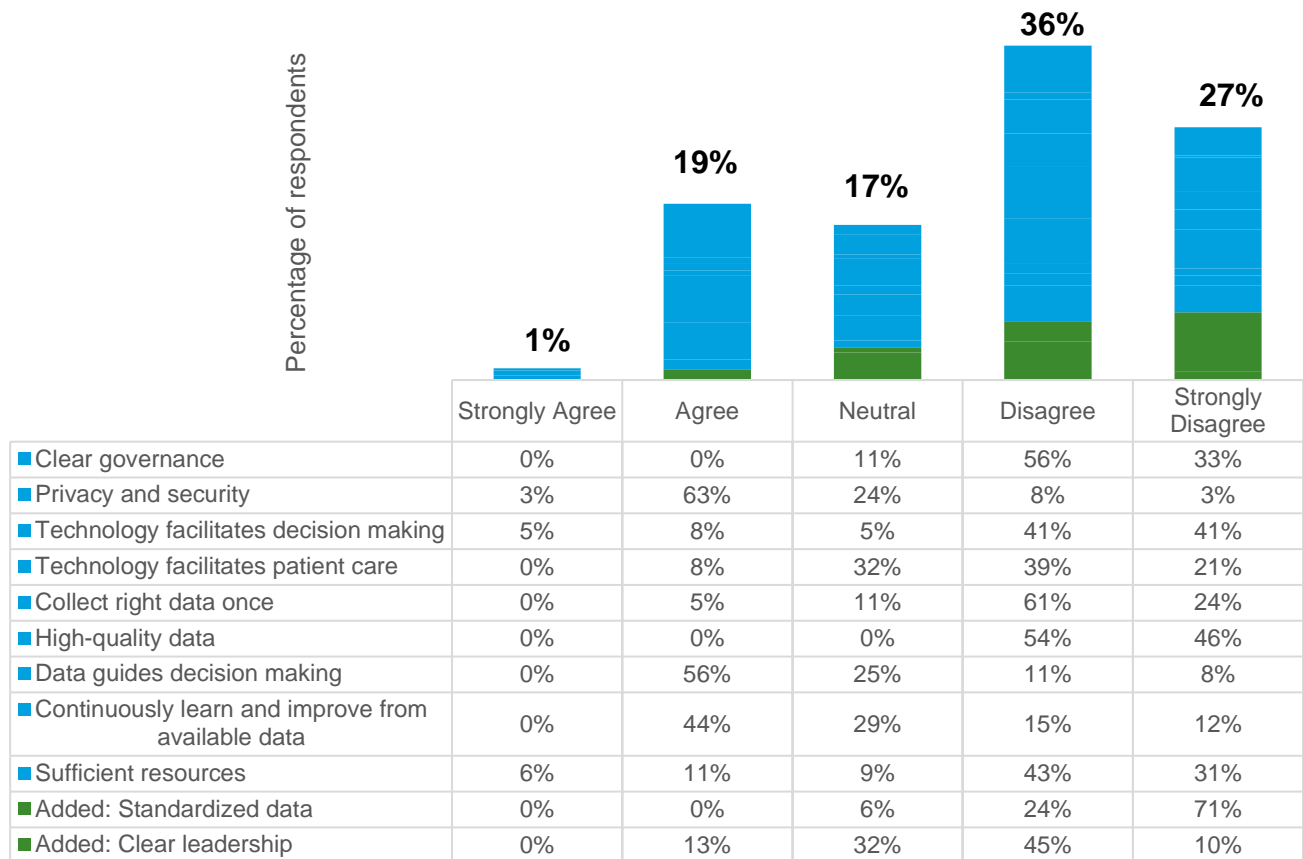
4 Current state

Insights into the current state of the Manitoba healthcare system IM&A Study were gathered through documentation review, the visioning and current state sessions, and consultations with healthcare leaders across the system. This section of the report focuses on the progress the healthcare system has made towards the CIHI framework, current state strengths, current state findings by IDO theme, and a grouping of other findings.

1. Progress towards the CIHI framework

In the visioning session, participants were asked to assess the performance of the Manitoba healthcare system against the CIHI enablers and behaviors. While agreement with CIHI principles was very strong (see the Vision section of this study report), participants felt that the current state of the Manitoba healthcare system is not strongly aligned with the principles and objectives espoused by CIHI.

Chart 3: Percentage of participant votes by CIHI enablers and behaviours



Lack of clear governance

The Manitoba healthcare system consists of an array of stakeholders who may, at times, have competing or conflicting needs and priorities. The system's IM&A landscape is similarly complex and diverse. 89% of session participants disagreed or strongly disagreed that the system is supported by clear governance, citing a strong silo orientation along organizational lines, as well as governance structures and processes that are fragmented and only partially aligned. While communication and collaboration are

improving, the system would benefit from additional clarity around decision making authorities and accountabilities. The siloed nature of planning efforts, systems, data and processes create barriers to integration and impede the flow of information.

Clear leadership - added

In addition to expressing a need for development of an effective governance framework, more than half of session participants (55%) also expressed a need to add clear leadership as a foundational element for effective IM&A in the healthcare system. Only 13% of respondents did not identify leadership as an unmet need. Embedding a clear leadership role in the governance model, empowered with appropriate authority and charged with accountability for IM&A, will be critical in eliminating the siloed nature of the current state.

Strong privacy and security controls

Participants generally felt that the Manitoba healthcare system is well aligned to the privacy and security dimensions set out in the CIHI framework. Only 11% of participants disagreed or strongly disagreed that the system supports robust privacy and security measures. In fact, participants indicated that privacy and security are such a strong focus area for Manitoba that data sharing and integration may be affected as a result.

Technology does not sufficiently facilitate decision making and patient care

Session participants noted that significant progress is being made over time to address data management needs to support decision-making, particularly as new provincial systems are developed and legacy systems and non-enabled processes are retired. 82% of participants acknowledged that remaining legacy technology is not meeting the vision set out by CIHI, and felt that technology doesn't sufficiently facilitate decision making, citing a large number of disconnected systems that do not collectively provide sufficient visibility and insight into Manitoba healthcare system operations. Similarly, 60% of participants indicated that technology does not sufficiently facilitate patient care, citing significant reliance on paper records and a lack of technology-enabled communication across points of care. These issues will continue to be addressed over time as the focus on development of provincial ICT solutions continues, and as progress continues to be made on the ICT Study Roadmap (which addressed issues similar to those reviewed in this study).

Lack of high quality data

Participants indicated that the Manitoba healthcare system is not meeting the data quality vision set out by CIHI. All participants indicated that they disagreed or strongly disagreed that data collected and available is of sufficient quality. Participants cited significant efforts spent gathering data without associated robust master data and metadata management practices.

Lack of standardized data – added

Lack of comparability across data sets is a persistent problem that makes meaningful analysis very difficult. Participants identified standardized data – with common nomenclature, common definitions, and managed in a standardized way – as a key requirement that needs to be added to the framework.

Data guides decision making and decision makers continuously learn from available data

Participants indicated a strong willingness across the Manitoba healthcare system to use and apply available data, analytics and insights to help inform overall strategy. Participants were split, however, on the extent to which most decisions were actually made using sound analysis generated from reliable data. Participants cited efforts like the IM&A Study as an indication of willingness and the lack of an overall IM&A strategy as an indicator that the CIHI vision around use of data was not yet realized in Manitoba.

Insufficient resources

Participants generally felt that there were insufficient resources across the system (financial, personnel and technologies), with 70% disagreeing or strongly disagreeing that Manitoba is characterized by the CIHI resourcing vision. However, the 30% indicated that resourcing was a complex issue in the Manitoba healthcare system with little visibility or insight into whether or not there were sufficient resources. Due to measuring challenges, duplication efforts and the decentralized nature of the IM&A function, it is difficult to make a determination about whether the resources being devoted to IM&A are sufficient.

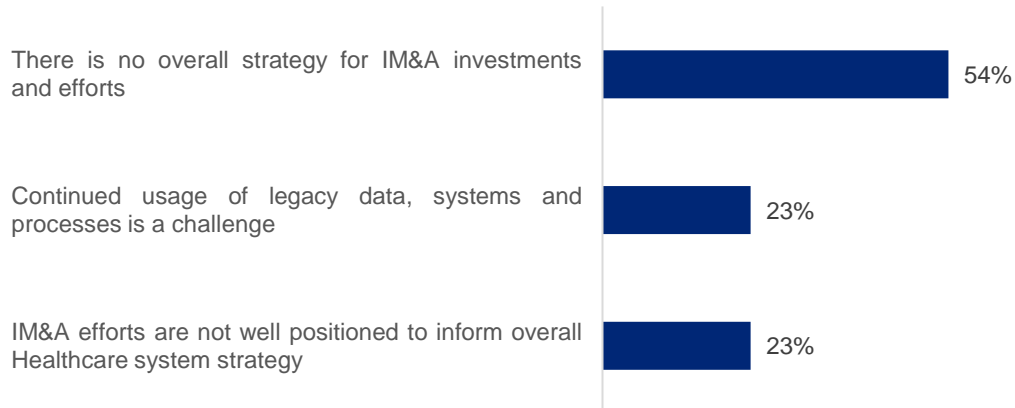
These preliminary findings helped inform the group and individual interviews undertaken with leaders across the healthcare system in the consultation phase of the study. See Appendix C for a copy of the Interview Guide. These findings were further refined and clarified during the interviews, with the results captured in the following strengths and findings section of this report.

3. Current state findings by IDO theme

4.3.1.1 Strategy

The chart below shows the results from the Current State Session validation of findings exercise. Participants were asked to vote on which Current State “Strategy” findings/themes resonated most strongly.

Chart 4: Percentage of participant votes – Top three Strategy findings/themes



There is no overall strategy for IM&A investments and efforts

Unfortunately, no central governing body exists with respect to IM&A investments. As a result, this has sometimes led to duplication of effort and in some cases, high sunk-costs in systems, processes, and initiatives. When investments are made, there is insufficient consideration given to maximizing the value of those investments across organizations and programs.

Continued usage of legacy data, systems and processes is a challenge

There are a large number of aging systems, datasets and processes in use across the Manitoba healthcare system. The rapid pace and high cost of technological change dictates that replacement of legacy systems must occur over time. The continued use of legacy systems and non-enabled processes in the interim presents significant challenges.

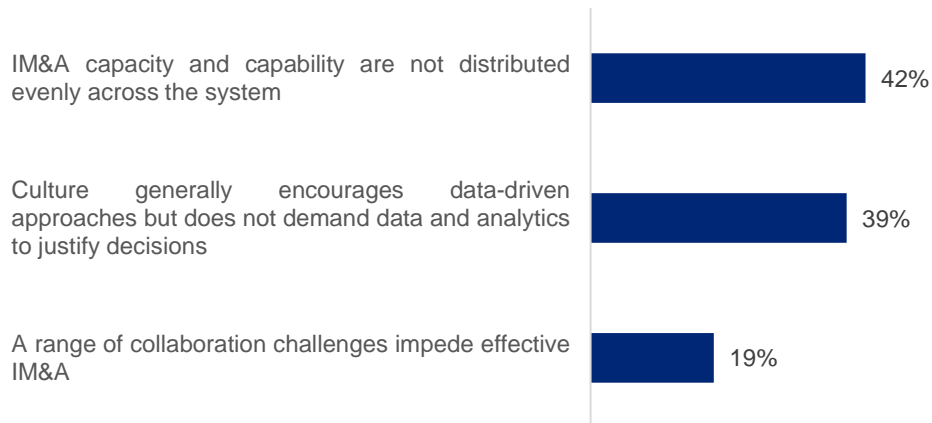
IM&A efforts are not well positioned to inform overall healthcare system strategy

Manitoba healthcare system leadership is increasingly demanding the information and analytics to make informed decisions but the IM&A function is unable to provide sufficient input to the strategic planning process. While effort is made to support leaders with data to make evidence-based decisions, and the system is generally rich in administrative and clinical data, there is a general frustration with the lack of reliable, consistent, and well-understood data sets to make medium- and long-term strategic planning decisions.

4.3.1.2 People

The chart below shows the results from the Current State Session validation of findings exercise. Participants were asked to vote on which Current State “People” findings/themes resonated most strongly.

Chart 5: Percentage of participant votes – Top three People findings/themes



IM&A capacity and capability are not distributed evenly across the system

Across the Manitoba healthcare system, there is little strategic alignment of IM&A capability and capacity to need. Resources capable of delivering IM&A services reside in program and organizational areas and are generally unable to support systemic views. This challenge is further compounded by resources tasked with performing IM&A having multiple other responsibilities, with IM&A efforts being sidelined and/or deprioritized. There are skillset and capacity gaps that impede accessing and applying available data, with limited formal IM&A training and opportunities for staff development and ongoing challenges with recruitment and retention of top IM&A talent.

Culture generally encourages data-driven approaches but does not demand data and analytics to justify decisions

While there is an emergent culture of demanding information to inform decisions, capability and capacity gaps have made such demands difficult to meet. Leadership is often forced to make decisions on the basis of incomplete data and insufficient analysis. Additionally, while analytics is applied where possible, respondents indicated that data is sometimes misinterpreted or applied without sufficient understanding for context. This has led to mistrust of those decisions that are made with supposedly data-driven insight.

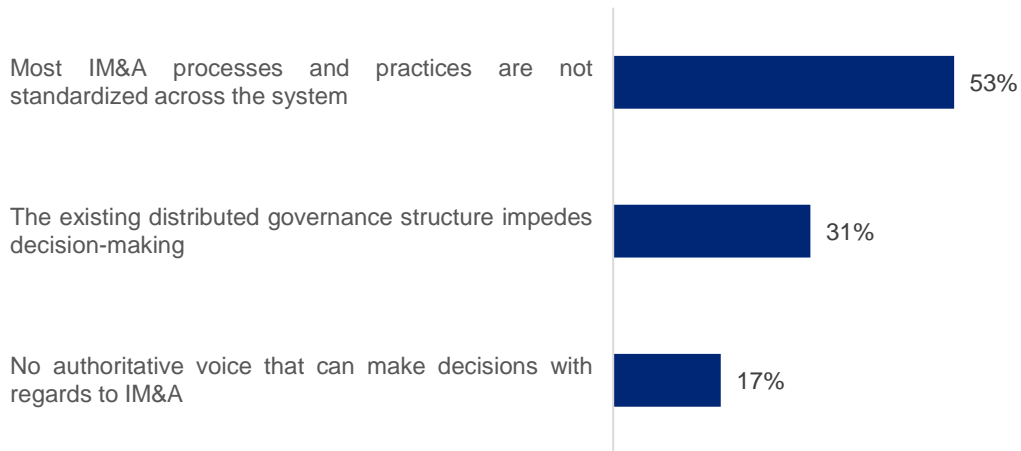
A range of collaboration challenges impede effective IM&A

The siloed nature of information management and lack of a provincial governance framework contribute to collaboration and communication challenges. Throughout the consultations, respondents also indicated that there are pockets of organizational mistrust and resistance to change.

4.3.1.3 Process

The chart below shows the results from the Current State Session validation of findings exercise. Participants were asked to vote on which Current State “Process” findings/themes resonated most strongly.

Chart 6: Percentage of participant votes – Top three Process findings/themes



Most IM&A processes and practices are not standardized across the system

Efforts have been made to begin applying standard definitions, practices and processes across the system. However, limited resources have meant that projects concerning metadata, masterdata and process standardization is often deprioritized and can take a very long time to complete. Accordingly, for most organizations, programs and services, there is a lack of mandate, leadership and accountability to provide guidance to help staff implement and/or adhere to standardized processes and practices.

The existing distributed governance structure impedes decision making

A siloed, complex, diffuse and layered system of decision-making, coupled with the absence of a system-wide IM&A mandate, has resulted in decisions being made and processes being developed to meet operational needs without formal and inclusive governance processes. Respondents highlighted the lack of governance as a serious and persistent challenge in achieving the Vision.

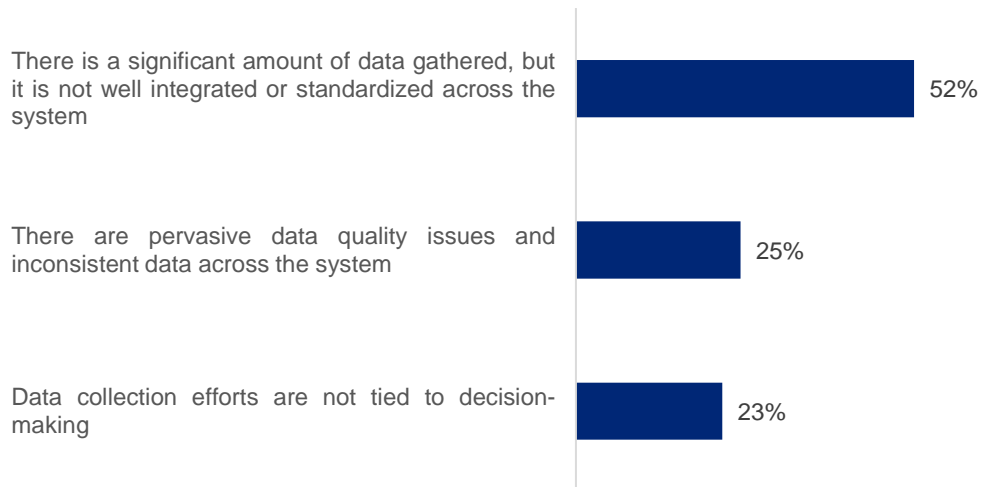
No authoritative voice that can make decisions with regards to IM&A

There is no council or other governing body that has the authority to establish/enforce data collection methods, quality standards, or sharing policies. Additionally, operational leadership for the IM&A function is spread so thinly across the Manitoba healthcare system, that many operational decisions that are made are often poorly communicated, understood and adopted.

4.3.1.4 Data

The chart below shows the results from the Current State Session validation of findings exercise. Participants were asked to vote on which Current State “Data” findings/themes resonated most strongly.

Chart 7: Percentage of participant votes – Top three Data findings/themes



There is a significant amount of data gathered, but it is not well integrated or standardized across the system

There are concerted and growing efforts to perform data clean-up and data standardization across the system, however, despite these efforts, data is not comparable across (and sometimes within) regions, sites, and programs. Further, significant quantities of data continue to reside in non-integrated legacy systems or in non-digital format (e.g. paper records). The lack of comparability and integration impedes the ability to conduct meaningful analysis of available data.

Data collection efforts are not tied to decision making

As noted, there are significant ongoing data collection efforts within all programs, facilities and organizations across the system. It was expressed by study participants that the power of the data that is being collected is not being fully harnessed and that significant data collection efforts may be expended on data that doesn't have a strategic purpose (e.g., to inform decision-making). For example, data that could support strategic goals may be collected and maintained within the system, but there may not be awareness within the system that the data is available. Conversely, once data begins to be collected and maintained, it will continue to be maintained without re-evaluation of why it's being collected and what other data could potentially be gathered to harness the data more strategically for local or system-wide decision-making or healthcare system use.

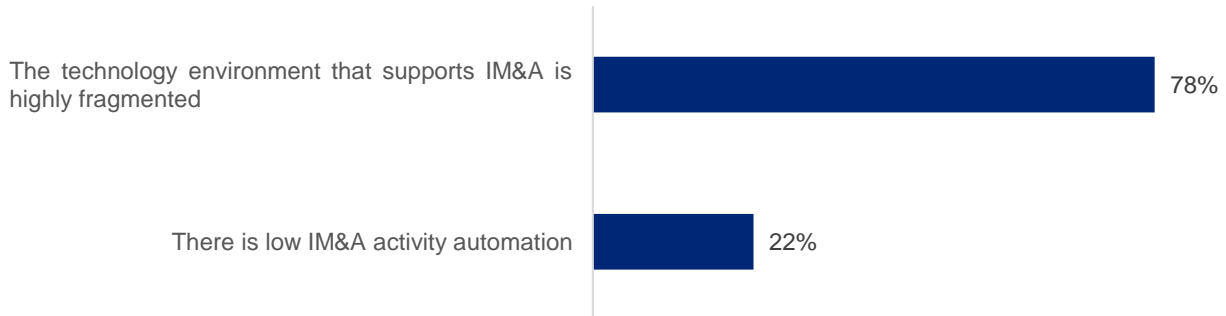
There are pervasive data quality issues and inconsistent data across the system

Recent efforts have been made to develop master and metadata management for select data sets, however, data quality continues to be a serious challenge with little documentation of data quality practices or procedures. As a result, the ability to link data sets and use data more strategically is affected. Study participants also stressed the need for the context within which data was collected to be considered, as the use of data out of context can impact the accuracy of its analysis and accordingly affect the validity of the use of the data.

4.3.1.5 Technology

The chart below shows the results from the Current State Session validation of findings exercise. Participants were asked to vote on which Current State “Technology” findings/themes resonated most strongly.

Chart 8: Percentage of participant votes – Top two Technology findings/themes



The technology environment that supports IM&A is highly fragmented

While the theme that emerged from current state discussions was that the technology environment is highly fragmented, it was also recognized that considerable efforts and progress are being made over time to reduce this fragmentation. Initiatives such as the ICT Study and resulting Roadmap, and continued development of provincial ICT systems that increase system integration and address data and decision support needs, are examples of these efforts. In the interim, however, there are a large number of siloed legacy systems that collect and store data. In addition to these formally controlled and understood systems, there are an unknown number of uncontrolled ad hoc databases and technology solutions throughout the healthcare system that are used to support varying maturities of analytics across organizations, sites and programs and are a source of risk for those responsible for managing ICT and IM&A in the Manitoba healthcare system.

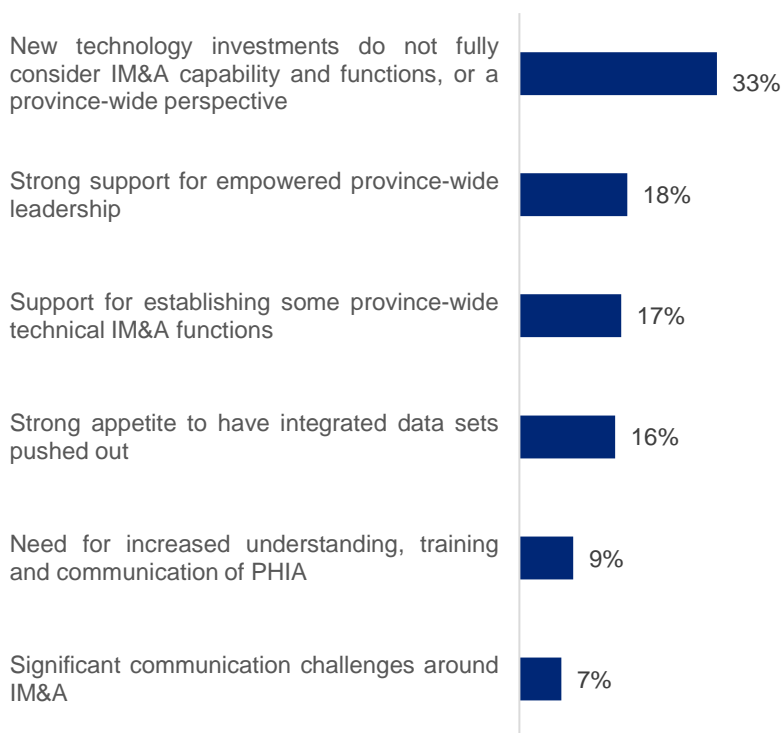
There is low IM&A activity automation

The system is characterized by the expenditure of manual effort to perform common analytics processes and functions, with little to no automation. While many tools exist across the system, much of the analysis is done in Excel and, to a lesser extent, statistical programming languages. This manual effort locks down resources in performing repeat analysis without any value being generated for the system.

4. Other findings

The chart below shows the results from the Current State Session validation of findings exercise. Participants were asked to vote on which other findings resonated most strongly.

Chart 9: Percentage of participant votes – Ranking of other findings



New technology investments do not fully consider IM&A capability and functions, or a province-wide perspective

There are significant challenges articulating the value of IM&A activities, with efforts to achieve value often affected by communication, governance, and implementation challenges. Additionally, while significant progress in this area continues to be made, study participants expressed that new technology investments do not always fully consider IM&A capability and functions, or a province-wide perspective.

Strong support for empowered province-wide leadership

There is support for strong leadership in the IM&A space, with stakeholders articulating the need for empowered province-wide leadership, in order to provide accountability for IM&A performance and continue to enhance evidence-based decision making.

Support for establishing some province-wide technical IM&A functions

There is support for establishing some province-wide technical IM&A functions including centralized data repositories and a standardized set of reporting and analytics tools. Additionally, while perspectives varied across the province, many study participants felt that there may be sufficient capability and capacity in the healthcare system, but that effort would be required to strategically align these resources to support province-wide goals and analytics needs. It was noted that the establishment of province-wide IM&A functions (e.g., analytics support), and increasing system-level collaboration or organization, would not replace local data analysis but would support it more effectively.

Strong appetite to have integrated data sets pushed out

There is a strong appetite to have integrated data sets pushed out to regions and programs from a centrally-managed hub.

Need for increased understanding, training and communication of PHIA

PHIA is perceived by some stakeholders as a barrier to effective information-sharing, with others perceiving it as an effective protection of private information that does not limit sharing. Interviewees noted the need to increase the understanding of PHIA across the system, to communicate more effectively, to provide more training, and to consider the impact on health outcomes in

the administration of PHIA. A concern with privacy pervades the system and potentially limits the ability to cost-effectively deliver the IM&A function.

Significant communication challenges around IM&A

There are significant communication challenges that directly impact the effectiveness of IM&A activities and initiatives. Respondents pointed to insufficient communication being the primary cause of individuals and programs across the system not knowing what resources, data or information is available for them to access and use.

5 Target state

Insights into the desired target state for the Manitoba healthcare system were gathered through the visioning, current state and target state sessions, as well as the consultations with healthcare leaders across the system. This section of the report consists of a documented desired target state, the gap that exists between the current state and the target state, a listing and associated analysis of twenty two initiatives designed to bridge the gap, and an inter-jurisdictional review of IM&A trends.

1. **Becoming an Insight Driven Organization (IDO) is about evolution not revolution.**

In many ways, creating an IDO is analogous to building a house: you need an owner who sets out a vision for the dwelling and who remains ultimately accountable for decision making at every stage; a strategy in the form of an architect's drawing, which describes what the house will look like once built; an agreed set of processes, which take into account everything from the order in which the building goes up to the steps required to meet building regulations; a team of builders and project-managers to oversee the construction; as well as all the materials needed, many of which may have to be sourced separately, and the tools and equipment to slot them all together. If any element is missing, the owner's original vision will not be met and costs may spiral. It's the same with becoming an Insight Driven Organization.

Becoming an insight driven organization or "IDO" requires the fundamental building blocks of People, Process, Data and Technology, informed by an effective Strategy, embedding analysis, data and reasoning into decision-making processes. An IDO views data and information as valuable assets, and analytics as a core capability across the organization that provides insight to support the decision making process and to address complex challenges. Embedding insight into planning and decision making processes, provides line-of-sight between data and health system planning, and between decisions and data, with technical solutions delivered to support and inform this process.



2. **IM&A Strategy and Vision**

The articulation of the IM&A target state vision represents a significant first step in the development of an overall IM&A target state strategy. The proposed roadmap and recommendations set out in Section 6 represent the strategy to achieve the IM&A vision as well as the foundational steps to continue the development of the strategy and the Manitoba healthcare system's evolution toward its vision.

VISION STATEMENT

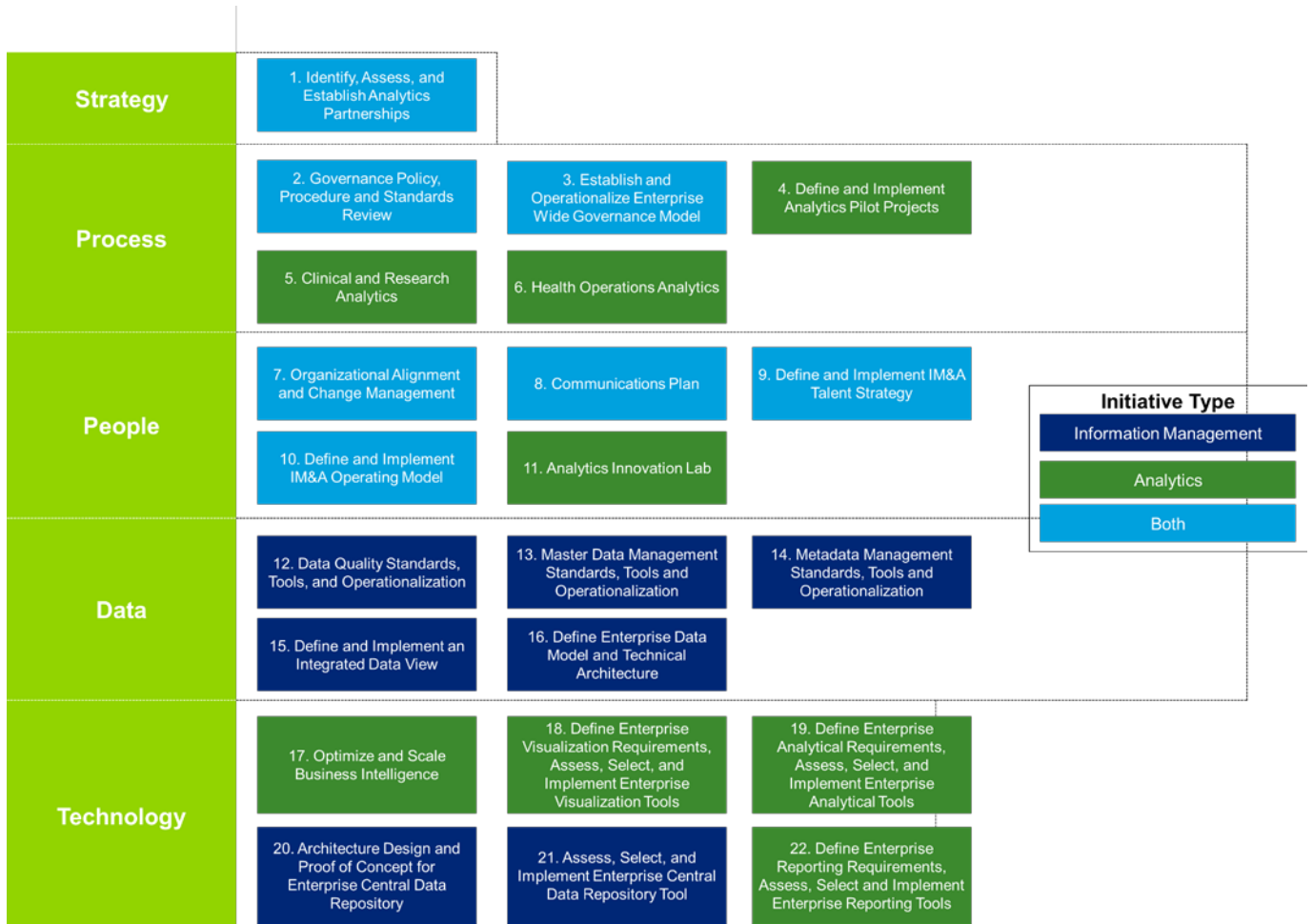
We enable an integrated provincial system that provides timely, accurate, and relevant information and innovative analysis to inform the actions and decisions of the public, patients, providers, policy-makers, administrators, and planners.

3. Current to target state transformation – addressing the gaps

IDO Building Blocks	Current State	Target State
 <p>Strategy</p>	<ul style="list-style-type: none"> • There is no overall strategy for IM&A investments and efforts • IM&A efforts are not well positioned to inform overall Manitoba healthcare system strategy • Continued usage of legacy data, systems and processes is a challenge 	<ul style="list-style-type: none"> • A Provincial IM&A Strategy for the healthcare system • Governance structure and evaluation mechanisms that support analysis and inform decision-making to maximize the value of investments across organizations and programs. • Standardized, integrated and well-understood data sets that support evidence-based planning and performance management across the system • Coordination of ICT and IM&A governance structures and processes to facilitate informed data and ICT investment and disinvestment decisions
 <p>Process</p>	<ul style="list-style-type: none"> • No authoritative voice that can make decisions with regards to IM&A • The existing distributed governance structure impedes decision-making • Most IM&A processes and practices are not standardized across the system 	<ul style="list-style-type: none"> • Effective governance policies, procedures and standards that establish appropriate decision-making authority and accountability • A collaborative planning process that integrates the requirements from the various areas of the Manitoba healthcare system to help inform IM&A and overall health system strategy • Robust processes that will guide consistent decision-making across the Manitoba healthcare system for the collection, use, storage, sharing of and access to information
 <p>People</p>	<ul style="list-style-type: none"> • A range of collaboration challenges impede effective IM&A • IM&A capacity and capability are not distributed evenly across the system • Culture generally encourages data-driven approaches but does not demand data and analytics to justify decisions 	<ul style="list-style-type: none"> • A culture that demands data and analysis to inform administrative decisions and processes and that encourages sharing data and information appropriately • A recruitment and retention strategy that includes development opportunities for IM&A talent • An innovative and entrepreneurial environment where IM&A staff are encouraged to develop, test and sometimes discard IM&A projects • Planned and managed IM&A operating model that provides clarity around roles and responsibilities to all IM&A functions and programs as well as a defined IM&A service catalogue
 <p>Data</p>	<ul style="list-style-type: none"> • Data collection efforts are not tied to decision-making • There is a significant amount of data gathered, but it is not well integrated or standardized across the system • There are pervasive data quality issues and inconsistent data across the system 	<ul style="list-style-type: none"> • Data collection efforts that are directly tied to decision making processes • Robust self-service visualization and reporting capabilities pushed out from the IM&A function that includes sufficient documentation and context to provide decision support that meets system needs while supporting organizational (e.g. regional) needs • Consistent reliable data that supports decision making at all levels across the healthcare continuum and all healthcare settings, e.g. from the clinic to the boardroom • Common master data and metadata management systems across the province with significant continuous improvement efforts focused on data collection and quality methods
 <p>Technology</p>	<ul style="list-style-type: none"> • The technology environment that supports IM&A is highly fragmented • There is low IM&A activity automation 	<ul style="list-style-type: none"> • Rationalized and integrated tools, licenses and systems with significantly reduced duplication of functionality and purpose • An ICT procurement process which considers the IM&A needs of the provincial healthcare system • Several centrally managed IM&A tools including: master data management, metadata management, reporting, visualization, and analytical tools • Clearly defined, documented and updated IM&A technical architecture • An enterprise central data repository

4. Target state initiatives

Several potential initiatives, summarized in the graphic below, were reviewed and prioritized by study participants through the Target State survey, and further validated through the Target State session. These initiatives are intended to address the gaps between the current and desired target state. Detailed descriptions of the initiatives, and the outcomes of the prioritization, are provided in Appendix A.



5.4.1 Top 12 Initiatives

Survey respondents used the following criteria to prioritize the target state initiatives:

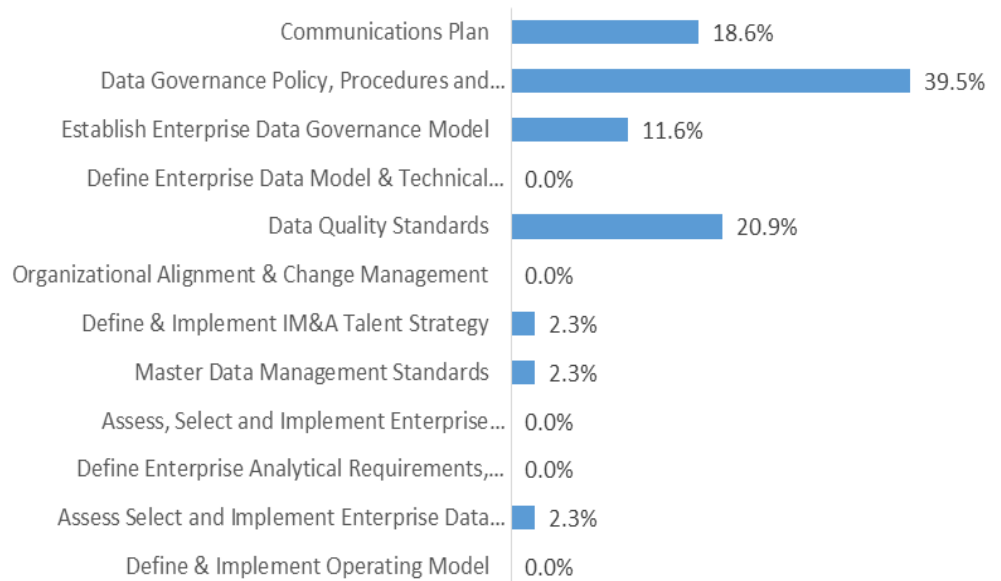
Prioritization criteria:

- **Urgency** – the time frame in which the initiative should be implemented - right away (year1), in the short term, or over the longer term (3+years)
- **Value** – perceived business value / impact of the initiative on the healthcare system - low, medium, or high
- **Complexity** – ease of implementation based on influencing factors such as readiness / availability of key stakeholders, data or technology requirements, disruptiveness
- **Capacity** – the healthcare system’s capability and capacity to implement the initiative / solution

The top twelve initiatives and their rankings, based on the combination of these four criteria, are presented in the illustration below.



Target State session participants were asked to identify which of these twelve initiatives were their top two – i.e., which were the highest priority or most important? Almost 40% of participants singled out the primary governance initiative as their top priority, which is consistent with the findings of the consultation process throughout the study. The second and third highest priorities, representing close to 20% of participants each, were development of data quality standards and the need for a communications plan. Similar to the need to develop a governance model, these two initiatives represent recurring current state themes to be addressed.



Further information regarding the results of the survey and prioritization exercise undertaken through the Target State Session can be found in Appendix F – Target State Session deliverable.

5. Inter-jurisdictional IM&A trends

Canadian jurisdictions are turning to Information Management and Analytics for performance improvements and cost reductions. Health Systems are undergoing a major IM&A-fueled transformation in how care is managed and delivered. As more data is captured and compiled from sources like electronic health records, drug claims, medical devices, and patient-provided input, analytics can help detect hidden patterns in information, delivering actionable insights and enabling systems to sense, predict, infer, and conceive alternatives that might not otherwise be obvious. Such insights are already playing a major role in helping health systems improve costs and quality, identify at-risk populations, connect with consumers, and better understand performance.

5.5.1 Healthcare IM&A challenges

Big data

Traditional information management and analytics tools and methods are outpaced by the amount of data generated in our daily lives. Big data is about finding patterns across various databases and integrating those databases to generate new insights that single data sets alone cannot provide. It can improve the administration of healthcare and can provide new and unexpected insights into how to best provide care to patients. In some instances, big data is being used by providers to leverage vast amounts of patient data gathered from a variety of sources to more accurately determine the clinical value of specific treatments and promising areas for improvement. Big Data refers to internal and external data that is multi-structured, generated from diverse sources in near real-time and in large volumes making it beyond the ability of traditional technology to capture, manage and process within a tolerable amount of elapsed time. Enhanced data storage, processing and delivery tools and methodologies enable us to integrate vast amounts of structured and unstructured data, to analyze and find patterns in order to generate new insights that single data sets alone cannot provide.

Evidence-based decision making

There is increasing pressure on healthcare systems around the world to improve their decision making processes and strengthen analytics and evidence-based analysis of their administrative and patient data sets. The public and decision makers are demanding that policy and program decisions are made on the basis of sound and defensible analysis. Robust evidence-based decision making processes are made possible by cheap storage and exponential increases in computational power and span the breadth of healthcare provision.

Measuring and managing outcomes

There is a strong and ever-increasing push towards measuring and managing patient and administrative outcomes. A range of common outcomes are being tracked across Canadian jurisdictions by CIHI, including:

- People who report they have a regular medical doctor
- Patients waiting longer than 3 months to see a specialist
- Patients receiving cancer radiation treatment within 1 month
- Patients receiving a hip or knee replacement within 6 months
- Patients urgently readmitted to hospital within 30 days of discharge
- Comparison of hospital deaths to the average Canadian experience
- Mental health patients with at least 3 hospital stays in a year
- Daily or occasional smokers
- Adults considered obese based on self-reported height and weight
- Average years an individual is expected to live
- Deaths per 100,000 that were potentially avoidable with better prevention or care
- Percentage of vulnerable children in areas of early development
- Government spending per person after adjusting for differences in population age and sex
- Cost per patient stay in an acute care hospital

Measuring and managing outcomes against effective, clearly defined key performance indicators can give valuable insights that help decrease costs as well as improve healthcare effectiveness and overall patient satisfaction.

Digitization of health records

The demand for value and an increasingly technological environment are prompting health care organizations to find new and more effective ways to improve care delivery. This includes making services more accessible and potentially less expensive by enabling patient-provider connectivity “anytime and anywhere.” Specifically, health care organizations are exploring ways to facilitate communication between providers and consumers; engage consumers; and support prevention and management of chronic care outside traditional settings.

Advancements in digital health technology are leading to advancements in connected health. Data captured by wearable devices, mobile health apps (mHealth), and social media are being used to transform aspects of health care that earlier seemed beyond the purview of such technologies. Digital health is also becoming an important platform for providers and health plans to strengthen patient engagement programs and collaborate with other stakeholders in the health care system.

Connected Health

Connected health (cHealth) is digital and technology-enabled care delivery that allows for remote communication, diagnosis, treatment, and monitoring. An important goal of an effective, patient-centred approach is to improve digital connectivity between providers and patients to allow individuals to access the care they need, anytime and anywhere. Across the spectrum of care, digital and cHealth strategies may help to reduce costs and improve health outcomes, patient satisfaction, and long-term consumer engagement.

Additionally, patient demands are shifting to community-based care with an emphasis on integrated care across the sectors on a population basis. Innovation, patient engagement, outcomes management, and technology investments are viewed as critical enablers of reform and sustainability in Canada's health care system. In particular, the public's desire to create and manage access and control their electronic health and social care records on their own is growing faster than health care systems are able to provide it.

5.5.2 Healthcare IM&A challenges

Shrinking budgets

In 2014, the Canadian Institute of Health Information (CIHI) estimates healthcare spending rose by its lowest rise since 1997. The rate of growth in health spending (2.1%) continued to be lower than inflation and population growth, and health spending decreased by an annual average of 0.4% the previous four years. Health expenditure was approximately 11% of Canada's GDP in 2014. Despite these budgetary challenges, more is being demanded of the IM&A function at all levels of the healthcare system. Budgetary pressure is forcing healthcare systems to rethink the way they operate.

Unstructured data

In the healthcare industry, unstructured data is a growing challenge. Examples of this can include patient emails, PDFs of patient records, etc. Unstructured data is very difficult to analyze, and clogs up storage capacities. While eliminating unstructured data is difficult, e.g., documentation of reasons for failing to adhere to medication, more needs to be done to ensure data is coded, standardized, and organized.

Isolated data sets/Interoperability challenges

Data integration challenges have slowed adoption of cHealth. Consumer demand and expectations, and the public and private sectors' rapid uptake of value-based care initiatives are changing the landscape for cHealth. In response, technology developers and health care organizations need to consider the potential of cHealth savings, the investment costs for new digital technologies, and targeted strategies for the patients who may benefit most.

Data security concerns

Although the digitization of health care data is improving patient care and operational efficiency, these improvements come with cyber risks. Organizations handling personally identifiable information and protected health information must continually guard against cyber threats which are becoming more commonplace and severe. Emerging threats include:

- Cloud-based computing attacks: With the broad migration of software to the cloud (public/hybrid) as a main backup storage platform, the health care sector has been exposed to new security challenges from distributed denial of service (DDoS) and related types of cyber-attacks. These threats also hold regulatory implications, as health authorities focus attention on risks related to unauthorized changes made to public cloud platforms that could inadvertently impact functionality that touches patient safety or product quality.
- Medical device security concerns: While medical devices are playing a transformative and beneficial role in health care, they also pose risks to patient safety and health information security. When a medical device or its data, is compromised due to a security breach, the loss of integrity can lead device malfunction or result in incorrect care decisions by medical practitioners.
- Privileged access: Nowadays privileged access management means integrating business processes, user management and various tools. This enables improved operational effectiveness and reduces the risk of insider attacks, while also complying with organizational security policies and offering auditing capabilities to meet various regulatory obligations.

Lack of skilled resources

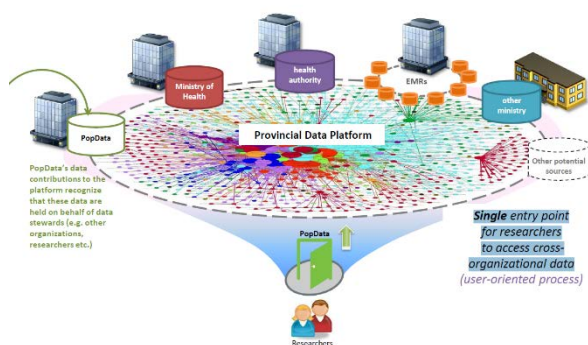
Expertise in the IM&A space is in high demand, with many well-funded private sector organizations struggling to retain top talent. As IM&A demands grow, healthcare systems are struggling to recruit, train and retain top talent. Canada generally has a less developed analytics function in healthcare, and researchers have less experience handling big data. Researchers in other countries work with large datasets, and experiment with linking large volumes of administrative data so they gain experience in handling 'big data'. For example, the Canadian Research Data Centres Programme cites as a benefit the opportunity to "train a new generation of Canadian quantitative social scientists.

6. Some Canadian jurisdictional insights

British Columbia

The BC Ministry of Health published a cross sector policy paper¹ to set a provincial strategy on health information management and technology in order to enable effective, quality population and patient centered care. As a true insight driven organization, the Ministry set the IMIT strategic priorities to enable the Province's three strategic directions (primary care, rural care and surgical services) and address their IMIT implications. The IMIT strategic priority directly relevant to IM&A is "data sharing for decision support". In addition to enabling effective care using other IT related strategic priorities, the Province took concrete steps to enhance its health information management and analytics capacity to: improve access, quality, standardization and timeliness of administrative and clinical care data for health system planners, policy makers, managers and researchers; build informatics capacity to use data; and, enhance decision making and improve outcomes at all levels of the system, while meeting privacy and security requirements. The Province is taking the following immediate steps (note that once these steps are completed, the Province is expected to start other initiatives):

- Establish Health Information Management Policy Framework
- Establish Data Sharing Accountability Framework



In addition to the Ministry's efforts in enhancing IM&A capacity within the Province, BC Support for People and Patient-Oriented Research and Trials (SUPPORT) Unit initiated the first steps to design and implement a provincial data platform that will serve a single entry point for researchers to access cross-organizational data. The goals of this platform is set to improving timeliness, efficiency and greater breadth in researcher data access, increasing use and utility of data by broadening potential users and scope of access, positioning BC for excellence in data-driven evidence for health and health research sectors, advancing best data management practices, and increasing security and functionality in data capture, storage and retrieval for health research, including real world clinical trials and randomized controlled trials.

The Province, however, has not waited for all data to be integrated to make better secondary use of health data. As an example, a Big Data approach was used to take data from administrative databases, such as physician billings, hospitalizations, prescription drugs, home & integrated care programs, emergency department visits, in order to better understand the health of the BC population and their use of the Health Care system from a patient population perspective rather than a care episode perspective. Several insights were extracted and used to guide the development of the BC Health Strategy.

Similarly, innovative work is in progress to embed advanced analytics to inform decisions in order to better manage target patient population. For example, one of the larger regional health authorities has undertaken a project to predict frailty so that patients at risk can be identified earlier and a more integrated care approach can be used in a primary care setting to prolong the pre-frailty

¹ <http://www.health.gov.bc.ca/library/publications/year/2015/IMIT-policy-paper.pdf>

stage. The shift from acute to primary care is expected to improve patient outcomes, satisfaction and decrease cost per capita. Initial estimates have demonstrated significant potential savings.

Alberta²

The Alberta Electronic Health Record (Alberta EHR) is the integrated provincial electronic health information network that provides shared access to prescribed health information, by authorized custodians, in a secure environment. The scope of the Alberta EHR is limited to networked health information systems for which Alberta Health is either the Information Manager or custodian.

The Alberta EHR provincial program began in 1997 with the establishment of Alberta Wellnet by Alberta Health with the mandate to develop and deliver province-wide EHR initiatives. This was the predecessor to the current Alberta Netcare program.

The Alberta EHR integrates and connects over fifty e-health systems, with various custodians and affiliates contributing content and support services. In its current state, the Alberta EHR is comprised of four major components supporting the network in different ways:

Access Tools - allow users to view health data across repositories and registries in the Alberta EHR, but do not hold any data themselves.

Registries - capture, store, and provide the authoritative source of data on places, identities, and events used by all repositories and access tools for identification purposes.

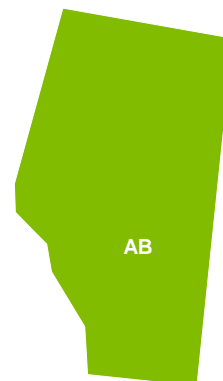
Repositories - capture, store and maintain various kinds of diagnostic, treatment, and care information about patients.

Infrastructure - components that enable repositories, registries and access tools to connect and transmit health data requested by users or other systems.

Ontario

Ontario published an ehealth blueprint³, which is a foundational document that informs EHR planning and delivery for the province, in 2014. The blueprint is built on key foundational principles including privacy and security compliance, collaborative governance, regulation and policy, standards, and federation. The following information management principles are used by eHealth Ontario to guide the process of managing information resources: Information needs are business-driven; Information is a public asset; Information is shared; Information is accessible (for those authorized to use it); Information is protected; Information is managed using a life cycle approach; Information is managed in an integrated manner; Information needs to be integrated to support better decision making; Information management is everyone's business. Strategic key players in the information management and analytics ecosystem published and executed strategies on information management and analytics.

Public Health Ontario identified five strategic directions⁴, three of which have direct implication to IM&A strategy. One of the strategic directions is "Accelerate integrated population health monitoring" which involves development of a data hub in collaboration with health system partners that enables integrated population health monitoring, production and dissemination of tools and resources which transform data to information and knowledge that guide public health action, and development and application analytic and presentation methodologies that inform population health monitoring. PHO also have two strategic directions to improve the secondary use of health data. These strategic directions involve synthesizing and disseminating knowledge and leading practices in public health to accelerate their application into practice; providing evidence and tools to influence policy and program development; leading the generation of new public health knowledge in priority areas; developing



² http://www.albertanetcare.ca/documents/An_Overview_of_Albertas_ERHIS.pdf

³ http://www.ehealthontario.on.ca/images/uploads/pages/documents/Blueprint_Book.pdf

⁴ https://www.publichealthontario.ca/en/eRepository/StrategicPlan_Interactive_2014_2019.pdf

innovative approaches and methodologies for public health implementation science; evaluating and enhancing complex population health interventions.

Another initiative that aims to integrate data is a local initiative started at South East LHIN. The South East Health Integrated Information Portal (SHIIP)⁵ is a secure electronic information portal that enables data to flow across all health care sectors and assist with care coordination, particularly for people living with multiple or complex health conditions. As a technology enabler, SHIIP will allow patient hospital information to quickly flow from the hospital to their primary care team. An important feature of SHIIP is its capacity to pull together information from various sources and identify patients who would benefit from enhanced care coordination. SHIIP enabled the LHIN to develop advanced analytics models to predict unplanned emergency visits. Another unique initiative is Insight4care⁶, which is a multi-year, multi-phase program intended to gather and collate all patient data from participating physician practices in Ontario and make the de-identified data available to individual physicians in usable formats. The intent is to unlock the data assets in EMRs currently locked and not utilized to make sure that data gets used to improve patient care, to provide better outcomes and to help doctors use that data so they can provide the best quality care for their patients.

Regarding the secondary use of health data, the Health Analytics Branch (HAB) of the Ministry of Health and Long-Term Care has undertaken three initiatives: 1. Analysis to inform development of tools to predict high cost users of Ontario's healthcare system, 2. Construction of a model to measure the influence of clinically relevant patient characteristics on resource utilization for hip fracture cases, and 3. An analysis to evaluate the impact of patient enrolment with primary care providers on emergency department utilization for non-emergent care. These sample projects show how HAB manages health analytics requests, develops statistical methods, and creates reports and tools to meet ministry, Local Health Integration Networks and other client needs for accurate, timely and useful information in order to support evidence-based decision making in the healthcare system.

⁵ <http://www.southeastlin.on.ca/goalsandachievements/Technology/shiip.aspx>

⁶ <https://www.cma.ca/Assets/assets-library/document/en/about-us/future-practice-june-2015.pdf>

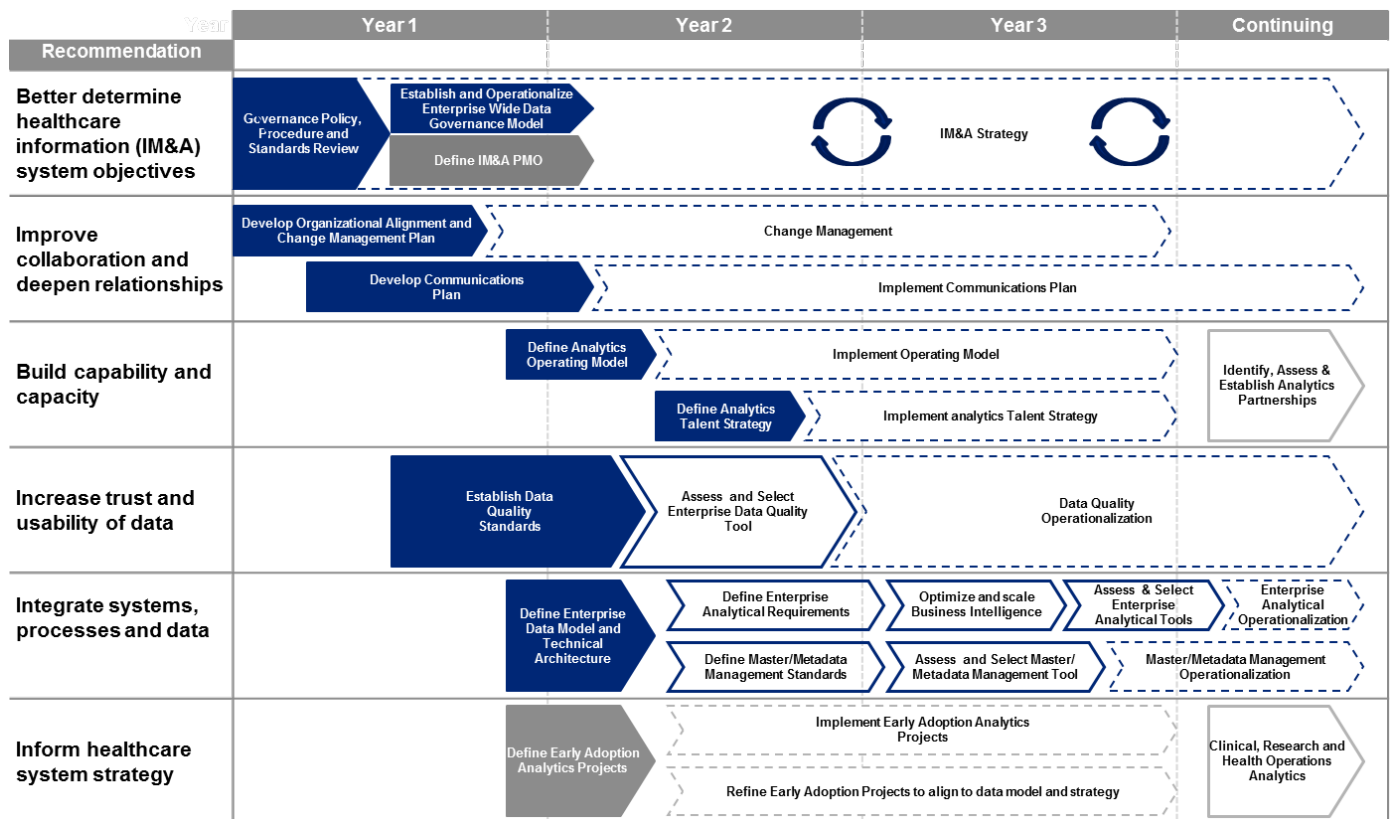
6 Target state roadmap and recommendations

1. Roadmap

By supporting and participating in this study, the Manitoba healthcare system, through HSLC, the Project Study Committee, and the more than 200 leaders who participated in this study, has clearly demonstrated its commitment to evolving the management of information and the effective use of data in order to offer more value across the healthcare system.

The study identified six recommendations and associated action items to promote the realization of the target state vision for IM&A across the Manitoba healthcare system. These recommendations and actions address current state gaps and challenges, as identified during the consultation phase of the study and validated through workshops with stakeholders across the system. Taken together, and integrated with the healthcare system’s business strategy and clinical practices, these recommendations form a complete strategy that will support the evolution towards the IM&A vision.

The proposed roadmap sets out the high-level sequencing, logic and timing of the twelve high priority target state initiatives, as well as the proposed timing and sequencing of the recommended follow-on initiatives that will be required to continue the journey toward the IM&A vision.



The twelve priority initiatives form the backbone of the roadmap, and are presented above in solid dark blue. Their follow-on initiatives are in solid dark blue outline. Initiatives in hashed outline represent ongoing implementation or operationalization activities related to these initiatives that will not only be instrumental in the launch of the new IM&A framework, but will need to be undertaken on an ongoing basis in order for the IM&A evolution to be successful. Two initiatives on the roadmap were not identified within the set of highest priority initiatives – these initiatives are shown in solid grey and described in section 6.2.

2. Recommendations

Detailed action items for the prioritized target state initiatives included in the roadmap are provided in the descriptions of the initiatives in Appendix A. Following are initiatives/action items included on the roadmap that were not identified previously as target state initiatives:

IM&A governance framework and leadership role

Developing an appropriate and effective governance framework is a critical foundational element for the success of the IM&A initiative and is a key – perhaps the key – recommendation of this study.

Critical components include:

- establishing a governing body with the authority to make decisions, and appropriate representation from across the healthcare system (e.g. Data Governance Council)
- establishing an IM&A leadership position to lead the evolution of the IM&A function and its ongoing delivery – this can be an existing position with a redefined role, or a new position (e.g. Chief Data Officer or Chief Analytics Officer)
- accountability for setting and monitoring the IM&A Strategy
- Defining IM&A policies and procedures
- Defining processes, controls and frameworks to guide the healthcare system – (e.g. data quality standards)
- Aligning stakeholders through change management to educate and train to fulfill the new data roles and responsibilities
- Designing and executing early adoption projects to test the new data policies and processes and monitor and measure the value generated

A primary consideration for governance of the IM&A function is the relationship with the ICT function. While the two are inter-related, they need not be governed together. In fact, a single governance framework for both ICT and IM&A could present a significant risk that the IM&A function may be misunderstood to be ICT-focused, and inadequate attention to the management of data and information could result. It will be important, however, to formally build communications, interaction, and consultative capacity between IM&A and ICT.

Accountability for the IM&A strategy requires a robust relationship with healthcare delivery/clinical leadership. Similar to the relationship with ICT, it is critical for there to be interaction, communication and collaboration/consultation with the “business side” of healthcare.

Define IM&A Project Management Office (PMO)

The roadmap as presented is very aggressive. The priority initiatives that address current state gaps are foundational in nature, and are all vitally important for the IM&A evolution to be successful. As a result, years 1 and 2 will require dedicated focus and resources, as well as significant coordination and project management effort. Accordingly, the first year of the roadmap includes defining how the implementation of the roadmap will be undertaken, monitored and managed, including the establishment of a Project Management lead role.

Early adoption analytics projects

The second initiative shown in grey is the development of early adoption analytics projects. Adding this initiative to the roadmap serves two purposes:

- Over the first two years, significant effort will be expended on foundational elements, which, while required, will not likely generate or maintain excitement within the healthcare system. Undertaking early adoption projects will demonstrate “the art of the possible” and will help maintain momentum.
- Starting on the provincial analytics journey by defining and implementing early adoption projects will provide useful learning in a controlled environment.

Refresh the strategy

The roadmap's initiatives have been developed and sequenced to promote the realization of the target state vision for IM&A across the Manitoba healthcare system. Identified action items address current state gaps and challenges, as identified during the consultation phase of the study and validated through workshops with stakeholders across the system. Taken together, and integrated with the healthcare system's business strategy and clinical practices, the roadmap and recommendations form a complete strategy that will support the evolution towards the IM&A vision.

It will be important to review and refresh the IM&A strategy periodically, to ensure the Manitoba healthcare system continues to drive toward the IM&A Vision and that the Vision remains unchanged.

Training and communications related to *The Protection of Health Information Act (PHIA)*

The need for increased understanding, training and communication related to PHIA was noted as a current state theme. PHIA is perceived by some stakeholders as a potential barrier to effective information-sharing, and that from time to time, access decisions may not appropriately weigh the value of access to health data. The consensus gathered through the consultation phase is that the legislation provides effective protection of private information with safeguards that allow for appropriate information-sharing, but may not be understood or interpreted consistently across the healthcare system. Interviewees noted the need to increase the understanding of PHIA across the system, to communicate more effectively, and to provide more training.

6.2.1 Summary of Recommendations

	Recommendation	Initiatives
1	Better determine healthcare system information (IM&A) objectives	<ul style="list-style-type: none"> • Develop and implement an effective IM&A governance framework and model , with supporting policies, processes and practices aligned with the vision and desired target state: <ul style="list-style-type: none"> – Establish Leadership Role for IM&A – Review Governance Policy, Procedures and Standards – Establish and operationalize enterprise wide data governance model • Establish a Project Management Office • Refresh the strategy at least annually • Develop and implement enterprise-wide training and communications related to <i>The Protection of Health Information Act</i>
2	Improve collaboration and deepen relationships	<ul style="list-style-type: none"> • Develop and implement Organization Alignment and Change Management Plan • Develop and implement Communications Plan
3	Build capability and capacity	<ul style="list-style-type: none"> • Define IM&A Operating Model <ul style="list-style-type: none"> – Implement IM&A Operating Model • Define and implement Analytics Talent Strategy <ul style="list-style-type: none"> – Implement Analytics Talent Strategy • Identify, Assess and Establish Analytics Partnerships
4	Increase trust and usability of data	<ul style="list-style-type: none"> • Establish Data Quality Standards <ul style="list-style-type: none"> – Assess and Select Enterprise Data Quality Tool(s) – Operationalize Data Quality
5	Integrate systems, processes and data	<ul style="list-style-type: none"> • Define Enterprise Data Model and Technical Architecture <ul style="list-style-type: none"> – Define Enterprise Analytical Requirements – Optimize and Scale Business Intelligence – Assess and Select Master/Metadata Management Standards and Tools – Operationalize Master/Metadata Management
6	Inform health system strategy	<ul style="list-style-type: none"> • Define Early Adoption Analytics Projects <ul style="list-style-type: none"> – Implement Early Adoption Analytics Projects – Refine Early Adoption Analytics Projects to align to data model and strategy – Undertake Clinical, Research and/or Health Operations Analytics

6.2.2 Next Steps

6.2.2.1 Preliminary Next Steps – Resource Inventories

Over the course of the consultations, it was clearly noted that the healthcare system has significant pockets of resources that deliver value within their local settings and could be leveraged to serve the healthcare system as a whole. The system, however, is often not aware of what resources exist or where they may reside. The roadmap sets out a number of initiatives to define the healthcare system's needs and develop the plan to address these needs. As a starting point, it would be helpful to undertake an inventory of existing resources which may be more effectively utilized in the interim and that may be effectively deployed to address target state needs once defined.

Resources to be inventoried include:

- Talent: An inventory of existing capacity and capability would help inform the talent strategy.
- Data: It is understood that there are rich sources of data in the healthcare system. Through the consultations, it was noted that from time to time, stakeholders are not aware of the data produced or stored by other stakeholders.
- Technology: Investments in analytics tools/technologies have been made by some system stakeholders. These investments may be able to be extended more broadly across the system. The existence and location of such tools would inform the technology-related initiatives.

6.2.2.2 Next Steps Working Session

The significance of the transformational opportunity reflected in these recommendations, and the effort that will be required to successfully implement the roadmap should not be underestimated. It will be important to secure early success in order to demonstrate value and capitalize on the current momentum for change in the healthcare system. Deloitte would be pleased to offer a half-day workshop, as part of the study engagement, to assist the Manitoba healthcare system determine its next steps and accelerate the implementation of the roadmap.

Appendix A – Target state initiatives

Initiative details

A profile has been provided for each of the initiatives that were reviewed and prioritized through the Target State survey and validated through the Target State session. Each profile consists of nine fields of information that provide a starting point for each initiative, as they could potentially be pursued for the Manitoba healthcare system. These profiles supplement the target state recommendations and roadmap.

Each profile provides:

- A high level description of the initiative
- The summarized perspectives of Target State survey respondents:
 - The timing, as estimated by survey respondents. It should be noted that the timing and sequencing of the initiatives included in the roadmap do not necessarily reflect the estimated timing suggested by the Target State survey results
 - The business value, as estimated by survey respondents
 - The complexity, as estimated by survey respondents
 - The capability of existing resources in the Manitoba healthcare system as estimated by survey respondents
- The specific current state challenges addressed by the initiative
- Benefits that can be realized through implementation of the initiative
- Key activities and tasks to be undertaken for the initiative to be successful. As implementation of the roadmap and recommendations proceeds, before implementing a new initiative, the key activities should be reviewed and updated periodically in order that they remain relevant and current with the passage of time
- Anticipated outcomes, either products or services, that will be completed through implementation of the initiative

Initiative profiles

These initiative profiles are in the order they were presented in the Target State survey. The order of presentation does not in any way reflect relative priority and does not reflect recommended timing or sequencing set out in the recommendations and roadmap.

1. Identify, Assess, and Establish Analytics Partnerships

Description	This initiative focuses on identifying potential (external) strategic partners, assessing the viability of those potential partnerships, and establishing those partnerships that will support the Manitoba healthcare system in achieving its strategic priorities. Potential partners may be managers of data that could enhance the value/power of data managed within the healthcare system, to provide additional insights for decision-making
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Years 1 – 2	High	Medium	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • Data collection efforts are not tied to decision making. • Culture generally encourages data-driven approaches but does not demand data and analytics to justify decisions. • A range of collaboration challenges impede effective IM&A.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Drive innovation with third parties to supply analytics insights and to provide them with information. • Catalogue and "certify" third party information sources to be used to support IM&A activities. • Provide access to the Health System data to other government agencies in support of open data for government. 	<ol style="list-style-type: none"> 1. Articulate and define what qualifies as an analytics partnership. 2. Define the process for identifying, assessing and establishing analytics partnerships. 3. Conduct facilitated workshops with key stakeholders gather potential partnership requirements. 4. Develop a list of potential partnerships. 5. Determine criteria for evaluating potential partnerships. 6. Define the following for each potential partnership <ul style="list-style-type: none"> • High level business requirements • Cost estimate • Business value • Legislative considerations 7. Determine the partnerships and structure of the partnerships that should be pursued. 8. Review business and legislative requirements and functional/technical specifications of the partnerships about to be pursued. 9. Execute on the partnership. 10. Evaluate and document results to determine the business value of the insight generated. 11. Document lessons learned. 	<ul style="list-style-type: none"> • Prioritized list of partnerships. • Partnership business requirements. • Partnership functional and technical specifications. • Partnership roll out plan. • Partnership results summary. • Ongoing maintenance of lessons learned documentation.

2. Governance Policy, Procedure and Standards Review

Description	This initiative will review existing data and analytics governance policies, procedures and standards, and development of a target state governance model and framework that will assist the Manitoba healthcare system to achieve its strategic goals. This includes developing an understanding of all current state IM&A-related policies, procedures and standards pertaining to data collection, security/privacy, integrity, compliance, availability, use and retention.		
Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 1	High	High	High - appropriate internal resources available
Business challenges addressed			
<ul style="list-style-type: none"> • No authoritative voice that can make decisions. • The existing governance structure impedes decision making. • There is no overall strategy for IM&A investments and efforts. 			
Benefits	Key activities	Key outputs	
<ul style="list-style-type: none"> • Development of an effective governance model and framework will support evidence-based decision-making and effective IM&A investment decisions • Provides an inventory of all IM&A governance framework documentation, including policies, procedures, and standards. • Identifies gaps in the existing governance framework as it relates to IM&A. • Promotes understanding and buy-in across organizational and functional boundaries on the IM&A data governance framework. 	<ol style="list-style-type: none"> 1. Review and design governance responsibilities and accountability associated with the management of data/information, including : <ul style="list-style-type: none"> • Clinical • Health system management • Population health objectives • Policy and program design • Innovation/Research 2. Review inventory of existing governance policies, procedures, guidelines and/or standards for completeness. 3. Assess gaps and improvement opportunities in current data governance policies, procedures, guidelines and standards. 4. Develop target state data governance policies, procedures, guidelines and standards where applicable to align with overall strategy. 	<ul style="list-style-type: none"> • Documented current state IM&A governance framework, including policy, procedures, standards and processes. • Documented target state IM&A governance framework, including policies, procedures, standards and processes. 	

3. Establish and Operationalize Enterprise Wide Governance Model

Description	Drawing upon the Governance Policy, Procedure and Standards Review initiative, this initiative further develops, establishes and operationalizes a future state enterprise governance model.		
Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 1	High	High	Medium - some internal resources available
Business challenges addressed			
<ul style="list-style-type: none"> • No authoritative voice that can make decisions. • The existing governance structure impedes decision making. • There is no overall strategy for IM&A investments and efforts. 			
Benefits	Key activities		Key outputs
<ul style="list-style-type: none"> • Establishes a clear governance structure to drive IM&A initiatives that will support evidence-based decision-making and effective IM&A investment decisions • Promotes understanding and buy-in across organizational and functional boundaries on the IM&A data governance framework. • Provides the information necessary to support organization-wide communication and training plans related to governance. • Robust target state governance that can provide direction and strategy to the IM&A function across the Manitoba healthcare system. • Clarity around roles and responsibilities. 	<ol style="list-style-type: none"> 1. Develop organizational alignment and change management plan for target state enterprise governance model. 2. Develop communications plan for target state enterprise governance model. 3. Implement enterprise wide governance model that includes: <ul style="list-style-type: none"> • Roles and responsibilities • Policies and procedures • Standards • Processes • Controls 		<ul style="list-style-type: none"> • Target state organizational alignment and change management plan. • Target state data governance communications and training plan. • Established and documented target state IM&A governance framework, including policies, procedures, standards and processes. • Established data governance controls.

4. Define and Implement Early Adoption Analytics Projects

Description	This initiative focuses on defining early adoption analytics projects based on current and future business needs and then prioritizing them in accordance with business value. This initiative then consists of conducting short analytics projects using an agile approach. The order in which early adoption projects are conducted will be based on the results of the earlier prioritization activities.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 1	High	Medium	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • IM&A efforts are not well positioned to inform overall strategy. • Continued usage of legacy data, systems and processes. • There is low IM&A activity automation. • Data collection efforts are not tied to decision making.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Undertaking early adoption projects will demonstrate “the art of the possible” and will help maintain momentum. • Starting on the provincial analytics journey by defining and implementing early adoption projects will provide useful learning in a controlled environment. • Provides the business with the opportunity to identify key analytical projects / proof-of-concepts to address current challenges. • Demonstrates the value of analytics and gain a better understanding of its business impacts on people, process, technology and data. • Expands data-driven decision making capacity by leveraging new content, data, statistical and quantitative analysis and predictive modeling to create new insight. • Creation of analytical models that can be expanded to produce actionable insights across the organization. • Assists in helping to understand the level of analytics capability and capacity needed internally. • Provides opportunities to build analytics expertise. 	<ol style="list-style-type: none"> 1. Define what qualifies as an early adoption project and the process for delivering the projects. 2. Conduct facilitated workshops with key stakeholders within business and ICT to gather analytics project requirements. 3. Develop a list of potential analytics projects and determine criteria for evaluating potential projects. 4. Define the following for each potential project: <ul style="list-style-type: none"> • High level business requirements • Cost estimate • Business value 5. Review business requirements and functional and technical specifications of the project to be implemented. 6. Setup development environment/area to conduct projects (as needed). 7. Develop and test analytical models to meeting project requirements. 8. Execute analytical models and integrate into reports/visualization for consumption. 9. Evaluate and document project results to determine the business value of the insight generated and whether not it should be promoted to Production environment. 10. If applicable, develop plan to promote early adoption project into production. 11. Document lessons learned. 12. Update previously defined Enterprise Analytical Requirements as required. 	<ul style="list-style-type: none"> • Prioritized list of early adoption projects. • Analytics project high level business requirements. • Analytics project functional and technical specifications. • Analytics project roll out plan. • Early adoption analytics project models. • Analytics project test plan including cases. • Analytics projects results summary. • Updated enterprise analytical requirements documentation. • Analytic environment for innovation, testing new proof-of-concepts and ideas. • Project outputs as defined in the project’s definition.

5. Clinical and Research Analytics

Description	<p>This initiative focuses on developing clinical and research analytical capability. This initiative profile captures the features of the example focus areas as described below.</p> <p>For the clinical dimension, a possible focus could be the touch-points between different care settings. The goal could be to continuously identify opportunities to improve patient safety and the quality of care delivered, lower costs, and provide a more efficient and comfortable experience for both patients and clinicians.</p> <p>For the research dimension, a possible focus could be establishing an integrated population health management platform that focuses on high priority patient populations such as frail elderly, mental health, chronic disease. The initiative will include collecting, collating and curating the data to enable longitudinal analysis on these patient populations, building predictive models to flag patients at risk proactively and to provide clinicians insights on the selected population to affect change.</p>
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 2	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • IM&A efforts are not well positioned to inform overall strategy. • There is a significant amount of data gathered, but it is not well integrated or standardized across the system. • There are pervasive data quality issues and inconsistent data across the system.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Expands data-driven decision making capacity by leveraging new content, data, statistical and quantitative analysis and predictive modeling to create new insight. • Creation of analytical models that can be expanded to produce actionable insights across the organization. • Provides opportunities to build analytics expertise. • Improved patient outcomes. 	<ol style="list-style-type: none"> 1. Articulate and define what qualifies as a clinical or research analytics project. 2. Conduct facilitated workshops with key stakeholders to gather clinical and research required. 3. Develop a list of potential clinical and research analytics projects. 4. Determine criteria for evaluating potential projects. 5. Define the following for each potential clinical and research analytics project: <ul style="list-style-type: none"> • High level business requirements • Cost estimate • Business value 6. Develop clinical and research analytics roadmap. 7. Review business requirements and functional/technical specifications of the project about to be implemented. 8. Develop and test analytical models. 9. Execute analytical models and integrate into reports/visualization for consumption. 10. Evaluate and document results to determine the business value of the insight generated. 11. Document lessons learned. 	<ul style="list-style-type: none"> • Clinical and research analytics roadmap. • Clinical and research analytics business requirements. • Clinical and research analytics functional and technical specifications. • Improved clinical and research analytics function. • Documented lessons learned.

6. Health Operations Analytics

Description	This initiative focuses on developing health operations analytical capability, such as: an enterprise performance management framework for KPIs using interactive dashboards and other capabilities to promote financial sustainability and asset efficiency; establishing an analytics environment for analyzing the healthcare supply chain; or expanding the existing performance management platform to focus on utilization analysis, prediction, and management, staffing and scheduling optimization, and workforce effectiveness and productivity analytics.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 2	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • IM&A efforts are not well positioned to inform overall strategy. • There is a significant amount of data gathered, but it is not well integrated or standardized across the system. • There are pervasive data quality issues and inconsistent data across the system.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Expands data-driven decision making capacity by leveraging new content, data, statistical and quantitative analysis and predictive modeling to create new insight. • Creation of analytical models that can be expanded to produce actionable insights across the organization. • Provides opportunities to build analytics expertise. • Reduced cost 	<ol style="list-style-type: none"> 1. Articulate and define what qualifies as a health operations analytics project. 2. Conduct facilitated workshops with key stakeholders to gather health operations required. 3. Develop a list of potential health operations analytics projects. 4. Determine criteria for evaluating potential projects. 5. Define the following for each potential health operations analytics project: <ul style="list-style-type: none"> • High level business requirements • Cost estimate • Business value 6. Develop health operations analytics roadmap. 7. Review business requirements and functional/technical specifications of the project about to be implemented. 8. Develop and test analytical models. 9. Execute analytical models and integrate into reports/visualization for consumption. 10. Evaluate and document results to determine the business value of the insight generated. 11. Document lessons learned. 	<ul style="list-style-type: none"> • Health operations analytics roadmap. • Health operations analytics business requirements. • Health operations analytics functional and technical specifications. • Improved health operations analytics function. • Documented lessons learned.

7. Organizational Alignment and Change Management

Description	This ongoing initiative initially focuses on obtaining organizational alignment to demonstrate support for and champion the value and benefits of the target state of IM&A across the organization. This initiative can include conducting assessments of organizational change readiness and responding to the findings as needed. Finally, this initiative includes communicating and executing specific change management activities associated with the rollout of each other IM&A initiative.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 1	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • No authoritative voice that can make decisions. • IM&A capacity and capability are not distributed evenly across the system. • Significant communication challenges around IM&A. • A range of collaboration challenges impede effective IM&A. • Culture generally encourages data-driven approaches but does not demand data and analytics to justify decisions. • Data collection efforts are not tied to decision making.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Leadership alignment in supporting, promoting and championing the IM&A program. • Identifies which functional areas are ready, willing and able to effectively participate in and embrace the rollout of new IM&A initiatives and structures. • Identifies key stakeholders and specific interests and needs within each functional area. • Understand if there are organizational design changes required to ensure success of the IM&A initiatives. 	<ol style="list-style-type: none"> 1. Establish a dedicated team to support organizational alignment, change management and communications for the IM&A initiatives. 2. Evaluate and leverage existing change management strategy plans, including but not limited to: stakeholder analysis, change readiness templates, communication plans. 3. Conduct change readiness assessments to gauge organizational awareness and readiness for transformation. 4. Develop the IM&A change management strategy and plan. 5. Define the program approach and plan to address stakeholder issues and impacts, encourage staff adoption of IM&A-related initiatives, knowledge transfer, assess organizational change readiness, and support staff through the transition. 6. Establish a change network to drive success. 7. Facilitate leadership and stakeholder alignment <ul style="list-style-type: none"> • Assess alignment across leadership and stakeholders • Develop leadership and stakeholder action plans to encourage alignment • Identify opportunities for leadership to show visible commitment 	<ul style="list-style-type: none"> • Change Management Strategy and Plan. • Organizational Change Readiness Assessments, including impacts and recommended actions. • Stakeholder Maps/Assessments. • Onboarding processes and materials. • Toolkit to support leadership enablement, stakeholder engagement, impact analysis and readiness planning.

8. Assess organizational change impacts and develop recommended actions to address impacts.

8. Communications Plan

Description	This ongoing initiative focuses on providing effective communications across the entire organization to raise and maintain awareness and understanding of the development of the IM&A function and the various IM&A initiatives. It includes but is not limited to generalized, organization-wide IM&A communications and targeted communications to key stakeholders before, during, and immediately after the roll out of specific IM&A initiatives/activities.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 1	High	Medium	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • The existing governance structure impedes decision making. • A range of collaboration challenges impede effective IM&A. • Need for increased understanding, training and communication of PHIA. • Significant communication challenges around IM&A. • New technology investments do not fully consider IM&A capability and functions, or a province-wide perspective.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Creates a common awareness and understanding of the transition to the future state governance, operating model and practices throughout the organization. • Consistent organization-wide IM&A program messaging that clearly communicates key project activities and impacts to relevant stakeholders. • Gathers stakeholder feedback for the operating model and validates the value of each IM&A initiative as they are rolled out across the organization • Dedicated team to develop and execute an overarching communications plan for the IM&A program. 	<ol style="list-style-type: none"> 1. Establish a dedicated team to support organizational alignment, change management and communications for the IM&A initiatives. 2. Conduct ongoing communications planning, development and delivery. <ul style="list-style-type: none"> • Identify and analyze key stakeholders • Establish key messages targeted to each stakeholder group, schedule, and communications format 3. Develop and distribute communication materials. <ul style="list-style-type: none"> • Create all documentation required to support all communications activities necessary for the IM&A program, including emails, FAQs, newsletters, stakeholder engagement update meetings either for general distribution and/or for specific audiences/ end users • Distribute communication materials and facilitate two-way dialogue, adjusting the communications plan as necessary 4. Conduct ongoing stakeholder engagement activities. 	<ul style="list-style-type: none"> • IM&A communications strategy and plan • Stakeholder communications plan • Communications materials for specific IM&A initiatives as required.

9. Define and Implement IM&A Talent Strategy

Description	This initiative focuses on improving educational opportunities and career development path for IM&A resources in order to improve and retain talent as well as attract top talent to fulfill future IM&A capability and capacity requirements.		
Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 1	High	Medium	Medium - some internal resources available
Business challenges addressed			
<ul style="list-style-type: none"> • IM&A capacity and capability are not distributed evenly across the system. • IM&A efforts are not well positioned to inform overall strategy. 			
Benefits	Key activities	Key outputs	
<ul style="list-style-type: none"> • Improves IM&A capability and capacity across the organization. • Assists the Manitoba healthcare system with the retention of top talent and the recruitment of new talent to support IM&A capability and capacity requirements. • Establishes a formal training program that clearly identifies IM&A career development paths and opportunities for all applicable staff. 	<ol style="list-style-type: none"> 1. Gather and review all documentation related to current training and recruitment activities. 2. Review previously defined analytics, reporting, and visualization requirements to inform IM&A training and hiring requirements. 3. Conduct facilitated workshops with key stakeholders within business and IT to gather current and future IM&A resource requirements. 4. Develop and execute a competency assessment and mapping exercise to evaluate the Manitoba healthcare system's current IM&A capability and capacity. 5. Perform gap assessment to identify both IM&A training and recruiting opportunities. 6. Develop a talent strategy that defines and develops an: <ul style="list-style-type: none"> • Curriculum which includes IM&A career paths and a phased approach rollout plan. • Recruitment Plan which includes identification of IM&A recruiting channels and target labour pools, IM&A hiring checklist, IM&A interview guides. 7. Validate and socialize talent strategy with key stakeholders within business and IT. 	<ul style="list-style-type: none"> • IM&A Talent competency assessment and map. • IM&A Talent gap assessment. • IM&A Talent strategy, including a recruitment plan and a curriculum. • Talent recruitment targets. 	

10. Define and Implement IM&A Operating Model

Description	This initiative focuses on establishing a target state IM&A operating model by leveraging the new IM&A vision and governance model to define and implement the organizational infrastructure that directs, governs, standardizes, and simplifies the use of the IM&A function across the Manitoba healthcare system.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 1	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> IM&A capacity and capability are not distributed evenly across the system. No authoritative voice that can make decisions. Most IM&A processes and practices are not standardized across the system. IM&A efforts are not well positioned to inform overall strategy. There is no overall strategy for IM&A investments and efforts. Strong appetite to have integrated data sets pushed out. Support for establishing some province-wide technical IM&A functions.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> Provides accountability for and coordination of IM&A activities. Provides support to business users in resolving their IM&A challenges in a way which benefits the entire Manitoba healthcare system. Drives information liberalization, promote standardization and reduce duplication. Promotes innovation and creativity across the organization. 	<ol style="list-style-type: none"> 1. Conduct operational readiness and change impact assessments with all functional areas (via Organizational Alignment and Change Management). 2. Identify Executive Sponsor to oversee and champion the refined IM&A operating model. 3. Conduct facilitated workshops with key stakeholders to identify and validate IM&A target state operating model. <ul style="list-style-type: none"> Governing bodies and operational support requirements and resources. Program responsibilities. Services and priority activities. 4. Develop detailed plan to implement the IM&A operating model that includes: <ul style="list-style-type: none"> Incorporating roles and responsibilities into job descriptions. Alignment to organization chart and reporting activities. Identification of IM&A capability or capacity gaps that could drive hiring or outsourcing requirements. Development of an operating model communications plan. 5. Execute IM&A operating model implementation plan. 	<ul style="list-style-type: none"> Target state IM&A operating model including: <ul style="list-style-type: none"> Program responsibilities Roles and responsibilities Service catalog IM&A operating model implementation plan. Supporting materials for change management and communications. Identification of additional and/or reallocated resources to support revised operating model. Fully established target state IM&A operating model.

11. Analytics Innovation Lab

Description	This initiative focuses on establishing an analytics lab to catalyze healthcare innovation. This will be an innovation hub that brings the external partners and internal analytics expertise together to improve health through agile analytics projects.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 1	Medium	High	Low - no internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • IM&A capacity and capability are not distributed evenly across the system. • IM&A efforts are not well positioned to inform overall strategy. • New technology investments do not fully consider IM&A capability and functions, or a province-wide perspective. • Strong appetite to have integrated data sets pushed out.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Cultivates an entrepreneurial and innovative analytics environment. • Leverages partnerships to enhance the analytical function. • Enhances IM&A capability and capacity. 	<ol style="list-style-type: none"> 1. Define the governance of the Analytics Innovation Lab. 2. Define the criteria for initiatives to be pursued at the Analytics Innovation Lab. 3. Define the process for delivering projects from the Analytics Innovation Lab. 4. Conduct facilitated workshops with partners and with key stakeholders across IM&A resources to gather potential projects for the Analytics Innovation Lab. 5. Develop a list of potential projects. 6. Determine criteria for evaluating potential projects. 7. Define the following for each potential project to be conducted by the Analytics Innovation Lab: <ul style="list-style-type: none"> • High level business requirements • Cost estimate • Business value 6. Review business requirements and functional and technical specifications of projects about to be implemented. 7. Develop and test analytical models to meeting project requirements. 8. Document lessons learned. 9. Update previously defined Enterprise Analytical Requirements as required. 	<ul style="list-style-type: none"> • Criteria, process and governance of Analytics Innovation Lab. • Operational Analytics Innovation Lab. • Initial prioritized list of projects to be conducted out of the Analytics Innovation Lab (to be updated regularly). • Completed analytical projects. • Documented lessons learned. • Updated enterprise analytical requirements documentation.

12. Data Quality Standards, Tools, and Operationalization

Description	<p>This initiative consists of three parts:</p> <ol style="list-style-type: none"> 1) Defining the Data Quality framework and standards enterprise wide, including assessing current data quality practices, policies, procedures, and guidelines in place as well as roles/ responsibilities for data quality. 2) Conducting assessments of Data Quality tools against clearly defined enterprise functionality requirements. 3) Establishing the most appropriate one(s) to establish a standardized, enterprise-wide data quality platform.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Years 1 – 2	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • There is a significant amount of data gathered, but it is not well integrated or standardized across the system • There are pervasive data quality issues and inconsistent data across the system • The technology environment that supports IM&A is highly fragmented • There is low IM&A activity automation

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Identifies and establishes leading data quality practices. • Enables a cohesive and comprehensive data quality program that integrates with the new IM&A operating model. • Defines clear roles and responsibilities for data quality across the organization. • Establishes enterprise standards, processes, and controls to enable effective data quality. • Identifies a centralized tool that will meet the majority of business data quality needs and serve as an enterprise solution which will reduce overall technical complexity within the organization. • Drive tool/licensing rationalization across the organization. 	<ol style="list-style-type: none"> 1. Review inventory of existing IM&A-related Data Quality policies, procedures, guidelines and/or standards for completeness against leading practice framework. 2. Conduct analysis (via interviews, examinations of systems, data and business functions) to understand specific data quality business requirements and current challenges. 3. Assess gaps and improvement opportunities in current data quality framework. 4. Define data quality roles and responsibilities and integration into the operating model. 5. Validate data quality roles, responsibilities, procedures, standards and controls with the IM&A Operating model 6. Conduct market scan of data quality tools and short-list leading vendors based on market positioning and alignment with high-level enterprise data quality requirements. 7. Follow standard procurement processes to assess and select potential data quality tool/product. 8. Procure selected tool. 9. Develop and execute detailed implementation plan for the data quality tool. 	<ul style="list-style-type: none"> • Data quality assessment of priority data sources. • Data quality business requirements. • Data quality operating procedures including the identification of data quality roles, responsibilities & processes within the context of the new IM&A operating model. • Data quality standards. • Data quality measures and controls. • Data quality tool assessment. • Procurement of enterprise data quality tool. • Data quality tool implementation plan, including: <ul style="list-style-type: none"> • Data quality configuration guide • Data quality enterprise architecture diagram/documentation • Testing and quality assurance strategy and plan. • Training strategy and plan. • Supporting materials for change management and communications. • Data quality tool rollout plan. • Implementation of data quality tool.

13. Master Data Management Standards, Tools and Operationalization

Description	<p>This initiative consists of three parts:</p> <ol style="list-style-type: none"> 1) Defining a framework and standards for Master Data Management (MDM), assessing practices currently in place and gathering business requirements for the development of a data dictionary/business glossary. Also includes the development of MDM processes, procedures and guidelines that define how data assets should be managed. 2) Conducting assessments of integrated MDM tools that support the development of a data dictionary/business glossary against clearly defined functionality requirements and then selecting the most appropriate one to establish a centralized, enterprise-wide platform. 3) Establishing a centralized, enterprise-wide MDM platform through the implementation of the selected tool.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Years 1 – 3	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • There is a significant amount of data gathered, but it is not well integrated or standardized across the system. • There are pervasive data quality issues and inconsistent data across the system. • The technology environment that supports IM&A is highly fragmented. • There is low IM&A activity automation.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Allows business users to express their MDM requirements. • Identifies requirements for a centralized common platform for MDM. • Identifies and prioritizes key master data. • Identifies a centralized tool that will meet the majority of business data quality needs and serve as an enterprise solution which will reduce overall technical complexity within the organization. • Enables consistency in key master data elements across applications and repositories, enabling timely updating of master data elements and improving data quality and reliability. • Establishes a central place to create, share and manage a common business vocabulary. • Improves data integrity by providing business users with a clearer understanding of data elements which promotes the efficient use and reuse of information. 	<ol style="list-style-type: none"> 1. Review inventory of pre-existing metadata management procedures, guidelines and/or standards. 2. Conduct facilitated data dictionary workshops with key business stakeholders to gather business requirements. 3. Validate data dictionary requirements and prioritized data sources with key business and IT stakeholders 4. Assess gaps and improvement opportunities in current procedures, guidelines & standards. 5. Validate standards and procedures with the IM&A operating model. 6. Conduct market scan of MDM and tools and short-list leading vendors based on market positioning and alignment with high-level enterprise requirements. 7. Follow standard procurement processes to assess and select potential MDM tool. 8. Procure selected tool. 9. Execute tool rollout plan 10. Leverage the Metadata & Master Data Management tools to define data dictionary data element attributes. 11. Develop processes for maintenance and review of the data dictionary. 12. Execute data dictionary rollout plan. 	<ul style="list-style-type: none"> • MDM business requirements. • MDM management tool assessment. • Procurement of a MDM tool. • MDM tool implementation plan, including: <ul style="list-style-type: none"> • MDM configuration guide. • MDM enterprise architecture diagram/documentation. • Testing and quality assurance strategy and plan. • Training strategy and plan. • Supporting materials for change management and communications. • Data dictionary rollout plan. • Implementation of MDM tool <ul style="list-style-type: none"> • Business requirements. • Standards. • Operating procedures. • Roles and responsibilities. • Implementation of data dictionary.

14. Metadata Management Standards, Tools and Operationalization

Description	<p>This initiative consists of three parts:</p> <ol style="list-style-type: none"> 1) Defining a framework and standards for Metadata management, assessing practices currently in place and gathering business requirements for the development of a data dictionary/business glossary. Also includes the development of Metadata management processes, procedures and guidelines that define how data assets should be managed. 2) Conducting assessments of integrated Metadata Management tools that support the development of a data dictionary/business glossary against clearly defined functionality requirements and then selecting the most appropriate one to establish a centralized, enterprise-wide platform. 3) Establishing a centralized, enterprise-wide Metadata Management platform through the implementation of the selected tool.
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Target state survey results

Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Years 2 – 3	High	High	Medium - some internal resources available

Business challenges addressed

- There is a significant amount of data gathered, but it is not well integrated or standardized across the system.
- There are pervasive data quality issues and inconsistent data across the system.
- The technology environment that supports IM&A is highly fragmented.
- There is low IM&A activity automation.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Allows business users to express their metadata management requirements. • Identifies requirements for a centralized common platform for metadata management. • Identifies and prioritizes key metadata. • Identifies a centralized tool that will meet the majority of business needs related to metadata management and data dictionary development and serve as an enterprise solution. • Provides a centralized common metadata management platform where indexing, searching, retrieving and classification of data across the organization is simplified for business users. • Enables IT staff to manage technical metadata and business users to collaboratively manage business data. • Improves data integrity by providing business users with a clearer understanding of data elements. • Enables linkages between technical metadata and business names/definitions to provide a greater understanding of business context. 	<ol style="list-style-type: none"> 1. Review inventory of pre-existing metadata management procedures, guidelines and/or standards. 2. Conduct facilitated data dictionary workshops with key business stakeholders to gather business requirements. 3. Validate data dictionary requirements and prioritized data sources with key business and IT stakeholders 4. Assess gaps and improvement opportunities in current procedures, guidelines & standards. 5. Validate standards and procedures with the IM&A operating model. 6. Conduct market scan of MDM and tools and short-list leading vendors based on market positioning and alignment with high-level enterprise requirements. 7. Follow standard procurement processes to assess and select potential MDM tool. 8. Procure selected tool. 9. Leverage the Metadata and Master Data Management tools to define data dictionary data element attributes. 10. Develop processes for maintenance and review of the data dictionary. 11. Execute data dictionary rollout plan. 	<ul style="list-style-type: none"> • Metadata business requirements. • Metadata management tool assessment. • Procurement of a metadata management tool. • Metadata management tool implementation plan, including: <ul style="list-style-type: none"> • Metadata management configuration guide. • MDM enterprise architecture diagram/documentation. • Testing and quality assurance strategy and plan. • Training strategy and plan. • Supporting materials for change management and communications. • Metadata management: <ul style="list-style-type: none"> • Business requirements. • Standards. • Operating procedures. • Roles and responsibilities. • Implementation of metadata management tool.

15. Define and Implement an Integrated Data View

Description	This initiative focuses on creating integrated data views across key data elements in alignment with the Manitoba Health System's Enterprise data model. This will enable developers and business users to have an integrated, 360 degree view across the System.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 3	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • Strong appetite to have integrated data sets pushed out. • IM&A efforts are not well positioned to inform overall strategy. • The technology environment that supports IM&A is highly fragmented. • There is low IM&A activity automation.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Robust and managed view of select data elements across the system. • Allows for an apples-to-apples comparison across sites/areas/programs to make informed policy and care decisions. • Clarity around important indicators at a system level. • Provides data element specific standardization process experience for eventual roll-out across a larger set of common data elements. 	<ol style="list-style-type: none"> 1. Define what qualifies as a key data element for inclusion in the integrated data view. 2. Conduct facilitated workshops with key stakeholders within business and ICT to gather business requirements for an integrated data view. 3. Drawing upon the outputs from the Define Enterprise Data Model and Technical Architecture initiative, identify promising data elements to be included in an integrated complete view across the Manitoba healthcare system. 4. Develop a list of potential data elements. 5. Determine criteria for evaluating data elements, including assessing MDM and metadata for selected data elements. 6. Evaluate data elements. 7. Validate data elements with key ICT and business stakeholders. 8. Develop detailed implementation plan for integrated data view. 	<ul style="list-style-type: none"> • Common data elements across entire system. • Rigorous MDM and metadata for select data elements. • Integrated data view implementation plan, including: <ul style="list-style-type: none"> • MDM and metadata guidelines for selected data elements. • Testing and quality assurance strategy and plan. • Training strategy and plan. • Supporting materials for change management and communications. • Implemented integrated data view.

16. Define Enterprise Data Model and Technical Architecture

Description	This initiative focuses on defining an enterprise data model that supports systems integration and data compatibility to support future IM&A needs. It includes identifying how data elements from various source systems are connected and will inform the target Enterprise Data Model that the Manitoba healthcare system requires for their current and future IM&A needs.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Years 1 – 2	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • The technology environment that supports IM&A is highly fragmented. • There is low IM&A activity automation. • New technology investments do not fully consider IM&A capability and functions, or a province-wide perspective.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Allows business and IT users to express their strategic data and data integration requirements to meet current and future IM&A needs. • Defines the target Enterprise Data Model required for reporting and analytics and identifies gaps in the current model. 	<ol style="list-style-type: none"> 1. Gather and review documentation related to current data models in use. 2. Conduct interview with key business stakeholders to identify strategic data assets for inclusion in enterprise data model (EDM) and define scope. 3. Review key applications to understand how data elements within them are inter-related and where they are being used. 4. Develop EDM, including: <ul style="list-style-type: none"> • Entity relationship diagrams • Conceptual data model • Logical data model • Physical data model • Data/Process flow model • Data model naming standards 5. Review and validate EDM with key business and IT stakeholders. 6. Conduct gap assessment between target EDM and current data model. 7. Review gap assessment findings with key IT stakeholders to evaluate potential impact of EDM implementation on current enterprise technical architecture. 	<ul style="list-style-type: none"> • Current state current data model. • Target enterprise data model • Data model gap assessment and summary. • Revised enterprise technical architecture.

17. Optimize and Scale Business Intelligence

Description	This initiative focuses on conducting an inventory of all standard reports across Health System to assess usage, duplication, distribution and levels of automation to identify opportunities to rationalize, discontinue or automate specific reports. The BI optimize and scale initiative will rationalize, standardize, build and automate BI capabilities to support future state processes and is a foundational step to the analytics journey. One of the key objectives of this initiative is to liberate and enrich the data to better enable the business to use it for their own BI inquiries.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
>3 Years	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • Data collection efforts are not tied to decision making. • IM&A efforts are not well positioned to inform overall strategy. • There is low IM&A activity automation. • New technology investments do not fully consider IM&A capability and functions, or a province-wide perspective.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Detailed understanding of BI business requirements. • Rationalized BI function with reduction of efforts and costs associated with BI. • Enhanced BI function. • Enables subsequent enterprise analytical function initiatives. • Improves IM&A activity automation. 	<ol style="list-style-type: none"> 1. Assess business requirements for BI processes and reporting for selected business functions. 2. Assess existing BI tools and platforms and select ones required for optimizing BI, reporting, forecasting and other capabilities. 3. Review and rationalize current BI capabilities across organization by business function <ul style="list-style-type: none"> • Perform a detailed review of standard user reports and ad-hoc analysis done by specific functions and areas. • Assess existing reports and data sets in terms of completeness, relevance and duplicity. 4. Develop updated BI capabilities and reports where necessary. 	<ul style="list-style-type: none"> • BI / Reporting business requirements • Tools and platforms assessment • Implementation of selected tool • Repository optimizations to support BI inquiries, reporting needs and data discovery

18. Define Enterprise Visualization Requirements, Assess, Select, and Implement Enterprise Visualization Tools

Description	<p>This initiative consists of three parts:</p> <ol style="list-style-type: none"> 1) Gathering and prioritizing the visualization requirements necessary to allow business users to perform data discovery and analysis with minimal assistance from IT / technology team. Building upon existing capabilities, identifying opportunities for standardization and optimization. 2) Conducting assessments of visualization and dashboarding tools (both new and existing) and then selecting the most appropriate one(s) to establish a standardized, enterprise-wide visualization/dashboarding platform that is user-friendly and meets business needs. 3) Establishing a standardized, enterprise-wide visualization platform through the implementation of the selected visualization and dashboarding tools.
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Target state survey results

Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Years 2 – 3	High	High	Medium - some internal resources available

Business challenges addressed

- Data collection efforts are not tied to decision making.
- IM&A efforts are not well positioned to inform overall strategy.
- Strong appetite to have integrated data sets pushed out.
- Support for establishing some province-wide technical IM&A functions.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Allow business users to express their data visualization requirements and how they wish to perform data discovery activities. • Identifies requirements for a centralized common visualization platform where business users can access and generate standard and ad-hoc visualization reports. • Identifies a centralized tool that will meet the majority of business visualization needs and serve as an enterprise solution which reduces technical complexity within the organization, and drive tool/licensing rationalization across the organization. • Supports organization-wide understanding and adoption of visualization best practices and proven standards. • Provides a multi-faceted view to communicate complex information with clarity, precision and efficiency via data visualization. • Enables the visualization of relationships and patterns between operating conditions and business performance • Allows business users to manipulate and interact directly with data to uncover actionable insights. 	<ol style="list-style-type: none"> 1. Gather and review all documentation related to current visualization requirements and activities. 2. Conduct facilitated workshops with key stakeholders within business and IT to gather visualization requirements. 3. Document and prioritize high level and detailed specifications and requirements. 4. Conduct operational readiness and change impact assessments with all functional areas. 5. Design/define the visualization solution architecture. 6. Conduct market scan of data quality tools and short-list leading vendors based on market positioning and alignment with high-level enterprise data quality requirements. 7. Follow standard procurement processes to assess and select potential data quality tool/product. 8. Procure selected tool. 9. Develop detailed implementation plan to implement the tool. 	<ul style="list-style-type: none"> • Visualization business requirements. • Visualization management, delivery, and sharing requirements. • Functional and technical visualization specifications • Visualization tool assessment. • Visualization Tool Enterprise Expansion Plan or Procurement. • Implementation Plan, including: <ul style="list-style-type: none"> • Visualization tool configuration guide • Visualization enterprise architecture diagram/documentation • Testing and quality assurance strategy and plan. • Training strategy and plan. • Supporting materials for change management and communications. • Visualization tool rollout plan. • Implementation of visualization tool.

19. Define Enterprise Analytical Requirements, Assess, Select, and Implement Enterprise Analytical Tools

Description	<p>This initiative focuses on gathering and prioritizing the functionality requirements necessary to expand and promote both new and existing analytical capabilities enterprise-wide. It also builds upon existing capabilities, identifying opportunities for standardization and optimization.</p> <p>This initiative focuses on conducting assessments of analytics tools (both new and existing) against clearly defined enterprise functionality requirements and then selecting the most appropriate one(s) to establish a standardized, enterprise-wide analytical platform.</p>
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Years 1 – 3	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • Data collection efforts are not tied to decision making. • IM&A efforts are not well positioned to inform overall strategy. • Strong appetite to have integrated data sets pushed out. • Support for establishing some province-wide technical IM&A functions.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Allow business users to express their analytical requirements as well as their predictive modeling needs • Identifies requirements for a centralized common analytical platform where developers can create and modify predictive and segmentation models that meet business needs • Identifies a centralized tool that will: <ul style="list-style-type: none"> – Meet the majority of analytical business needs – Serve as an enterprise solution which reduces technical complexity within the organization, and • Drive tool / licensing rationalization across the organization • Provides a centralized common analytical platform where the business can conduct advanced analytics activities • Provides improved capabilities to measure and monitor business performance, analyze results, predict outcomes and plan for better business results 	<ol style="list-style-type: none"> 1. Gather and review all documentation related to current analytical requirements and activities 2. Conduct facilitated workshops with key stakeholders within business and IT to gather analytical requirements 3. Document and prioritize high level and detailed requirements and specifications. 4. Evaluate existing in-house analytical technologies and current features against enterprise analytical requirements and scalability. 5. Conduct market scan of analytical tools and short-list leading vendors based on market positioning and alignment with high-level enterprise analytical requirements 6. Evaluate options to either outsource analytic needs or procure and support an internal enterprise analytical tool. 7. For both decisions, follow standard procurement processes. 8. Procure selected analytical services or tool. 9. Develop detailed implementation plan. 	<ul style="list-style-type: none"> • Analytical business requirements including: <ul style="list-style-type: none"> • Analytics management, delivery, and sharing requirements. • Analytics generation process requirements. • Process requirements for incorporating insight from analytical models into operational reports. • Functional and technical analytical requirements. • Analytical tool assessment. • Analytical tool enterprise expansion plan or procurement. • Implementation Plan, including: <ul style="list-style-type: none"> • Analytical tool configuration guide • Analytical enterprise architecture diagram/documentation • Testing and quality assurance strategy and plan. • Training strategy and plan. • Supporting materials for change management and communications. • Analytical tool rollout plan. • Implementation of enterprise analytical tool.

20. Architecture Design and Proof of Concept for Enterprise Central Data Repository

Description	This initiative focuses on performing a full technical assessment of the existing data warehouse and ETL (Extract-Transform-Load) to identify opportunities for optimization, improvement and expansion to support current and future IM&A activities. This also includes the development of formal documentation on business rules, ETL processes and data holdings within each fact and dimension table, identification of responsibilities for ongoing maintenance of this supporting documentation as well as identifying new priority data sources and informing requirements for potential expansion.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 2	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • Strong appetite to have integrated data sets pushed out. • Support for establishing some province-wide technical IM&A functions. • The technology environment that supports IM&A is highly fragmented.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Provides business users with a clear and picture of the data warehouse current state. • Identifies opportunities to optimize, improve and expand the data warehouse environment to better support the ongoing and future IM&A needs. • Ensures that a thorough and consistent capacity and expansion process is followed. • Ensures that the data platform is flexible, adaptable and aligned with organizational requirements. 	<ol style="list-style-type: none"> 1. Conduct data warehouse environment and maturity review, including reviewing all documentation related to the current data holdings and technical configuration. 2. Conduct facilitated workshops with key business stakeholders to identify new data sources and elements for potential inclusion into the data warehouse. 3. Evaluate newly identified data sources and elements. 4. Review evaluations with key business stakeholders to develop a prioritized list of new data sources for future integration into the data warehouse. 5. Evaluate and document data warehouse architecture and data model, development processes, service processes and ETL. 6. Identify optimization and improvement opportunities 7. Develop recommendations and review with key IM&A stakeholders. 8. Create a high level data warehouse expansion road map that identifies the sequence of data sources to be integrated, and business group(s) to champion integration and use of newly integrated data. 	<ul style="list-style-type: none"> • Data warehouse maturity assessment. • Documentation on the current state of the data warehouse with regard to: <ul style="list-style-type: none"> • General architecture and infrastructure • Data model • ETL • Development and service processes • Data warehouse observations and optimization recommendations. • List of potential new data sources for inclusion within data warehouse. • New data source and element assessment. • Data warehouse expansion plan.

21. Assess, Select, and Implement Enterprise Central Data Repository Tool

Description	This initiative focuses on conducting assessments of central data repository tools against clearly defined enterprise functionality requirements, selecting the most appropriate one and implementing it to establish an enterprise central data repository.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Year 3	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • Strong appetite to have integrated data sets pushed out. • Support for establishing some province-wide technical IM&A functions. • The technology environment that supports IM&A is highly fragmented.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Build upon the earlier identified opportunities to optimize, improve and expand the data warehouse environment to better support the ongoing and future IM&A needs. • Ensures that a thorough and consistent capacity and expansion process is followed. • Ensures that the data platform is flexible, adaptable and aligned with organizational requirements. 	<ol style="list-style-type: none"> 1. Review documentation and results from Architecture design and proof of concept for Enterprise central Data Repository Tool. 2. Conduct market scan of data quality tools and short-list leading vendors based on market positioning and alignment with requirements. 3. Follow standard procurement processes to assess and select potential data quality tool/product. 4. Procure selected central data repository tool. 5. Refine high level data warehouse expansion map into a detailed implementation plan. 	<ul style="list-style-type: none"> • Central data repository tool business requirements. • Functional and central data repository tool analytical requirements. • Enterprise central data repository tool assessment. • Enterprise central data repository tool. • Central data repository tool assessment. • Implementation Plan, including: <ul style="list-style-type: none"> • Enterprise central data repository tool configuration guide • Enterprise central data repository diagram/documentation. • Testing and quality assurance strategy and plan. • Training strategy and plan. • Supporting materials for change management and communications. • Enterprise central data repository rollout plan. • Implementation of enterprise data repository tool.

22. Define Enterprise Reporting Requirements, Assess, Select and Implement Enterprise Reporting Tools

Description	This initiative focuses on gathering and prioritizing reporting functionality requirements necessary to expand and improve the development of standard and ad-hoc reports enterprise-wide. It also builds upon existing capabilities, identifying opportunities for standardization and optimization as well as nascent and predicted reporting needs.
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Target state survey results			
Estimated timing	Estimated business value	Estimated complexity	Implementation capability
Years 2 – 3	High	High	Medium - some internal resources available

Business challenges addressed
<ul style="list-style-type: none"> • Data collection efforts are not tied to decision making. • IM&A efforts are not well positioned to inform overall strategy. • Strong appetite to have integrated data sets pushed out. • Support for establishing some province-wide technical IM&A functions.

Benefits	Key activities	Key outputs
<ul style="list-style-type: none"> • Allows business users to express their data reporting requirements. • Identifies opportunities to automate routine reporting to minimize manual and repetitive work. • Identifies requirements for a centralized common reporting platform where business users can access and generate standard and ad-hoc reports. • Allows the efficient creating, viewing, manipulation and distribution of reports. • Allows for automation of routine reporting to minimize manual and repetitive work. • Provides a centralized common reporting platform where business users can access and generate standard and ad-hoc reports. 	<ol style="list-style-type: none"> 1. Gather and review all documentation related to current reporting requirements and activities. 2. Conduct facilitated workshops with key stakeholders within business and IT to gather reporting requirements. 3. Document and prioritize high level and detailed requirements and specifications. 4. Review and validate prioritized reporting requirements with key stakeholders. 5. Design and define the enterprise reporting solution architecture and document its integration into the broader architecture. 6. Conduct market scan of data quality tools and short-list leading vendors based on market positioning and alignment with requirements. 7. Follow standard procurement processes to assess and select potential data quality tool/product. 8. Procure selected reporting tool. 9. Develop detailed implementation plan. 	<ul style="list-style-type: none"> • Reporting business requirements including: <ul style="list-style-type: none"> • Report management, delivery, and sharing requirements • Report generation process requirements • Standard / Ad-Hoc reporting requirements • Reporting functional and technical reporting specifications • Reporting tool assessment. • Reporting tool enterprise expansion plan or procurement. • Implementation Plan, including: <ul style="list-style-type: none"> • Reporting tool configuration guide • Reporting enterprise architecture diagram/documentation • Testing and quality assurance strategy and plan. • Training strategy and plan. • Supporting materials for change management and communications. • Implementation of enterprise reporting tool.

Appendix B – Stakeholders consulted

Members of the Study Committee who provided guidance throughout the Study

Study Committee Member	Organization	Study Committee Member	Organization
Deborah Malazdrewicz	MHSAL	Dan Skwarchuk	WRHA/MHSAL
Brie DeMone	MHSAL	Brian Schoonbaert	Prairie Mountain Health
Scott Murray	MHSAL	Craig Kozlowski	Manitoba e-Health
Barbara Wasilewski	MHSAL	Rick Guerard	Manitoba e-Health
Bryan Payne	MHSAL	Donna Turner	CCMB

Context-setting discussions October 2015

Council/Group/Area	Council/Group/Area
Performance Management Framework	Ongoing and Planned IT Initiatives
Information Management and Analytics	ICT Study

Large group sessions

In addition to Study Committee members, the following individuals were invited to the three large group sessions. The actual participants in individual sessions varied as some individuals were unable to attend, delegates attended on their behalf, and other stakeholders across the healthcare system were invited.

Session	Date
Visioning Session	November 3, 2015
Current State Session	January 8, 2016
Target State Session	March 17, 2016

Participant Name	Organization	Participant Name	Organization
Lorraine Dacombe Dewar	MHSAL	Chris Dumontier	WRHA
Teresa Mrozek	MHSAL	Anne Hakansson	WRHA
Rob Shaffer	MHSAL	Randy Martens	WRHA
Fran Schellenberg	MHSAL	Dr. Bruce Roe	WRHA
Jennifer White	MHSAL	Nick Hajidiacos	WRHA
Patricia Caetano	MHSAL	Giselle Okrusko	WRHA
Donna Hill	MHSAL	Trevor Strome	WRHA
Sean Brygidyr	MHSAL	Trish Bergal	WRHA
Rhonda Hogg	MHSAL	Lisa Lix	WRHA
Tina LeClair	MHSAL	Liliana Rodriguez	Prairie Mountain Health
Debbie Nelson	MHSAL	Gayle Charlo	Interlake-Eastern Health
Dr. Paul Van Caeselele	MHSAL	Susan Enns	Southern Health/Sante Sud

Participant Name	Organization	Participant Name	Organization
Nathan Hoepfner	MHSAL	Joy Tetlock	Northern Health Authority
Anita Moore	MHSAL	Ben Fry	Addictions Foundation
Tony Messner	MHSAL	Dr. Marshall Pitz	CCMB
Gayle Martens	MHSAL	Dr. Piotr Czaykowski	CCMB
Micheal Harding	MHSAL	Charles Conway	DSM
Phillip Jarman	WRHA	Alun Carter	DSM
Dr. Eric Bohm	WRHA	Dr. Alan Katz	MCHP
Colleen Metge	WRHA	Mark Smith	MCHP
Christina Von Schindler	WRHA	Charles Burchill	MCHP
Dr. Lawrence Elliott	WRHA	Rachel Porter	WRHA
Leona Lane	WRHA	Real Cloutier	WRHA
Mike Ocko	Manitoba eHealth	Allister Gunson	Manitoba eHealth
Doug Snell	Manitoba eHealth	Liz Loewen	Manitoba eHealth
Dana Bellehumeur	Selkirk Mental Health Centre		

Individual and group interviews November 2015 to December 2015

Council/Group/Area/Individual	Council/Group/Area/Individual
Health Senior Leadership Council	Deputy Minister, Manitoba Health, Seniors and Active Living
Quality and Patient Safety Council	IM&A Study Steering Committee Chair/Executive Sponsor
Planning, Accountability and Enterprise Risk Management Council	Interim IM&A Study Executive Sponsor
Provincial Human Resources Leadership Council	Executive Director, Information Management and Analytics and IM&A Study Project Manager
Continuing Care Council	CEO, Winnipeg Regional Health Authority
Provincial Medical Leadership Council	Chief Information Officer (MB eHealth)
Acute and Specialty Health Care Services Council	CEO, Southern Health Authority
Health Information Service and Analytics Functional Area	CEO, Northern Health Authority
Research and Evaluation Functional Group	CEO, Prairie Mountain Health
Governance and Privacy Functional Group	CEO, Interlake Eastern Health Authority
Information and Communications Technology Group (MHSAL, MB eHealth)	CEO, Diagnostic Services Manitoba
Primary Care Group	CEO, CancerCare Manitoba
Winnipeg Regional Health Authority Quality Improvement Group	CEO, Addictions Foundation of Manitoba
Winnipeg Regional Health Authority Leadership	CancerCare Manitoba
Surveillance Functional Area	Diagnostic Services Manitoba
Interlake Eastern Health Authority	Northern Health Authority
Southern Health Authority	Prairie Mountain Health Authority

Appendix C – Consultation Interview Guide

During this interview, we will be gathering qualitative information on the current and target state of IM&A in the Manitoba healthcare system. The discussion will focus on the subject areas below and may include some of the detailed questions found later in this document, depending upon the group or individual being interviewed.

The questions are targeted towards the healthcare system from the perspective of your portfolio or organization. In your responses, please consider the following information needs:

- Clinical (e.g. patient/consumer health)
- Health system management
- Population health objectives/Policy and program design
- Innovation/Research

Current state

General

- What do you see as major strengths related to IM&A?
- What do you see as major concerns, risks, and challenges related to IM&A?

Strategy

- What is the role that information management and analytics plays across the Manitoba healthcare system? To what extent does it shape the healthcare system's overall strategy and priorities?
- What current strategies do you deploy to maximize IM&A utilization throughout your organization?

People

- Does the organization structure of the Manitoba healthcare system support IM&A? Are there challenges/gaps/overlaps or opportunities for improvement?
- Does the system/organization have the skillsets, capacity, and roles required today to support the delivery of IM&A services?
 - Are there capacity and/or capability gaps?
 - Are there capacity and/or capability overlaps?
- Are decision makers encouraged to adopt and utilize data driven approaches in their roles? Is there sufficient education and training for decision makers to do this?

Process (includes Governance)

- Describe the current state information management and analytics governance model (roles and responsibilities) considering aspects such as: decision making, trusteeship, and information manager roles.
- Are there gaps (e.g. siloes), overlaps or a lack of clarity?
- Are there opportunities for improvement (e.g. integration, alignment)?
- What processes work well today?

Data

- Where are the system's strengths related to data and data management? Are there any gaps or opportunities (e.g. integration)?
- Does accessibility of data meet IM&A needs across the system?
- Does data allow insights into non-technical outcomes?
- Is data/information delivered in an easy-to-use format, and available in a timely fashion?
- Are you receiving the management and performance reporting you need to effectively do your job?

Technology

- Does technology sufficiently support IM&A activities and meet your needs? Is technology being used to its full extent?
- What IM&A technology capability challenges are you faced with? Where are capability challenges most pronounced?

Target state

- What improvements to information management and analytics would have the greatest impact for the Manitoba health system in relation to:
 - Clinical (e.g. patient/consumer health)
 - Health system management
 - Population health objectives/Policy and program design
 - Innovation/Research
- In the next 5 years, what do you anticipate to be your needs related to health sector information access and analytics?
- What does an ideal future state for Manitoba's healthcare system's IM&A services look like (e.g. how would services be planned, delivered and governed)?
- Do you see any specific barriers to achieving your ideal future state (e.g. people, time, cost, governance)?
- Is there anything else that you expected us to cover that we didn't?

Detailed Questions

As part of select interviews, a subset of interviewees with specific responsibilities and competencies will be asked to provide additional insight into select aspects of IM&A operations and practices of the Manitoba healthcare system.

Data Governance

1. Who currently manages the core data that is collected? Where is it stored?
2. Are there processes and policies in place to collect, access, manage and analyze data?
3. Are these processes followed? Do you have the capability to routinely audit?
4. Who oversees the processes to access data, make, and track changes to data?
5. Are there data governance processes and policies in place? Is there a governing body who updates them?
6. How are data governance processes being tracked and assessed?
7. What level of integration has been achieved?
 - Within your organization?
 - Across the Manitoba healthcare system?

Data Architecture

1. How are decisions made in your organization with respect to new/changed systems and how do they fit in existing architecture models? Are analytics and reporting needs commonly considered in the decision making processes?
2. What kind of data is captured and stored?
3. How well aligned is existing data architecture with business requirements/processes?
4. What is the method and frequency of data load? How often is the data updated?
5. Can existing data architecture interface with third party systems?
6. How well is this function resourced?

Data Quality Management

1. Describe current data quality (accuracy, reliability, consistency) management practices.
2. Is there any dedicated team to manage, monitor and control quality of the data?
3. Does the Manitoba healthcare system have any data quality vision, mission and strategy defined?
4. Are there any standards (data and process) defined for data entry into the source systems?
5. How are data quality metrics being measured and tracked? Who, if anyone, is accountable for ensuring adherence to data quality standards for performance?
6. How confident are you in the quality of data across the systems?
7. To what extent does the data need to be transformed (either in an automated or manual manner) to meet business needs?
8. What type of structure is in place to classify and understand your data/types of data? Does this classification and processes surrounding them, adequately meet your legislative, security and privacy needs?

Metadata Management

1. To what extent do the Manitoba healthcare system use metadata?
2. What is the process for defining and maintaining metadata? (i.e. Information Catalog, data dictionary) How often is it reviewed and updated?
3. Who is responsible for metadata management for the Manitoba healthcare system?
4. How are changes to metadata implemented?
5. How pervasive is the usage of metadata within the Manitoba healthcare system?
 - How useful is it?
 - If it was improved, how would you use it?
6. How are changes to metadata tracked?
7. How are metadata metrics being measured and tracked?

Data Privacy and Security

1. Who is responsible for data security for the Manitoba healthcare system?
2. What controls, standards, and processes are in place today for identifying and managing risks? Where do you see key gaps with respect to data privacy and security?
3. What kind of data access rules have been implemented?
4. How are security metrics being measured and tracked?
5. How is physical security handled?
6. How is technical security handled?
7. What are current risks to data privacy and security? Are there risk mitigation plans in place for these?

Data Archiving Management

1. What action plan does Manitoba healthcare system have in place in case of a disaster?
2. What standards are used for data archival process?

Master Data Management

1. Do you have master data in your current state?
2. Does the current master data serve your purposes to address critical business questions?
3. Is someone in charge of master data? If so whom?
4. Who tracks changes made to master data?
5. What kind of error detection/correction mechanism are used?

Analytics and Reporting

1. What types of reporting tools and analytical models exist?
2. What are some of the indicators commonly used in relation to performance? Are the measures satisfactory? Are there any gaps? How well does technical integration of data support these non-technical indicators?
3. How scalable are analytics models and reporting – do they support needs across the entire system or only certain organizations or programs? Are all organizations/programs supported in their data needs?
4. What is the operating model for analytics and reporting for your portfolio/organization? Is it a centralized, federated or decentralized model? What should it be?
5. Who has accountability and overall responsibility for managing the lifecycle of reports and analytical models?
6. Does your portfolio/organization utilize/deploy a standardized means of analytics and reporting?
7. What level of collaboration exists across the business with regards to reporting and analytics?

Technology

1. How is data acquired, stored, transformed, analyzed and served? Is there a platform in place to store and manage data sets centrally (e.g. centralized data repository)?
2. What is the underlying technology infrastructure in place to manage the data lifecycle and support the tools (infrastructure includes the technology processes, security, networks, servers, etc.)?
3. What are the processes that are used to manage the data lifecycle from acquisition to analysis? Specifically for:
 - a. Onboarding a new data set?
 - b. Managing data quality?
 - c. Ensuring the security and privacy?
 - d. Ensuring compliance to other governance policies?
4. What services and tools are used to develop reports? Advanced business analysis?
5. How user-friendly are your current reporting / analytics services and tools? Do they allow for self-service reporting?
6. Do you think you are optimizing /maximizing the capabilities within your current services and tools?
7. What level of integration exists between your reporting tools and source systems (i.e. do reporting/analytics tools have the ability to connect directly to your source systems)?
8. What services and tools are used to create and manage analytical/statistical models?
9. What services and tools are used to perform ETL (Extract / Transform / Load) activities?
10. What services and tools are used to support data quality?
11. What services and tools are used to support metadata management?
12. What services and tools are used to support master data management?

Appendix D – Current State Session deliverable

Deloitte.

Manitoba Healthcare System
Information Management
and Analytics (IM&A) Study

Current State Session
Results

February 2016



Introduction

Current State session

- On January 8, 2016, more than 50 stakeholders from across the healthcare system participated in the second of a series of workshops in the Information Management & Analytics (IM&A) Study project
- The purpose of the workshop was to continue to build a made-in-Manitoba vision for IM&A in the Manitoba healthcare system and to review, refine and validate Current State IM&A themes gathered through consultations across the healthcare system

Current State session results

- The Current State session used polling (voting) software to gather the perspectives of the participants
- This document follows the agenda and format for the Current State session and provides the polling results within the relevant sections of the document

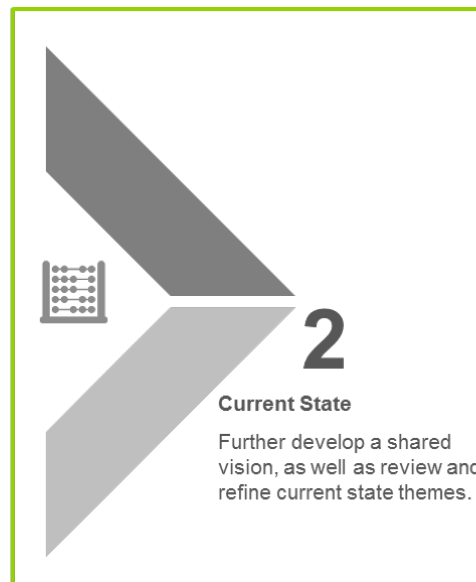
The IM&A Study is exploring the ways in which the Manitoba healthcare system and its stakeholders collect, use and share data

The IM&A Study is intended to identify strategies to accomplish the following health system objectives:

- Increase availability of standardized minimum content that is reliable;
- Manage data systemically, to plan for future processes and solutions and provide all healthcare system partners with access to the data they need;
- Strengthen reporting and analytics capacity;
- Better integration of data and information across the system;
- Make informed systemic investments; and
- Improve access to information in support of surveillance and research activities.

The Current State Session is the second session to gather your thoughts on IM&A within the healthcare system of Manitoba

This Current State Session is the second opportunity to gather your thoughts on IM&A within the healthcare system of Manitoba. In the coming months, a third working session will be convened to finalize current state understanding and validate the future state options and roadmap.



Objectives and agenda

Agenda and associated objectives	<p>Visioning</p> <ul style="list-style-type: none"> • Building on the original CIHI vision framework, use the material from the consultations to decide upon a made-in-Manitoba vision. <p>Current State</p> <ul style="list-style-type: none"> • Review, refine and validate the current state themes gathered during the consultations. <p>Conclusion and next steps</p> <ul style="list-style-type: none"> • Discuss and validate the made-in-Manitoba vision.
Agreement	<ul style="list-style-type: none"> • Recognize and follow the process; • Contribute freely and be courageous; and • Be respectful of others opinions, voices, and time.

Visioning

Background

This session presents findings from the visioning session and preliminary current state themes from interviews with leaders in the healthcare system.

Visioning session

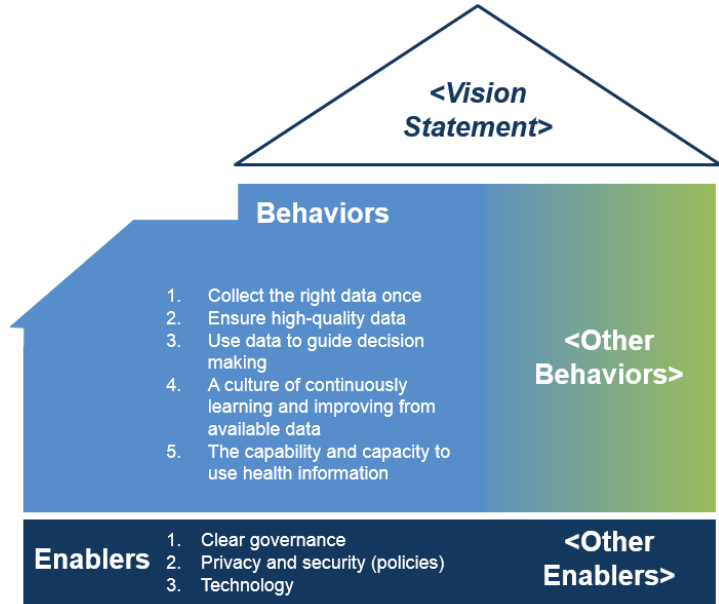
- A visioning session was held November 3, 2015 with more than 50 participants from across the healthcare system
- Participants reviewed CIHI's model for health system use of data, "Better Information for Improved Health", and provided their perspectives on the applicability of the CIHI model for the Manitoba healthcare system
- Participants also identified additional elements that should be considered in a Manitoba model for IM&A and themes/concepts that may be considered in Manitoba's vision for IM&A

Interviews

- Deloitte conducted 30 group and individual interviews between November 4, 2015 and December 18, 2015, including more than 225 stakeholders in the healthcare system.
- Interviews were conducted with Health Senior Leadership Council and select Councils, functional groups (Health Information Services and Analytics, ICT, Surveillance, Governance and Privacy, Quality Improvement, and Research and Evaluation), Regional Health Authorities, provincial health organizations, and several key leaders.
- The objective of the interviews was to seek insights on:
 - The current state of information management and analytics across the Manitoba healthcare system, including strengths/weaknesses, risks, governance, analytic capabilities, best practices, barriers, and gaps.
 - The future state of information management and analytics across the Manitoba healthcare system to more clearly define gaps that need be bridged, barriers that need to be overcome, and key strengths and best practices that should continue in the future state

Today, we are going to decide upon a made-in-Manitoba vision, building on the original CIHI vision framework

1. Review and revise the hopes and visions that participants shared during the consultations.
2. Revise and add behaviours and enablers that the CIHI vision framework does not capture.

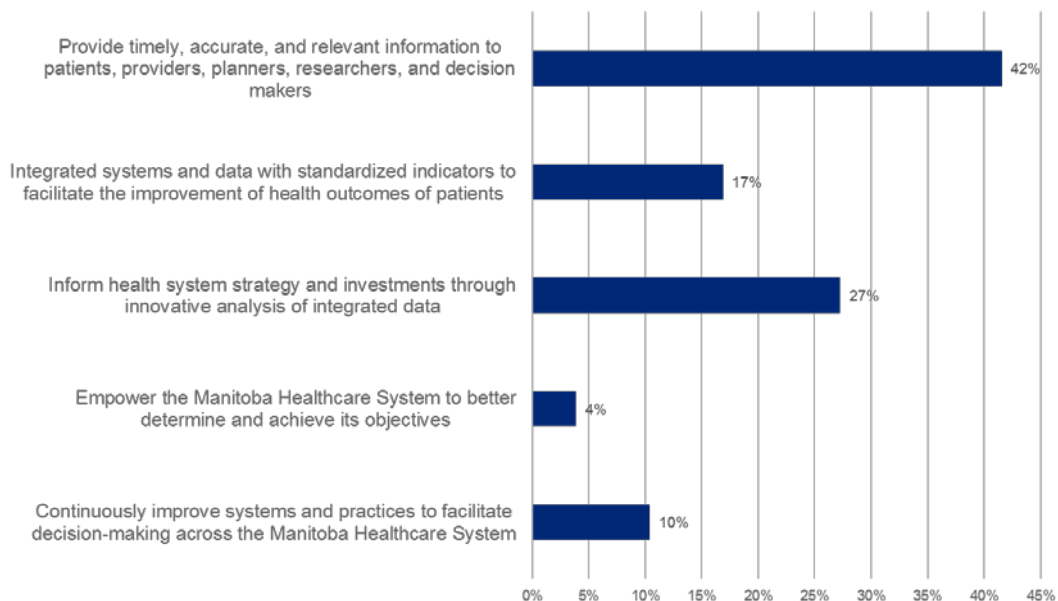


Throughout the visioning session and the consultations, participants provided short vision statements which have been collated

- Inform health system strategy and investments through innovative analysis of integrated data;
- Integrated systems and data with standardized indicators to facilitate the improvement of health outcomes of patients;
- Provide timely, accurate, and relevant information to patients, providers, planners, researchers, and decision makers;
- Continuously improve systems and practices to facilitate decision-making across the Manitoba healthcare system; and
- Empower the Manitoba healthcare system to better determine and achieve its objectives.

Which vision statement best captures your hopes for IM&A? (2 votes)

Below are the results of the poll vote taken in the Current State session:

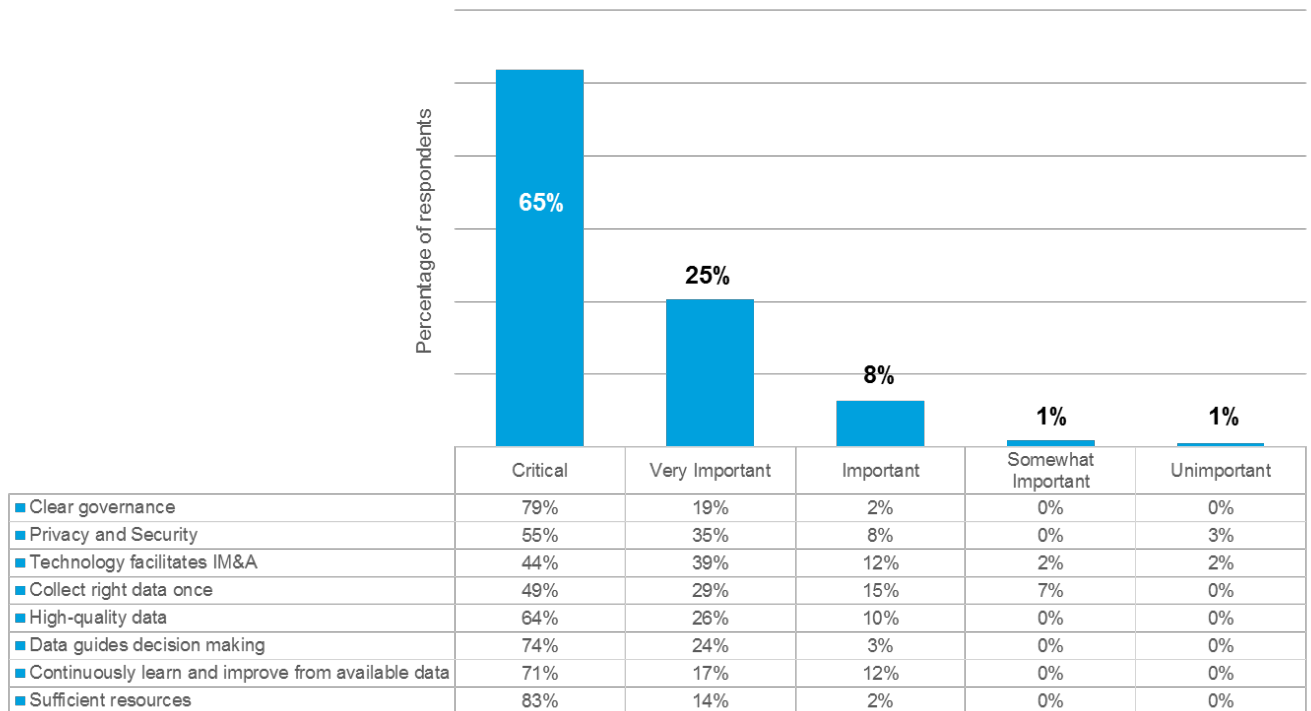


The CIHI framework is about using health information to make informed decisions and was reviewed during the visioning session



Alignment with CIHI principles

Participants in the Visioning Session were asked whether the principles of the CIHI framework align with the Manitoba healthcare system's perspectives. All eight enablers, data considerations, and people dimensions were considered to be critical for high-performing IM&A for the Manitoba healthcare system.



Possible additional elements to CIHI have been gathered throughout the consultations

	CIHI	Additional Proposed Elements
Enablers	<ul style="list-style-type: none"> • Clear governance • Privacy and security (policies) • Technology 	<ul style="list-style-type: none"> • System-level strategy and prioritization • Accountability frameworks, controls and measures • Standardized processes
Behaviours	<ul style="list-style-type: none"> • Collect the right data once • Ensure high-quality data • Use data to guide decision making • A culture of continuously learning and improving from available data • The capability and capacity to use health information 	<ul style="list-style-type: none"> • Collaboration, transparency, and integrity • Gathering of both quantitative and qualitative data • Recognize, respect, and address the distinct health needs of the Aboriginal, Métis and Inuit peoples. • Timely usage of data • Continuously examining and integrating best practices • Focused on improving the user experience for patients and staff • Providing patients access to their information • Providing value to decision-makers across the system • Providing staff opportunities for learning and development • Data integration and standardized collection methods, definitions and quality

Building a made-in-Manitoba vision

Current State session participants broke into groups for this exercise. The collective result of the exercise is presented in the last section of this document.

Using the materials provided at your table, along with the CIHI framework and the additional proposed dimensions, build a made-in-Manitoba vision.

Please:

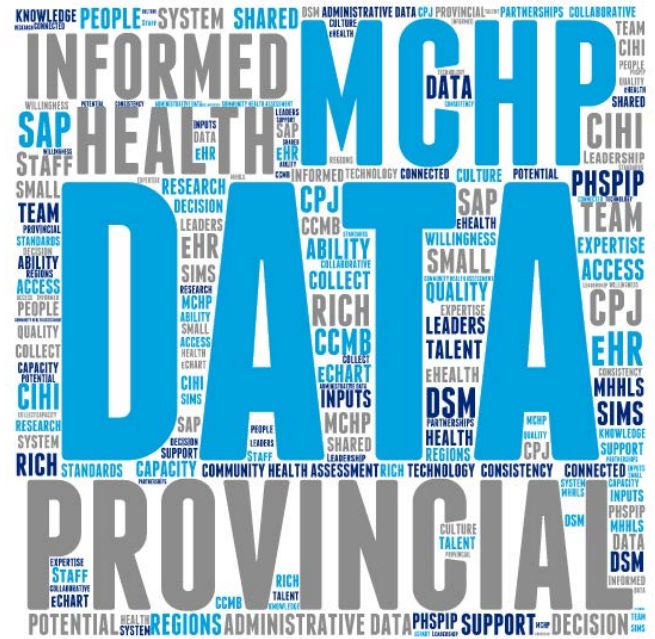
- Modify the enablers/behaviours, if appropriate;
- Write your own enablers/behaviours, if needed;
- Limit yourself to (4) enablers and (7) behaviours; and
- The results will be gathered and, during the current state portion of the session, will be collated into a made-in-Manitoba vision.

Current state

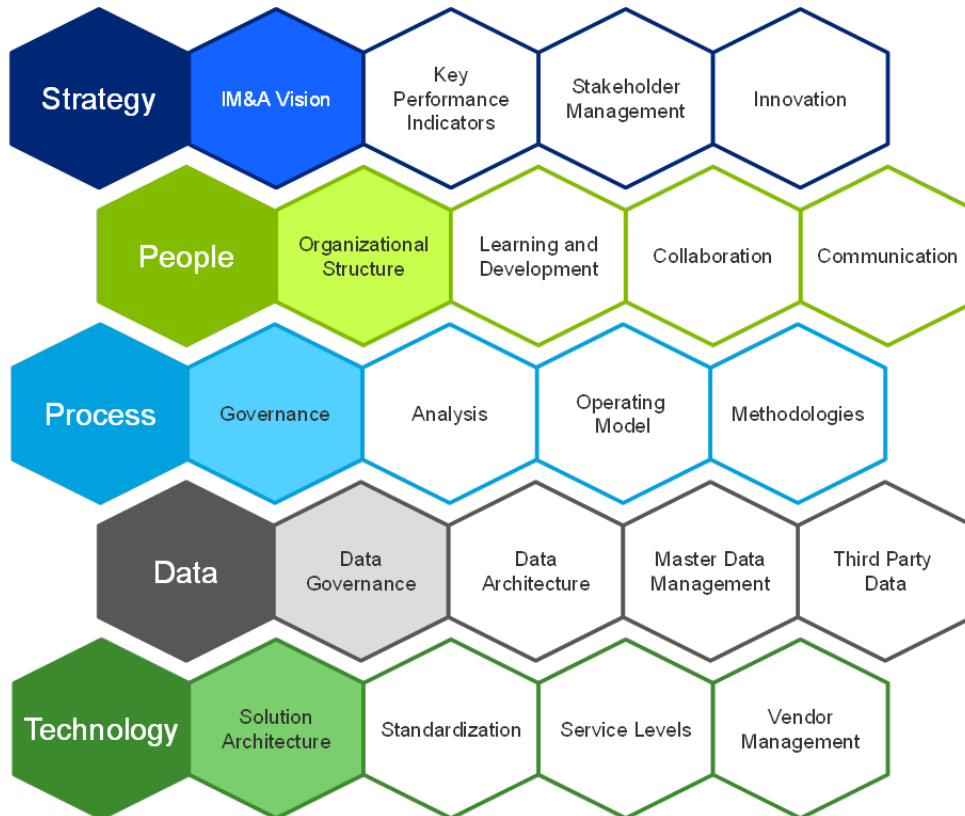
Strengths in the current state

Throughout the consultations, a number of current state themes emerged as core strengths of the Manitoba healthcare system IM&A landscape, including:

- A number of high-quality datasets and a rich amount of data collected
- Dedicated, resourceful and pragmatic staff
- Value placed on research, with the MCHP recognized as a key provincial asset
- A desire and willingness to be progressive, exemplified by initiatives such as PHSPIP and the Centre for Health Innovation
- Province-wide support for initiatives such as the Community Health Assessment
- Several provincial systems including eHR and EDIS



The current state findings have been organized using Deloitte's Insight Driven Organization (IDO) framework



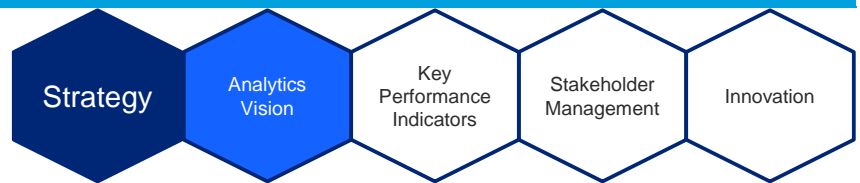
Current state findings summary by theme

Initial current state findings have been grouped into the five Insight-Driven Organization building blocks, with additional general findings following:

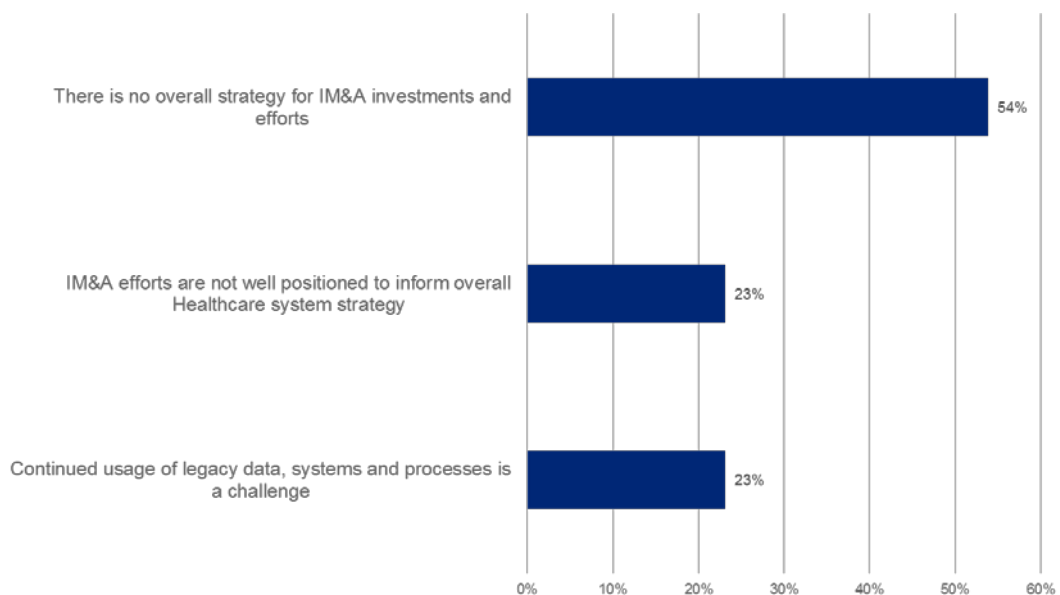
Theme	Finding
Strategy	<ul style="list-style-type: none"> There is no overall strategy for IM&A investments and efforts IM&A efforts are not well positioned to inform overall healthcare system strategy Continued usage of legacy data, systems and processes is a challenge
People/Culture	<ul style="list-style-type: none"> A range of collaboration challenges impede effective IM&A IM&A capacity and capability are not distributed evenly across the system Culture generally encourages data-driven approaches but does not demand data and analytics to justify decisions
Process/Governance	<ul style="list-style-type: none"> No authoritative voice that can make decisions with regards to IM&A The existing distributed governance structure impedes decision-making Most IM&A processes and practices are not standardized across the system
Data	<ul style="list-style-type: none"> Data collection efforts are not tied to decision-making There is a significant amount of data gathered, but it is not well integrated or standardized across the system There are pervasive data quality issues and inconsistent data across the system
Technology	<ul style="list-style-type: none"> The technology environment that supports IM&A is highly fragmented There is low IM&A activity automation

Strategy

Below are the results of the poll vote taken in the Current State session.



Which of these Strategy findings rings most true? (2 votes)

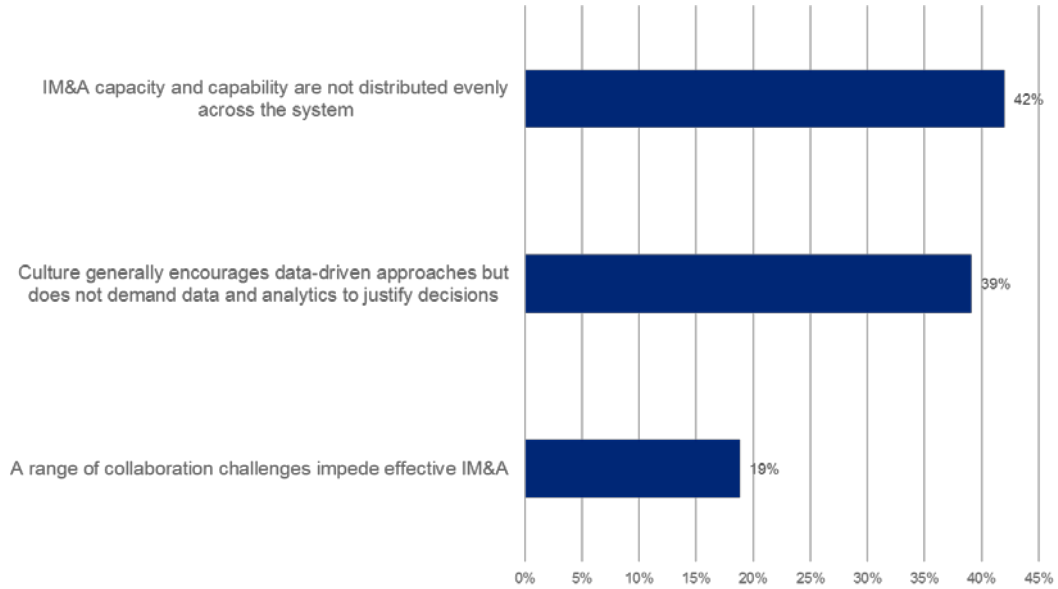


People

Below are the results of the poll vote taken in the Current State session.



Which of these Strategy findings rings most true? (2 votes)

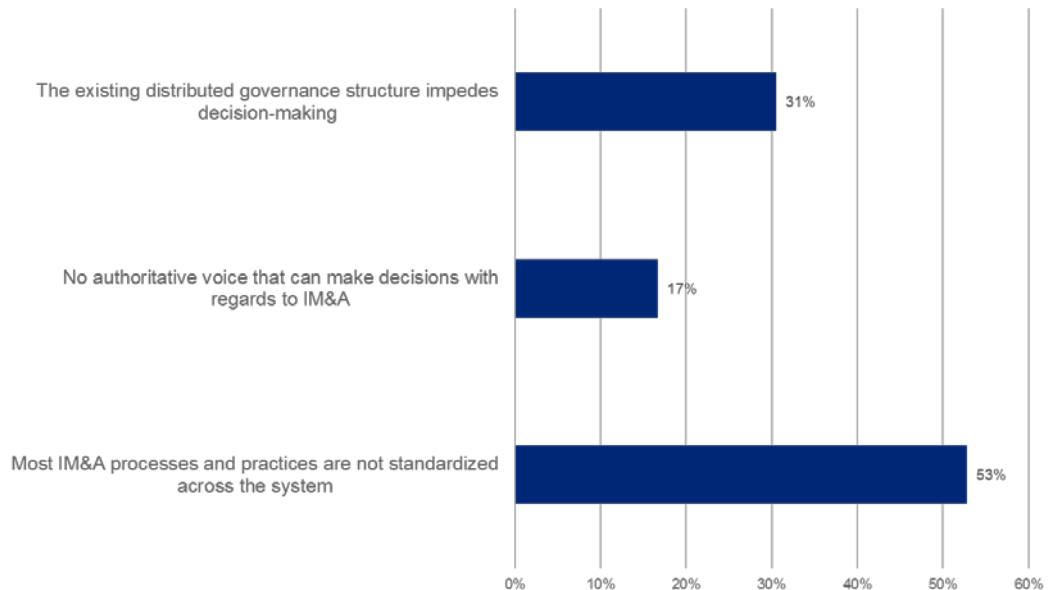


Process

Below are the results of the poll vote taken in the Current State session.

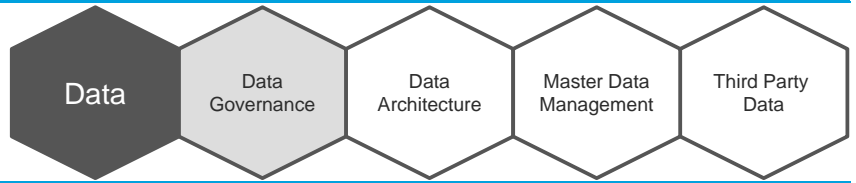


Which of these Strategy findings rings most true? (2 votes)

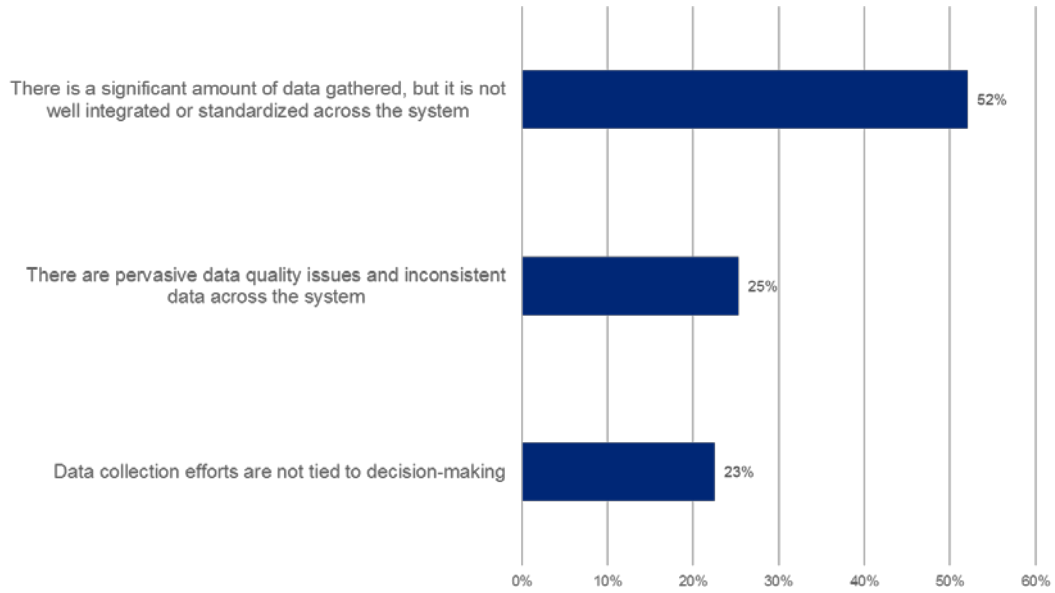


Data

Below are the results of the poll vote taken in the Current State session.



Which of these Strategy findings rings most true? (2 votes)

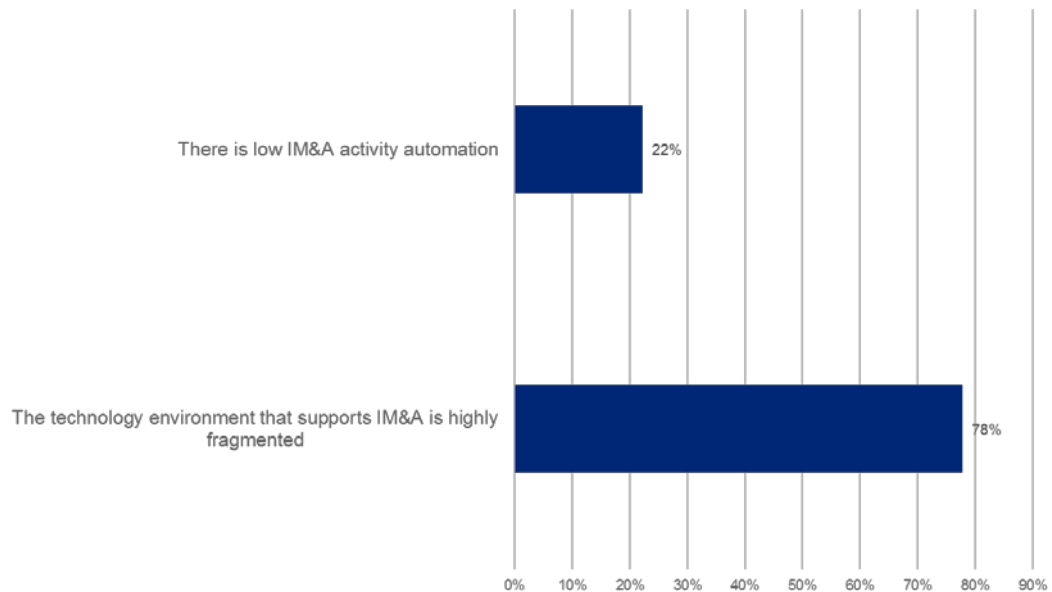


Technology

Below are the results of the poll vote taken in the Current State session.



Which of these Strategy findings rings most true? (1 vote)



Select other current state findings

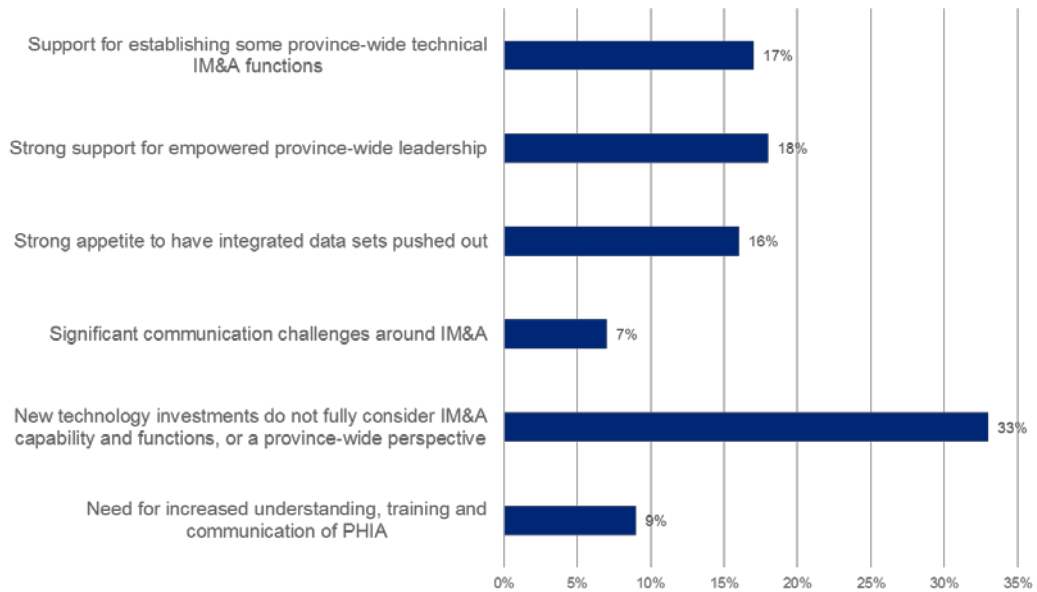
Below are additional current state findings that are not captured within the Insight-Driven Organization building blocks:

- Strong support for empowered province-wide leadership;
- Need for increased understanding, training and communication of PHIA;
- Strong appetite to have integrated data sets pushed out;
- Support for establishing some province-wide technical IM&A functions;
- Significant communication challenges around IM&A; and
- New technology investments do not fully consider IM&A capability and functions, or a province-wide perspective.

Other findings

Below are the results of the poll vote taken in the Current State session.

Which of these other findings rings most true? (3 votes)



Vision results

Made-in-Manitoba model

Below is the collective result of the visioning exercise:

Vision Statement	Provide timely, accurate, and relevant information and innovative analysis to inform the actions and decisions of the public, patients, providers, policy-makers, and planners
Behaviors	<ul style="list-style-type: none">• Collect the right data once in a standardized manner;• Ensure high-quality integrated data;• Collect and use data in a timely manner to guide decision making across the system;• A culture of continuously learning, evaluating, and improving from available data;• A culture of collaboration, transparency and integrity; and• The capability and capacity to use health information. <p>Additional</p> <ul style="list-style-type: none">• Recognize, respect and address the distinct health needs of the First Nations, Metis and Inuit Peoples; and• Ensuring security of private health information through understanding and consistent application of legislation.
Enablers	<ul style="list-style-type: none">• Clear responsive governance, including accountability frameworks, controls and measures;• Processes, technologies and tools that support available and reliable access to information; and• System-level Health Information Strategy.

Appendix E – Target State Survey questionnaire

Manitoba healthcare system Information Management and Analytics (IM&A) Study - Survey

Background

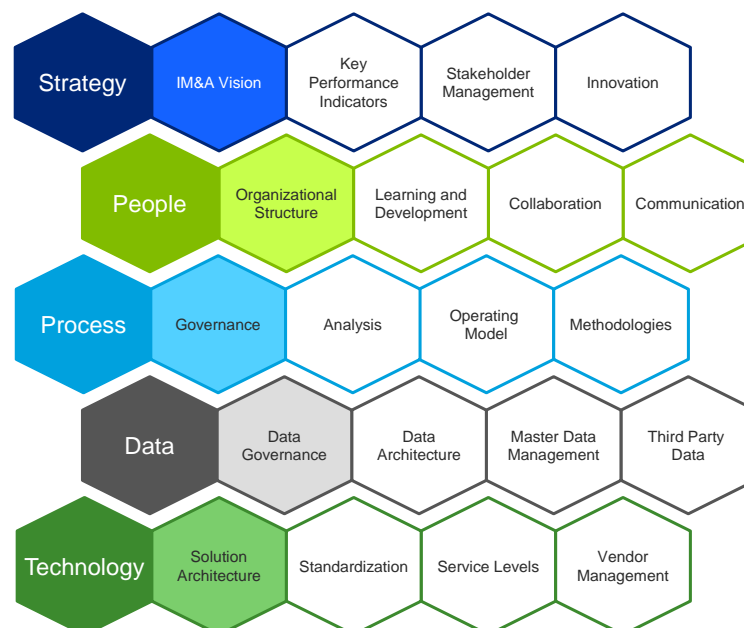
The effective collection, use and sharing of health information are key building blocks of the provincial healthcare system, and are critical to the achievement of the Province's goals for the system. The Health Senior Leadership Council has engaged Deloitte to work with leaders across the healthcare system on an Information Management and Analytics (IM&A) Study. This study will help define a strong vision for the health system's governance and use of data. The aim of the Manitoba healthcare system IM&A Study is to ensure the Manitoba healthcare system has the information it needs to support quality care and evidence-informed decision making, policy and planning. Deloitte is working collaboratively with leaders to document the Manitoba IM&A vision, review the current state of information management and analytics, and guide the development of a provincial plan to achieve the vision set out.

Beginning in November 2015, interviews and working sessions have been held with leaders across the Manitoba healthcare system to gather your insights into the current state of IM&A in the healthcare system, and your thoughts on opportunities and priorities for the future. We thank you for your participation in the consultation phase of the IM&A Study and invite you to continue to share your views through completion of this survey.

All survey responses are anonymous and will be kept confidential. Please complete the survey by **Monday, March 7, 2016**.

Insight Driven Organizations

The Manitoba healthcare system IM&A Study applies Deloitte's Insight Driven Organization (IDO) methodology. The methodology is used to assist organizations to achieve a high-performing state where decision making is continuously informed by robust data management, business intelligence, and analytics, operating across the whole organization. Becoming an IDO relies on a foundation of the fundamental building blocks of Strategy, People, Process, Data, and Technology. The five blocks and constituent themes are captured in the figure below. The themes on the left are the focus of this IM&A Study.



The survey

This survey is structured to gather your perspectives on potential future state initiatives **for the Manitoba healthcare system** that are targeted to addressing high priority current state themes identified through interviews and working sessions. Your perspectives will be used to prioritize these future state initiatives.

For each potential initiative, the survey asks the following questions

- **Urgency:** The time frame in which the initiative should be implemented
- **Business Impact/Value:** The perceived business value / impact of the initiative
- **Complexity:** The complexity of the initiative (i.e. ease of implementation based on influencing factors such as readiness / availability of key stakeholders, data or technology requirements, disruptiveness)
- **Implementation Resources:** Whether Health System resources have both capability & capacity to implement the initiative / solution

Each question has a selection of multiple choice answers to choose from, including “**unsure**”. Please feel free to answer “unsure” whenever the question falls outside your sphere of knowledge or area of expertise.

Note: Information management refers to the collection, use and sharing of information, from planning and systems development to disposal and/or long-term preservation. **Analytics** refers to using tools and computational methods to transform data/information into insights in order to inform decisions.

Please read before you proceed with the survey:

- The survey will take at least 45 minutes of your time
- Please note that the survey tool does not allow the option to save your answers and return at a later time. If you close the survey before you complete it, your partial answers will be submitted.
- Please feel free to answer "unsure" whenever the question falls outside your sphere of knowledge or area of expertise.

We sincerely thank you for taking the time to complete this survey and for your participation in the consultation phase of the Manitoba healthcare system IM&A Study. Your contributions and perspectives are very much appreciated.

If you have any questions, please email Aengus Bridgman at abridgman@deloitte.ca or contact him at 204-926-8962.

Begin Survey

What organization are you from?

Select the response that best describes your primary role/relationship with Information Management and Analytics within the Manitoba healthcare system?

- Strategic Decision maker
- Analytics Professional
- Information Management Professional
- Technology Professional
- Clinical Decision maker
- Researcher
- Other

Initiatives

For each initiative following, four questions were asked in the following way:

Urgency

Time frame in which initiative should be implemented

- Year 1 Year 2 Year 3 >3 years Unsure

Business Impact / Value

Perceived business value / impact of the initiative

- Low Medium High Unsure

Complexity

Complexity of the initiative (i.e. ease of implementation based on influencing factors such as readiness/availability of key stakeholders, data or technology requirements)

- Low Medium High Unsure

Implementation Resources

Healthcare system resources that have both capability and capacity to implement the initiative/solution

- No internal resources (Significant external resources required)
 Limited internal resources (Some external resources required)
 Appropriate internal resources (No external resources required)
 Unsure

Initiative listing

1. Data Quality Standards

This initiative will examine the data quality practices currently in place around the Health System and create best practices for the organization to follow. It also includes drafting of Data Quality policies, standards and guidelines, creating standard Data Quality operating procedures, defining Data Quality roles, and developing metrics to measure data quality.

2. Assess, Select & Implement Enterprise Data Quality Tools

This initiative will standardize the Health System around a single tool that will assess, resolve and ensure data quality across the organization.

By examining available tools and assessing them against the Health System's criteria / requirements, the organization will be able to procure and implement the optimal tool fitting its technology capabilities to enable data stewards to assess data quality against business rules, raise and track issues, perform some basic data cleansing, track remediation, and report data quality measures.

3. Data Quality Operationalization

This initiative will focus on using a phased approach to implement Health System's data quality program and measure data quality. It includes inserting defined and measurable data quality controls into business processes, monitoring, reporting & alerting when data quality issues arise and developing methods for data quality investigation & remediation of root causes.

4. Data and Analytics Governance Policy, Procedure & Standards Review

This initiative focuses on reviewing and refining Health System's current governance framework (i.e. policies, procedures and standards) as they apply to IM&A activities. This includes all policies, procedures and standards relating to data collection, security / privacy, integrity, compliance, availability, retention & disposal from IM perspective and relating to setting analytic priorities through a solid opportunity identification and prioritization process and monitoring/managing progress on key analytics initiatives from Analytics perspective. The initiative will also involve defining and formalizing a service and capabilities catalogue.

5. Establish Enterprise Data Governance Model

This initiative will assess the existing data and analytics governance model from a fit perspective to identify revisions that will assist the Health System achieve its strategic goals of operating seamlessly across the province.

6. Operationalize Enterprise Data and Analytics Governance

This initiative focuses on refining and communicating governance roles and responsibilities (including but not limited to data owners, data stewards, model/report owners, model/report stewards) across the health system and integrating data and analytics governance procedures, standards and measures into health system-wide business processes.

7. Organizational Alignment & Change Management

Initially the objective is to obtain senior leadership alignment that demonstrates support for the Health System's IM&A vision and aligning leadership to champion the value and benefits of IM&A. Once the above is validated, organizational alignment and change readiness creates the conditions necessary for success. Following initial organizational alignment and change readiness assessments, the implementation of specific change management activities will take place largely within each IM&A initiative.

8. Communications Plan

Effective communication with all stakeholders before, during, and immediately after each initiative is required to create a common awareness and understanding of the transition throughout the organization. The plan will cover all health system-wide program messaging, communicate key project activities and impacts to relevant stakeholders, gather feedback for project leadership, and validate the value of the transition throughout the organization.

A dedicated team will be assembled to develop and execute an overarching communications plan for the transformation programs.

9. Master Data Management (MDM) Standards

The Health System currently maintains patient and business data in a number of separate repositories. To support future state needs, a rationalized, single source of the truth for patient/ client, asset and vendor data must be in place in order for the health system to leverage consistent information to improve integration and collaboration across applications. This initiative encompasses the development of MDM policies, procedures and standards on how master data assets should be managed across the health system to achieve a single source of the truth.

10. Assess, Select & Implement Enterprise Master Data Management (MDM) Tools

This initiative focuses on conducting assessments of MDM tools against clearly defined enterprise MDM functionality requirements, selecting the most appropriate one(s) and then implementing it to establish a centralized, enterprise-wide MDM platform.

11. Master Data Management (MDM) Operationalization

This initiative uses a phased approach to define and implement MDM processes that combine Health System's core and disparate data sets into a single source of the truth to allow for better data integration and collaboration across applications. It also includes a MDM mapping exercise, review of ETL processes, and data clean-up effort to convert existing data to standard information models while discarding duplicate, incomplete and otherwise irrelevant data.

12. Metadata Management Standards

While IM&A applications have a standard set of basic metadata applied to structured and unstructured data, these elements are generic in nature and have limited application to the Health System's business needs. With business input, a standard set of business-relevant metadata needs to be created to describe the Health System's data stored in a health system-wide system. A standard set of metadata will facilitate indexing, searching, retrieving and classifying of information across the organization.

This initiative will focus on assessing the metadata management practices currently in place across the Health System as well as refine/ develop metadata management and taxonomy policies, procedures and standards on how business, technical and operational metadata can be managed across the Health System to achieve consistency in data definitions and clarity on data lineage and associations between data elements.

13. Assess, Select & Implement Enterprise Metadata Management Tools

This initiative focuses on conducting assessments of metadata management tools against clearly defined enterprise metadata requirements, selecting the most appropriate one(s) and then implementing it to establish a centralized, enterprise-wide metadata repository.

14. Metadata Management Operationalization

This initiative will focus on using a phased approach to design and implement a centralized health system-wide metadata repository. It also includes the development of processes on how to collect, store, synchronize, maintain and disseminate business-relevant metadata to facilitate the indexing, searching, retrieving and classifying of information across the organization.

15. Define Enterprise Data Model & Technical Architecture

This initiative focuses on defining an enterprise data model that supports systems integration and data compatibility to support Health System's future IM&A needs. It includes identifying what the authoritative data sources are, in what systems they reside and where data from different systems needs to be integrated.

16. Define & Implement an Integrated Data View

This initiative focuses on creating integrated data views across key data elements in alignment with Health System's Enterprise data model. This will enable developers and business users to have an integrated, 360 degree view across members, advisors, accounts, products, transactions, etc.

17. Architecture Design & Proof of Concept for Enterprise Central Data Repository

This initiative focuses on conducting a proof of concept on the creation of a new enterprise central data repository for structured and unstructured data. It includes the physical design of the underlying data architecture, leveraging open source technologies (such as Hadoop), that supports it.

18. Assess, Select & Implement Enterprise Central Data Repository Tool

This initiative focuses on conducting assessments of central data repository tools against clearly defined enterprise functionality requirements, selecting the most appropriate one and implementing it to establish an enterprise central data repository.

19. Define Enterprise Visualization Requirements, Assess & Select Enterprise Visualization Tools

This initiative focuses on gathering and prioritizing the visualization functionality requirements necessary to allow business users across Health System to perform data discovery and analysis with minimal assistance from IT / technology team. It also focuses on conducting assessments of visualization and dashboarding tools (both new & pre-existing at Health System) and then selecting the most appropriate one(s) to establish a standardized, health system-wide visualization / dashboarding platform that is user-friendly and meets business needs.

20. Implementation of Enterprise Visualization Tools

This initiative focuses on establishing a standardized, health system-wide visualization platform through the implementation of the selected visualization and dashboarding tools. It will also involve the development of user guides for both developers and business users that describes how to develop, transition, operationalize, interact with and interpret visualizations and dashboards based on Health System's visualization toolset(s).

21. Define Enterprise Reporting Requirements, Assess & Select Enterprise Reporting Tools

This initiative focuses on gathering and prioritizing reporting functionality requirements necessary to expand and improve the development and distribution of standard and ad-hoc reports health system-wide. It also focuses on conducting assessments of reporting tools (both new & pre-existing at Health System) against clearly defined enterprise functionality requirements and then selecting the most appropriate one(s) to establish a centralized, health system-wide reporting platform.

22. Implementation of Enterprise Reporting Tools

This initiative focuses on establishing a centralized health system-wide reporting platform through the implementation of the selected reporting and/or report distribution tools. It will also involve the development of user guides for both developers and business users that describes how to develop, transition, operationalize, and interpret reports based on Health System's reporting toolset(s).

23. Define & Implement Analytics Centre of Excellence Operating Model

This initiative focuses on establishing an Analytics Operating Model by leveraging Health System's new IM&A vision to define and implement the infrastructure that directs, governs, standardizes, and simplifies the use of analytics across Health System.

24. Define Early Adoption Analytics Projects

This initiative focuses on defining early adoption analytics projects based on current and future business needs of the health system and then prioritizing in accordance with business value and feasibility.

25. Implement Early Adoption Analytics Projects

This initiative focuses on conducting controlled 90 – 120 day analytics projects using an agile approach. The order in which analytics projects are conducted will be based on the results of Health System's earlier prioritization activities. As an initial step, the focus will be to develop a proof of concept to demonstrate the value of analytics as well as impacts on people, process, technology and data. Leverage content, data, statistical and quantitative analysis, exploratory and predictive modelling, and fact-based management to drive to a model that produces actionable insights based on patterns and trends.

26. Define & Implement IM&A Talent Strategy

This initiative focuses on improving educational opportunities and career development path for data and analytics resources in order to improve and retain information management and analytics talent as well as attract top talent to fulfil future IM&A capability & capacity requirements within the health system.

27. Optimize & Scale BI

This initiative focuses on conducting an inventory of all standard reports across Health System to assess usage, duplication, distribution and levels of automation to identify opportunities to rationalize, discontinue or automate specific reports. The BI optimize and scale initiative will rationalize, standardize, build and automate BI capabilities to support future state processes and is a foundational step to the Analytics journey. One of the key objectives of this initiative is to liberate and enrich the data to better enable the business to use it for their own BI inquiries.

28. Define Enterprise Analytical Requirements, Assess & Select Enterprise Analytical Tools

This initiative focuses on gathering and prioritizing the functionality requirements necessary to expand and promote both new and existing analytical capabilities health system-wide. It also focuses on conducting assessments of analytics tools (both new & pre-existing at Health System) against clearly defined enterprise functionality requirements and then selecting the most appropriate one(s) to establish a standardized, health system-wide analytical platform.

29. Implementation of Enterprise Analytical Tools

This initiative focuses on establishing a standardized, health system-wide analytical platform through the implementation of the selected analytical tools.

30. Identify, Assess & Establish Analytics Partnerships

The objective of this initiative is to highlight strategic partners that act as enablers and align with the Health System's strategies and priorities. The following are the primary objectives of the initiative: Drive innovation with 3rd parties to supply analytics insights and to provide them with information; Catalogue and "certify" 3rd party information sources to be used in the Health System BI and analytics; Provide access to the Health System data to other government agencies in support of open data for government.

31. Analytics Innovation Lab

This initiative focuses on establishing an analytics lab to act as a catalyst for healthcare innovation. This will be an innovation hub that brings the external partners and internal analytics team members together to improve healthcare through agile analytic projects.

32. Clinical Analytics: Analytics for Clinical Performance Management

This initiative focuses on implementing and deploying operational business intelligence and analytics on the touch-points between different care settings. The goal of the analytics is to continuously identify opportunities to improve patient safety and the quality of care delivered, lower costs, and provide a more efficient and comfortable experience for both patients and clinicians.

33. Clinical Analytics: Analytics for Population Health Management

This initiative focuses on establishing an integrated population health management platform that positions Health System to excel on Triple Aim goals for high priority patient populations such as frail elderly, mental health, chronic disease. The initiative will include collecting, collating and curating the data to enable longitudinal analysis on these patient populations, building predictive models to flag patients at risk proactively and to provide clinicians insights on the selected population to affect change.

34. Research Analytics: Cohort Exploration and Discovery

This initiative focuses on establishing a cohort selection, exploration and discovery. This will involve assessing current state research specific cohort selection, exploration and discovery tool sets, deploying a common analytical environment to enable this functionality, develop packaged cohort analysis and self-service capabilities.

35. Health Operations Analytics: Supply Chain Analytics

This initiative focuses on establishing an analytics environment for analyzing the health supply chain. This will include identifying, collecting, collating and curating the data required to analyze and optimize the supply chain, designing/implementing the business intelligence tools to monitor/manage the supply chain and designing/implementing the advanced analytics tools to optimize the supply chain.

36. Health Operations Analytics: Enterprise Performance Management

This initiative focuses on establishing an enterprise performance management framework for KPIs using interactive dashboards and other capabilities to promote financial sustainability, asset efficiency, etc.

37. Health Operations Analytics: Operations Performance Management

This initiative focuses on building on the existing performance management platform, implementing and deploying operational business intelligence for analyzing performance of key operational areas (e.g., resource utilization analysis, prediction, and management), staffing and scheduling optimization; and workforce effectiveness and productivity analytics.

Appendix F – Target State Session deliverable

Deloitte.

Manitoba Healthcare System Information Management and Analytics (IM&A) Study

Target State Session

March 17, 2016

Introduction

Future state session

- On March 17, 2016, approximately 40 stakeholders from across the Manitoba healthcare system participated in the third and final workshop in the Information Management and Analytics (IM&A) Study Project.
- Prior to the workshop, a prioritization survey was circulated among a broad group of stakeholders across the Manitoba healthcare system to provide an initial prioritization of 37 initiatives that will be part of addressing the current state challenges and realizing the stated Manitoba healthcare system IM&A vision.
- The purpose of the workshop was to review the initiatives and the findings of the prioritization survey, validate the initiatives, and gain a high level consensus on the top initiatives that may be pursued in the short, medium, and long term.

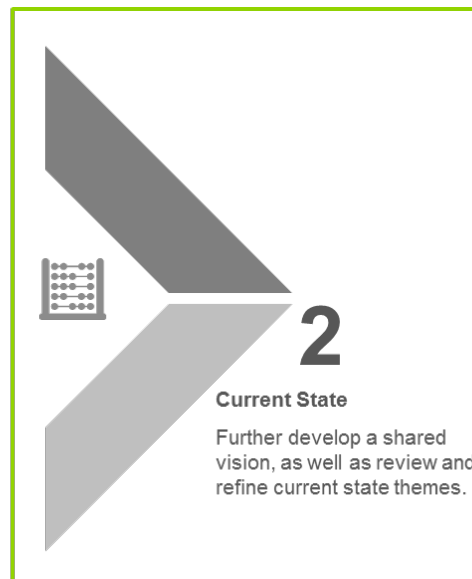
Future state session results

- The future state session used polling (voting) software to gather the perspectives of the participants as well as Tableau data visualization software to explore the results of the prioritization survey.
- This document follows the agenda and format for the future state session and provides the polling results and explanatory text within the relevant sections of the document.

Project background and process

The IM&A Study is about identifying strategies to accomplish health system objectives:

- Increase availability of standardized minimum content that is reliable;
- Manage data systemically, to plan for future processes and solutions and provide all healthcare system partners with access to the data they need;
- Strengthen reporting and analytics capacity;
- Better integration of data and information across the system;
- Make informed systemic investments; and
- Improve access to information in support of surveillance and research activities.





1

Review and validate target state initiatives

Review initiatives and findings of prioritization survey, validating initiatives and discussing further initiatives as appropriate



2

Prioritize initiatives

Gain a high level consensus on the top initiatives that may be pursued in the short, medium, and long term.

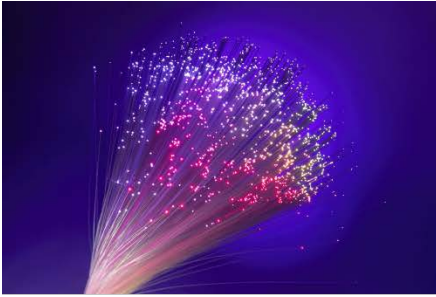
IM&A Trends and Drivers

IM&A Trends



<https://www.youtube.com/watch?v=8AkXW9EPFJg>

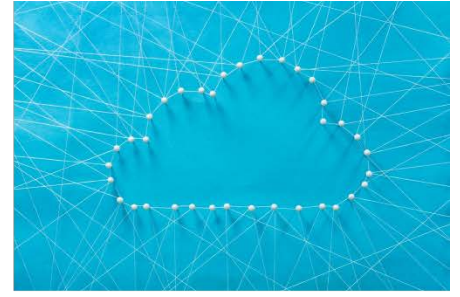
IM&A Trends



Big data



Unstructured data



Cloud

IM&A Healthcare Drivers



Evidence-based decision making



Measuring and managing outcomes



Health system and operational efficiencies



Interoperability challenges



Data security concerns



Lack of skilled resources

Use Case #1

Cancer Care Ontario

The challenge

- One of Cancer Care Ontario's (CCO) primary roles is to provide actionable information to decision makers across the province so they can make the choices that improve the performance and ensure the sustainability of the healthcare system, deliver value for money, and result in the best outcomes and experience for patients. As such, CCO wishes to find opportunities to deliver more actionable information by unlocking the power of its data assets, and to drive further insight, adoption, and capability in the analytics space.

The opportunity

- To support a larger initiative and vision to redesign and build capacity in the Analytics and Informatics space, CCO embarked on the development of an Analytics & Informatics (A&I) data architecture, asset and infrastructure strategy and roadmap to address known gaps in:
 - Analytics
 - Data Management
 - Data Assets
 - Data Architecture

The results

- Following the completion of an analytics and strategic data assets assessment, a future state analytics operating model and transition plan were developed. Highlights from the new operating model included a new competency center as well as service delivery centers for both analytics and data to ensure that analytics are efficiently being delivered to the organization's stakeholders.
 - The transition plan provided initiative snapshots to address known gaps in:
 - Governance & operating model
 - Metadata management
 - Data quality management
 - Agile Analytics
 - Data preparation self service
 - Data lake
 - Existing technology & architecture
 - Data acquisition
 - Master data management

Use Case #2

A Large Healthcare Organization in British Columbia

The challenge

- The complex needs of the frail elderly span across the care continuum at various stages of their aging. The jurisdiction estimates that the frail elderly population constitutes approximately 1% of the and yet, over 30% of publicly funded dollars spent on healthcare are spent on this population.
- Those over 80 years of age represent fastest growing age cohort.
- Health leaders indicate that during the past year the acute care facilities were filled beyond capacity, particularly by the frail elderly.
- In turn, the frail elderly and their families indicate that the overall experience in the acute care setting is sub-optimal (despite the hard work of those providing the care)

The opportunity

- Apply health analytics and the frailty index to create health insights as to who is/may become at risk frail elderly so as to engage home, community and residential care to support the frail elderly, decrease the use of the acute care system by the frail elderly and to improve the quality of care and experience of the frail elderly and their families.
- Want to then extend this concept to other key cohorts such as those with chronic disease and mental health/addictions

The results

- Managed performance dashboards provide real-time feedback regarding health system performance and risks

STEP 1: Calculate eFI



STEP 2: Identify Patients at Risk



Actions	Name	Clinical Gap	Cost Risk
	PATIENT10031, RACHEL	96 High	85 Medium

STEP 3: Right care to right patient at the right time



Where we want to be

Vision context

The Manitoba healthcare system IM&A Vision was discussed at the future state session, resulting in:

- The addition of the word “administrators” to the vision statement, and
- The need to include a definition of “information”.

Information in a broad sense refers to healthcare system data collected from across the system, for uses including:

- Clinical;
- Health system management;
- Population health objectives;
- Policy and program design; and
- Innovation/Research.

Vision statement

Provide **timely, accurate, and relevant** information and innovative analysis to inform the **actions and decisions** of the public, patients, providers, policy-makers, administrators, and planners.

Behaviors

- Collect the **right data once** in a **standardized manner**
- Cultivate **high-quality integrated data**
- Collect and use data in a **timely** manner to **guide decision making** across the Manitoba healthcare system
- A culture of continuously **learning, evaluating, and improving** from available data
- A culture of **collaboration, transparency and integrity**
- The **capability** and **capacity** to use health information
- **Recognize, respect and address** the distinct health needs of First Nations, Metis and Inuit Peoples
- Focus on **security of private health information** through understanding and consistently applying legislation

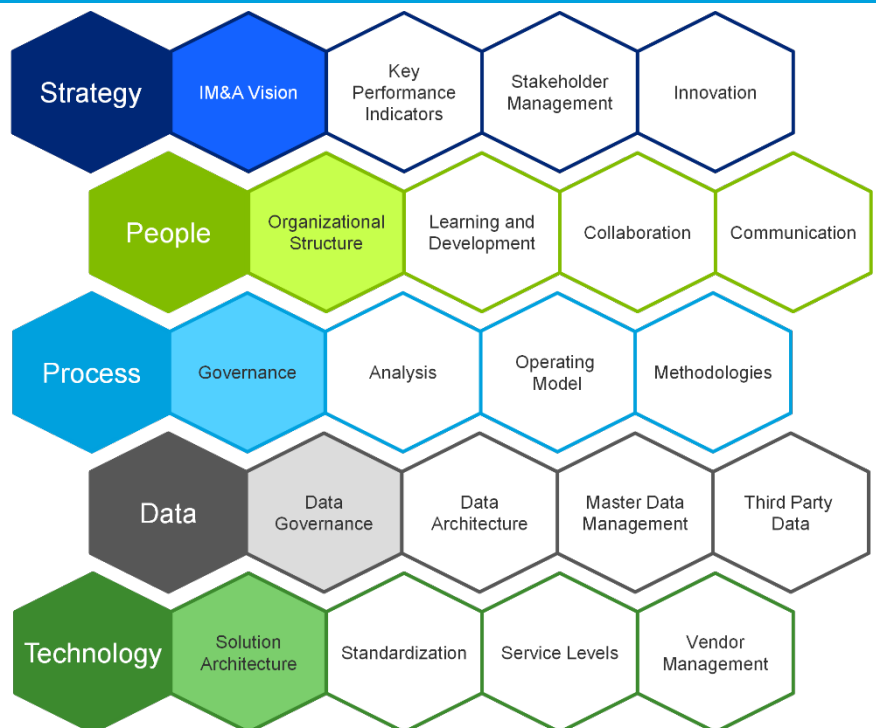
Enablers

- **Continuous engagement** with the patient and provider community
- Clear **responsive governance**, including accountability frameworks, controls and measures
- Processes, technologies and tools that support **available** and **reliable access to information**
- System-level **Health Information Strategy**

*Note: The term administrators has been added to the vision statement to be more inclusive of those who use IM&A across the Manitoba healthcare system.

Where we are

Insight Driven Organization framework



The current state findings were organized using Deloitte's Insight Driven Organization (IDO) framework and had been validated during the current state session.

Current state themes

<p>Strategy</p>	<ul style="list-style-type: none"> • There is no overall strategy for IM&A investments and efforts • IM&A efforts are not well positioned to inform overall healthcare system strategy • Continued usage of legacy data, systems and processes is a challenge
<p>Process</p>	<ul style="list-style-type: none"> • No authoritative voice that can make decisions with regards to IM&A • The existing distributed governance structure impedes decision-making • Most IM&A processes and practices are not standardized across the system
<p>People</p>	<ul style="list-style-type: none"> • A range of collaboration challenges impede effective IM&A • IM&A capacity and capability are not distributed evenly across the system • Culture generally encourages data-driven approaches but does not demand data and analytics to justify decisions
<p>Data</p>	<ul style="list-style-type: none"> • Data collection efforts are not tied to decision-making • There is a significant amount of data gathered, but it is not well integrated or standardized across the system • There are pervasive data quality issues and inconsistent data across the system
<p>Technology</p>	<ul style="list-style-type: none"> • The technology environment that supports IM&A is highly fragmented • There is low IM&A activity automation
<p>Other</p>	<ul style="list-style-type: none"> • Strong support for empowered province-wide leadership • Need for increased understanding, training and communication of PHIA • Strong appetite to have integrated data sets pushed out • Support for establishing some province-wide technical IM&A functions • Significant communication challenges around IM&A • New technology investments do not fully consider IM&A capability and functions, or a province-wide perspective

How we will get there (part 1)

Consolidated initiatives

	Initiatives				
Strategy	Identify, Assess, and Establish Analytics Partnerships				
Process	Governance Policy, Procedure and Standards Review	Establish and Operationalize Enterprise Governance Model	Define and Implement Analytics Pilot Projects	Clinical and Research Analytics	Health Operations Analytics
People	Organizational Alignment and Change Management	Communications Plan	Define and Implement IM&A Talent Strategy	Define and Implement IM&A Operational Model*	Analytics Innovation Lab
Data	Data Quality Standards, Tools, and Operationalization	Master Data Management Standards, Tools and Operationalization	Metadata Management Standards, Tools and Operationalization	Define and Implement an Integrated Data View	Define Enterprise Data Model and Technical Architecture
Technology	Optimize & Scale Business Intelligence	Define Enterprise Visualization Requirements, Assess, Select, and Implement Enterprise Visualization Tools	Define Enterprise Analytical Requirements, Assess, Select, and Implement Enterprise Analytical Tools		
	Architecture Design and Proof of Concept for Enterprise Central Data Repository	Assess, Select, and Implement Enterprise Central Data Repository Tool	Define Enterprise Reporting Requirements, Assess, Select and Implement Enterprise Reporting Tools		

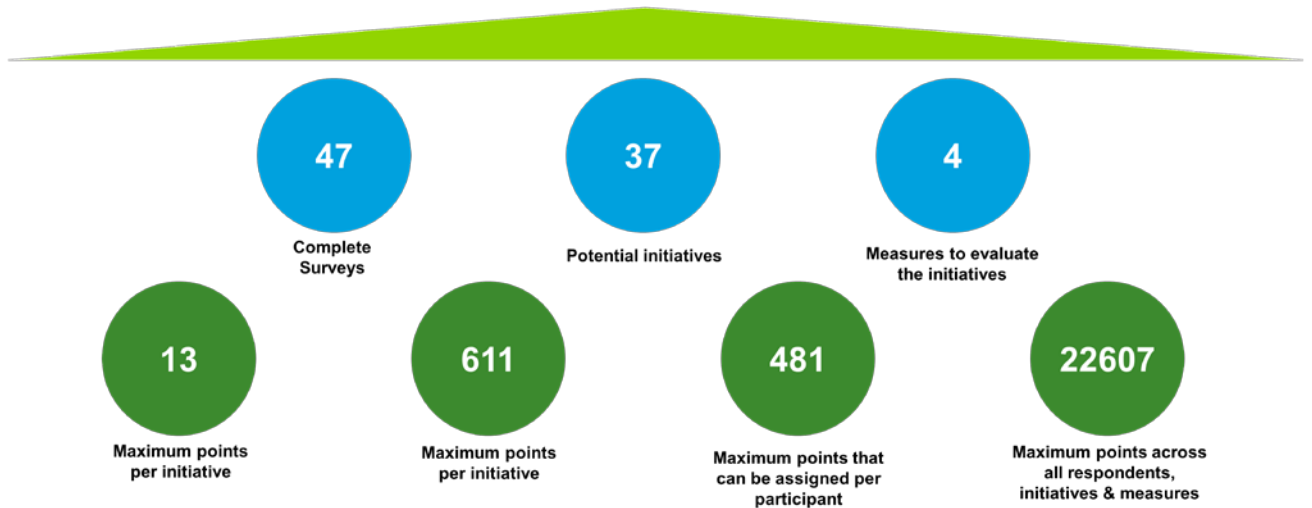
Initiative Type

- Information Management
- Analytics
- Both

*Note: The Prioritization Survey referred to this initiative as a Centre of Excellence. The term "Operational Model" better captures the description of the initiative and all references to "Centre of Excellence" in this document have been changed.

Prioritization survey facts and figures

IM&A Initiative Prioritization Tool



*Note: Each initiative and measure were assigned a specific number of points representing how highly ranked that initiative should be on a prioritized initiative plan. These points were totaled and used to inform the initial visualization of the initiatives.

Prioritization survey facts and figures

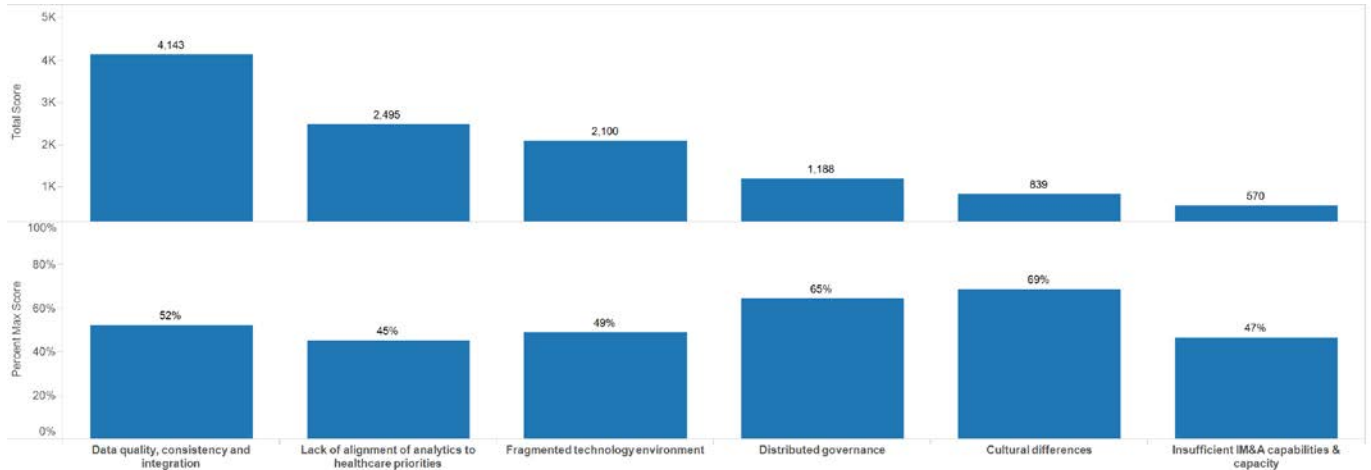
- The survey was lengthy with many technical initiatives across various areas of experience – some found it a challenge to complete.
- The tool seems to have kicked a few respondents out upon completion and it was not clear that their responses were captured (they were).

IM&A Initiative Prioritization Dashboard – Alignment to Business Challenges

The diagrams below is a visualization of the prioritization survey results.

The diagram shows:

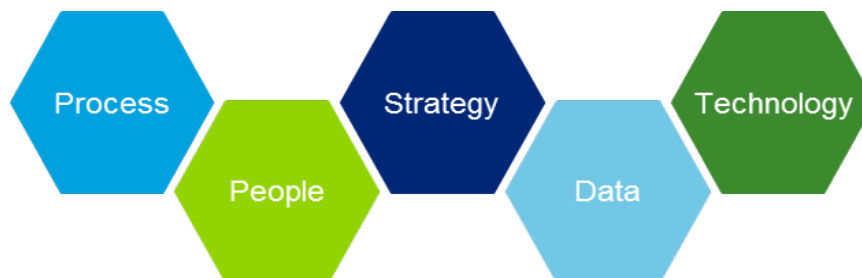
- Primary business challenges: the total value of the initiatives tied to specific challenges in the Manitoba healthcare system – these are where the greatest opportunities lie



- Initiative: the highest scoring challenges that represent the initiatives that are the best value for the Manitoba healthcare system



- Pillars: the value of the initiatives tied to each of the Insight Driven Organization pillars

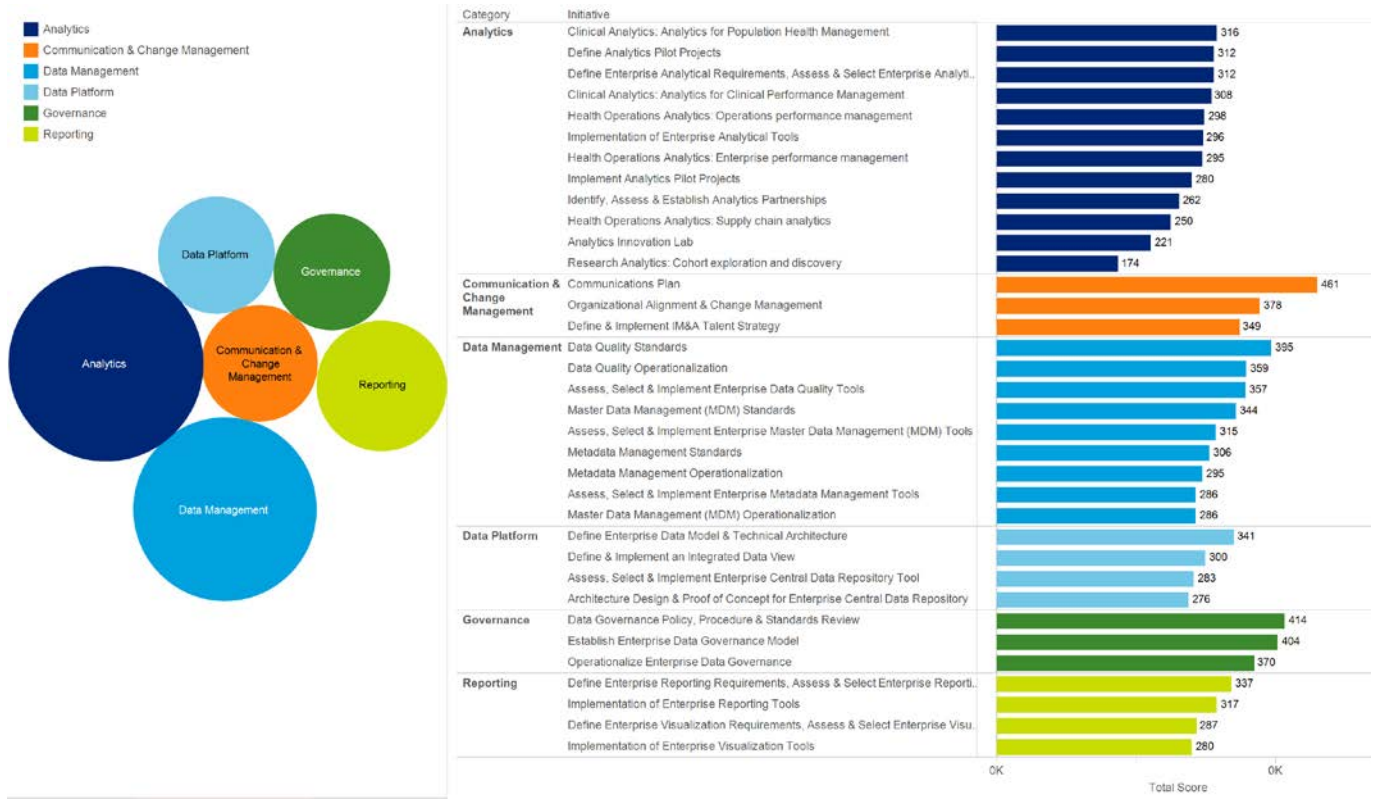


IM&A Initiative Prioritization Dashboard – Alignment to Business Challenges

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The diagram shows:

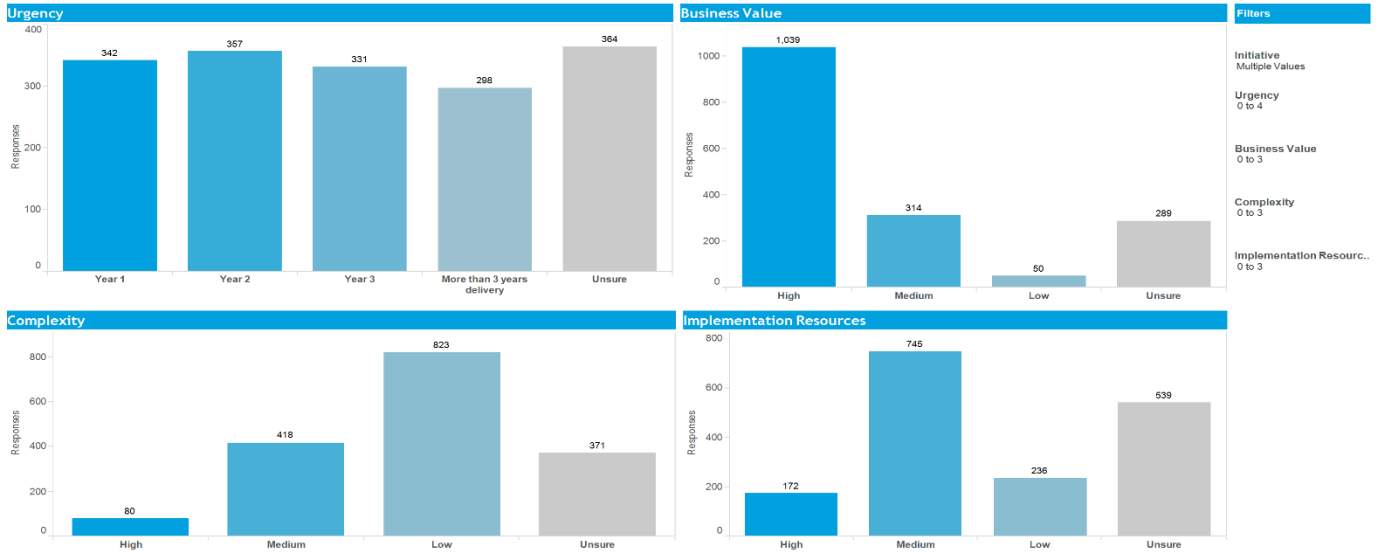
- The value of the initiatives tied to six high-priority categories, with data management, analytics and governance presenting the highest value opportunities
- The initiatives that fall under each of the high-priority categories, sorted by overall value



IM&A Initiative Prioritization Dashboard – Initiative Scorecard Overview

The diagrams below are a visualization of the prioritization survey results.

- The following diagram shows the number of responses under each of the four categories. Many initiatives had low complexity but high business value.



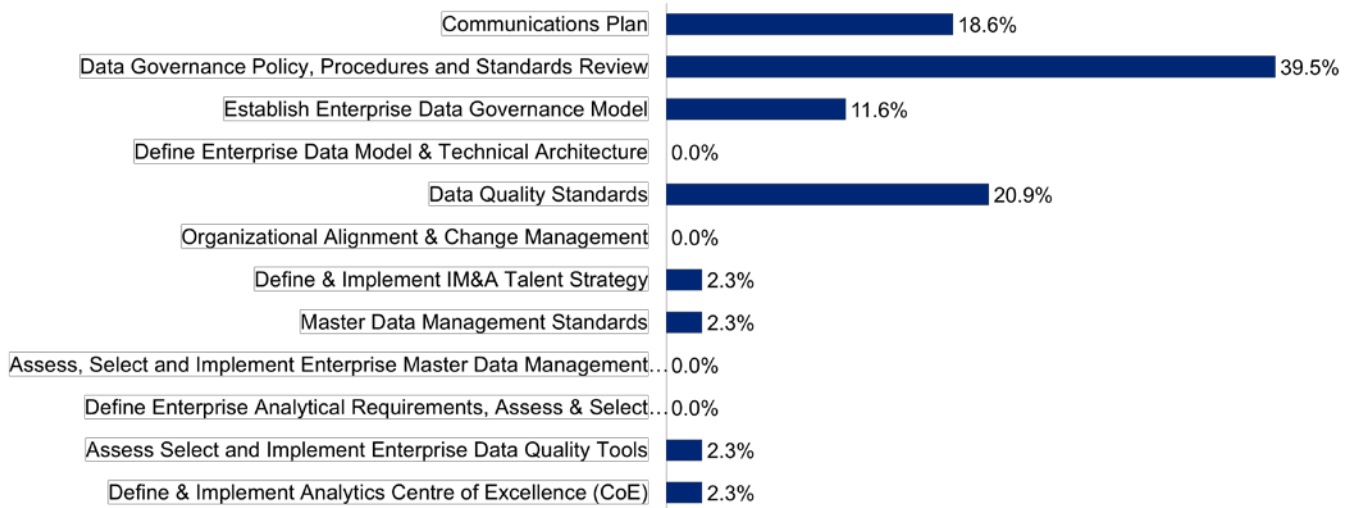
How we will get there (part 2)

Prioritization Survey – Data Visualization



Of the top twelve, which are your top two?

The chart below shows the results of the poll vote taken during the future state session



*Note: There was significant discussion regarding the concept of a Centre of Excellence. It was agreed that reference to development and implementation of an IM&A Operating Model would be more appropriate for the Manitoba healthcare system

Of the top twelve, which are your top two?

The chart below shows the results of the poll vote taken during the future state session



*Note: There was significant discussion regarding the concept of a Centre of Excellence. It was agreed that reference to development and implementation of an IM&A Operating Model would be more appropriate for the Manitoba healthcare system

What initiative do you think is missing from the top 12?

The list below shows the results of the poll vote taken during the future state session:

- Enterprise performance management
- Establishment and integration of information sources
- Health operations analytics
- Research Analytics
- Overarching system priority to focus IMA
- Overall ICT Planning and Road Map and How it all Connects
- Engagement strategy
- Governance structure
- Supporting use of information products
- Reliable and consistent source of funding for this initiative which does not impede other technological development
- Clinical analytics
- "Integration of existing systems/data
- Defined Requirements and Process MUST always come before Tools
- Program evaluation
- Inventory of existing data sources
- mobility access
- Structured clinical data
- Provider voice. Small experiments of change link to EPR. Where does this fit?
- Operationalize enterprise data governance

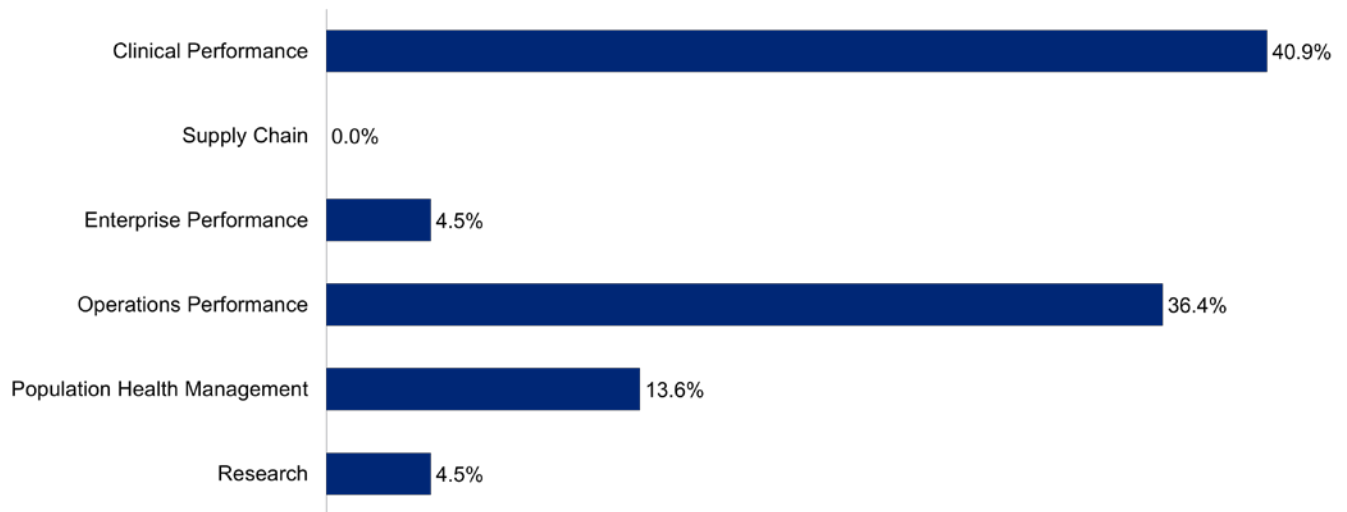
Why do you believe the communications plan is of high value and urgency? What objectives will it achieve?

The list below shows the results of the poll vote taken during the future state session:

- Alignment.
- set the stage
- Buy-in (4 entries)
- Large number of stakeholders.
- Change management needed to Support Model
- Stakeholder engagement
- Foster consistent interpretation
- Initiative needs to have comprehensive buy-in amongst a very diverse stakeholder group
- To get. All stakeholders on board
- Accountability
- Clarity and understanding
- Wide variety of stakeholders and geography challenges
- Wide range of knowledge/understanding of IM principles
- Culture in Manitoba to collaborate.
- Alignment of existing initiatives
- Consistent and clear understanding, change management, 'selling it'.
- Common framework
- Transparency
- Alignment
- It should be a communication and engagement plan. Need to bring stakeholders along
- Several other priorities on the go
- Change management and understanding
- Effective change management
- Leadership on same, consistent page
- Common understanding of vision
- Involve business from start!
- Enable culture shift
- Repeat, reorient and reframe the change such that basic levels of change sticks
- Create clarity in direction and leadership

Which of the following analytical initiatives should be the focus of the first pilot (2 votes)?

The chart below shows the results of the poll vote taken during the future state session:



What did you learn/what worked for you?

The list below shows the results of the poll vote taken during the future state session:

- Good validation of alignment and direction;
- Confirmation that we are all on the same page;
- We largely agree on many of the core components for IM&A;
- The work is just beginning;
- We have work to do; and
- Starting point.

What did you long for?

The list below shows the results of the poll vote taken during the future state session:

- Clarity on differences between concepts;
- Next steps;
- How; and
- Rationalization of investment against capacity to fund/resource.

Appendix G – Jurisdictional use cases

Use case #1

A Large Healthcare Organization in British Columbia

Frailty Prediction: Predicting the risk of frailty to prolong patients' non-frailty and pre-frailty stage

The challenge

- The complex needs of the frail elderly span across the care continuum at various stages of aging. The jurisdiction estimates that the frail elderly population constitutes approximately 1% of the population and yet, over 30% of publicly funded dollars spent on healthcare are spent on this population. Those over 80 years of age represent the fastest growing age cohort. Health leaders indicate that during the past year the acute care facilities were filled beyond capacity, particularly by the frail elderly. In turn, the frail elderly and their families indicate that the overall experience in the acute care setting is sub-optimal (despite the hard work of those providing the care)

The opportunity

- Apply health analytics and the frailty index to create health insights as to who is/may become at risk so as to engage home, community and residential care to support the frail elderly, decrease the use of the acute care system by the frail elderly and to improve the quality of care and experience of the frail elderly and their families. Further, we would then want to extend this concept to other key cohorts such as those with chronic disease and mental health/addictions

The results

- Managed performance dashboards provide real-time feedback regarding health system performance and risks

STEP 1: Calculate eFI



STEP 2: Identify Patients at Risk



Insight for Elder Care			
Care Provider			
CARE PROVIDER LIST (239)			
VIEW LEGEND		Risk Profile	
Patient Overview		Clinical Gap	Cost Risk
Actions	Name		
	PATIENT10031, RACHEL	96 High	85 Medium

STEP 3: Right care to right patient at the right time



Use case #2

Unlocking the power of data assets to drive insights

The challenge

- One of Cancer Care Ontario's (CCO) primary roles is to provide actionable information to decision makers across the province so they can make the choices that improve the performance and ensure the sustainability of the healthcare system, deliver value for money, and result in the best outcomes and experience for patients. As such, CCO wishes to find opportunities to deliver more actionable information by unlocking the power of its data assets, and to drive further insight, adoption, and capability in the analytics space.

The opportunity

- To support a larger initiative and vision to redesign and build capacity in the Analytics and Informatics space, CCO embarked on the development of an Analytics & Informatics (A&I) data architecture, asset and infrastructure strategy and roadmap to address known gaps in:
 - Analytics
 - Data Management
 - Data Assets
 - Data Architecture

The results

- Following the completion of an analytics and strategic data assets assessment, a future state analytics operating model and transition plan were developed. Highlights from the new operating model included a new competency centre as well as service delivery centres for both analytics and data to ensure that analytics are efficiently being delivered to the organization's stakeholders.
 - The transition plan provided initiative snapshots to address known gaps in:
 - Governance & operating model
 - Metadata management
 - Data quality management
 - Agile Analytics
 - Data preparation self service
 - Data lake
 - Existing technology & architecture
 - Data acquisition
 - Master data management
-

Use case #3

National Health Services

Co-managed analytics to accelerate health insights & outcomes – Vendor offers a managed analytics service to the UK NHS

The challenge

- The National Health Service (NHS) within the UK was facing a crisis: Healthcare costs were rising considerably faster than either the overall economy or the government budgets used to fund those costs. Underlying cost drivers such as long term demographics (aging population that was also living longer) and new treatments indicated the challenge was only going to get worse.

The opportunity

- The NHS decided to dramatically increase its analytic capabilities in order to use data and evidence-based decision making to concurrently improve health outcomes and reduce health costs. After reviewing its options, the NHS decided that its core mission and capabilities were in healthcare and that it needed to team up with an entity and eco-system that specializes in securely managing big data analytic environments in to order to create a co-managed analytics capability.
- Vendor was engaged to provide a managed analytics capability that supported nationwide, risk-based workforce planning as well as a national quality performance dashboard.

The results

- Managed performance dashboards provide real-time feedback regarding health system performance and risks.



Use case #4

National Health Services

Vendor built and operates the health system planning tool used to manage health care costs and improve health outcomes

The challenge

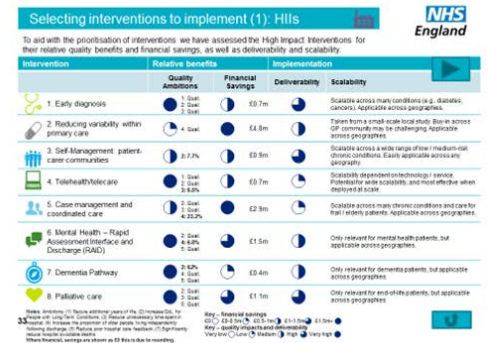
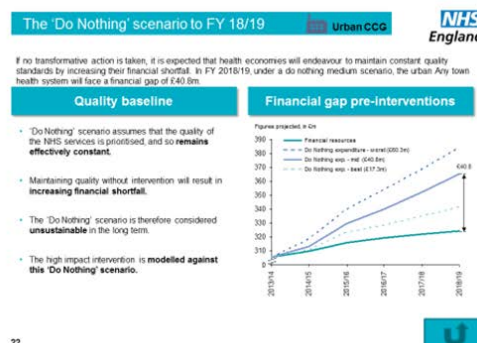
- The National Health Service (NHS) mandate is to deliver health services across the United Kingdom. At the same time, its executive leadership realized that it needed to enable local / regional decision making to make sure the health system was tuned to the unique needs of each region – one size would not fit all.

The opportunity

- To create an analytic capability that could be deployed at the local level, but that could also roll up to the regional and ultimately national level. The health system planning tool would enable the sharing of internal and external best practices for managing health care costs and improving health outcomes. The model would be driven by local data sets (e.g., local demographics, health capabilities, etc.).

The results

- The analytics model is enabling local decision makers to:
 - Forecast baseline (do nothing) performance
 - Identify key ambitions (by region)
 - Identify key interventions
 - Model impact (planned, unplanned)
 - Align expectations and outcomes
 - Assess do-ability
 - Provider, population, jurisdiction levels



Use case #5

A proof of concept in the United States

Lifestyle Analytics: Analyzed the relationship with demographics/lifestyle data and health risks

The challenge

- Given that it is hard to get healthcare data out of the current systems in real-time, are there any other alternative data sources that we can utilize to identify the patients at risk?

The opportunity

- Demographic and lifestyle data is available through credit card companies almost in a real-time basis. An organization can partner with a healthcare organization to understand the relationship between lifestyle/demographics data and health risks.
- Patients at risk can be identified on a near real-time basis, engaged and their conditions can be proactively managed.

The results

- Identification of patients at risk to proactively engage the patients and manage the potential risk factors:



John Smith



- 48 year old male
- Married to Jane with 3 children at home
- Undergraduate degree; employed in white collar job
- Group health insurance
- Hobbies include college and professional sports viewing and craft beers

Health risks include

- Increased risks for diabetes, cardiovascular and hypertension
- Low risk for tobacco related illnesses

Actions: Schedule full annual including complete lab

Jane Smith



- 45 year old female
- Married to John with 3 children ages 14, 12 and 9
- Master's degree in business; employed as stay-at-home parent
- Hobbies include team tennis, yoga, and 5k and 10k running

Health risks include

- Increased risks for skin cancer
- Low risk for diabetes, cardiovascular, and maternity event

Actions: Send a sun-blocking tennis hat, skin cancer educational brochure and coupon for sunscreen

Use case #6

A proof of concept in the United States

Readmission Optimizer: Assessing risk of readmission to reduce the readmission rates

The challenge

- Hospital readmissions, particularly through the emergency department, have become a major burden on the US health system. It is estimated that nearly 1 in 5 patients are readmitted to the discharging hospital within 30 days of discharge. Surprisingly, only 15% of readmissions to the ED are for actual emergencies. These readmissions account for \$15 billion in spending, and taking measures to reduce readmissions is now a number one priority.

The opportunity

- Apply predictive modeling to calculate the propensity of patients to be readmitted. By avoiding even 10% of readmissions, there is potential to avoid \$150M.

The results

- Managed performance dashboards provide real-time feedback regarding health system performance and risks:



Use case #7

A Healthcare Organization in the United States

Sentiment Analysis: Do I need to participate in the conversation?

The challenge

- A healthcare organization wanted to understand who and what people are talking about them on social media.

The opportunity

- Leverage big data to help provide a monitoring and decision support tool concerning whether the organization needs to participate/intervene in discussions by analyzing social media feeds.
- Be able to address the following crunchy business questions:
 - Who is talking about us?
 - What are they saying about us? Is it negative or positive sentiment?
 - Do I need to participate in the conversation?
 - How can we use social media to identify brand opportunities and risk?

The results

- The healthcare organization was able to participate/intervene in discussions by analyzing social media feeds:



Use case #8

University of Michigan Health System (UMHS)

Flexible managed services solution reduced cost, improved customer service, and provided organizational agility to meet demands

The challenge

- As part of UMHS' Epic implementation, interest in improved reporting rapidly grew and soon out-paced UMHS' existing resources, resulting in a backlog of over 500 reporting and analytics requests that were estimated to grow to over 1,000 within a few years. Additionally, the impact of limited reporting capabilities on clinical operations and business stakeholders was anticipated to result in continued pressure on IT management to come up with a solution.

The opportunity

- Utilize global reporting and analytics delivery capabilities to assist UMHS in improving its management of the reporting lifecycle. Vendor provided assistance in data management, reporting process improvement, and report development through an onshore/offshore delivery model:
 - **Consulting:** Vendor professionals teamed with UMHS staff to deliver on tightly scoped reporting and analytics projects.
 - **Reporting Services:** Vendor provided skilled technical resources for analytics and report development to complement UMHS' existing staff.
 - **Evergreen Solutions:** Vendor managed services program for advanced analytics and reporting capabilities.

The results

- **Cost Reduction:** Rationalized 400 reports to allow UMHS to quickly accommodate Epic upgrades, new regulatory reporting needs, and emerging business and clinical stakeholders' requests for information. UMHS' cost savings are projected to be \$800K over 3 years, 22% of what they would have spent with internal resources.
- **Service Agility:** Established flexible staffing model with regular checkpoints to allow UMHS to increase or decrease staffing levels according to changing business needs. Completed ~200 reports and enhancements and remediated ~850 Epic 2012 reports.
- **Data Access:** Provided development resources to meet growing reporting and analytics requirements of the user community; identified and deployed internal staff to focus on strategic analytics capabilities.
- **Data Quality:** Established quality standards and metrics which improved requirements specifications, reduced defects, and increased developer productivity

Use case #9

Moffitt Cancer Center/M2GEN

Global leader in using advanced analytics for cancer research built a platform to accelerate capacity for translational research

The challenge

- At the Moffitt Cancer Center, there was a need to develop and implement a roadmap for their informatics program. Moffitt engaged Vendor to help determine how data and analytics can be best used to assimilate clinical and genomics records - from bedside to bench (research) and back to bedside.

The opportunity

- The Moffitt Cancer Center and the Moffitt Total Cancer Care consortium (including eight affiliate health systems) have designed a unique program for treating cancer patients. Moffitt's vision is to raise the bar on its cancer research by advancing medical research and development/delivery of personalized medicine using research analytics technology.
- Vendor was engaged to develop a strategy for Moffitt's Health and Research Informatics Platform (HRI) and to then support and oversee its design and implementation. This included: Program Oversight, creation of a Data Concierge capability and Systems Integration, Testing and Deployment.

The results

- Through the project, Moffitt was able to create a platform to support patient-centred outcome research as well as conducting accelerated personal trials. Other results included:
 - Personalize patient cohort analysis: Ability to co-relate clinical characteristics and sample annotations to match the right patients to studies
 - Achieve on-demand access: Self-service platform for the researchers to analyze de-identified data for designing studies and trials
 - Pursue outcomes research: Ability to access clinical outcomes for specific therapies and perform comparative effectiveness studies
 - Engage in preventative research: Enable new methods for early detection of cancer
- In addition, Moffitt researchers can now use the Health and Research Informatics platform to:
 - Develop new methods for early cancer detection
 - Match the right treatment for the right patient
 - Identify patients whose clinical data has direct research project relevance
 - Improve the performance of clinical trials
 - Integrate new technologies to raise the standard of care for all patients by maximizing benefits and reducing costs

Use case #10

Regenstrief Institute

Vendor built the foundation to enable collaboration amongst researchers and find more efficient therapies

The challenge

- Regenstrief was seeking an opportunity to access a broader range of data to accelerate studies into comparative effectiveness and personalized medicine. The goal was to more effectively use real-world evidence (large clinical information datasets) to rapidly identify populations of interest for retrospective studies or clinical trials.

The opportunity

- Center/M2Gen as part of a rapid-learning network established by vendor to support the health industry's shift toward a value-based system featuring personalized medicines.
- Regenstrief collaboration will help health care providers determine better treatments based on clinical data and associated patient outcomes in targeted sub-populations. This is becoming increasingly important as reimbursement models shift toward value and population health.

The results

- Collaborating with Deloitte allowed Regenstrief to advance their goal of creating a rapid-learning environment for rigorous research. ConvergeHEALTH's OutcomesMiner platform, combined with their unique longitudinal data and research capabilities, helps life-sciences manufacturers and other private, public and academic collaborators accelerate studies and ultimately create more efficient therapies.
- The rapid-learning network also enables collaborators to conduct follow-on retrospective and prospective studies with its consortium members to develop further evidence to support comparative effectiveness research, product planning, health economic and outcomes research and observational insights that support safety analytics and commercial decision-making.

Use case #11

Victorian Comprehensive Cancer Centre (VCCC)

Vendor created the consortium to develop a truly innovative analytics platform to accelerate time to insights

The challenge

- Victoria is widely recognized for the quality of its cancer research, education, and clinical care and the strong alignment of these activities. However, despite significant advances as evidenced by their world leading survival rates, cancer still remains the leading cause of deaths in Victoria, affecting one out of three Victorians up to the age of 75. To support the VCCC in continuing to produce world class cancer research, there was a need for a partner to implement IM & ICT solutions and supporting services to facilitate the integration of cancer information, safe shared clinical care, and collaborative research and education.

The opportunity

- The Victorian Comprehensive Cancer Centre (VCCC), a \$1 billion investment and unique collaboration of 8 world-leading organizations within the Parkville precinct to establish a facility dedicated to cancer research, treatment and care, represents the Victorian Government's commitment to address this significant challenge.
- Vendor has reached across the globe to assemble a consortium that can not only deliver on the requirements of the VCCC, but can provide true insight into how the VCCC can operate; deliver computer systems that will enable the leading care delivery and research services that are expected of the new facility; and facilitate access to global research and technology initiatives that will enhance and further enable the delivery of the VCCC vision.

The results

- Vendor worked with the client and multiple technology solution vendors to lead the development of a proof of concept (POC) that:
 - Integrated multiple, disparate patient, clinical and research data sets to obtain a longitudinal patient view
 - Facilitates advanced patient cohort queries based on demographic, clinical, molecular, phenotypic and genotypic information to enable advanced study and clinical trial recruitment
 - Demonstrates translational research, clinical trial matching, comparative analytics and advanced analytics capabilities regarding performance including cost, quality, and patient experience criteria
 - De-identified and re-identified patients to comply with privacy laws and HREC guidance, while enabling users to access research data and develop research hypotheses
- The initiative has now moved from POC to full implementation, incorporating technologies from 5 different vendors and focusing on 3 main domains:
 - Portal Domain: Provides the means by which the users interact with the solution through a seamless interface
 - Clinical Services Domain: Provides integration of disparate clinical data from multiple sources and provides services for accessing this integrated information by end users
 - Research Analytics Services and Information Exchange (RIE) Domain: Provides a suite of translational research and operational analysis tools to address the needs of cancer clinicians, researchers and health service administrators, while protecting the privacy of patients on which these tools operate

Use case #12

British Columbia Support Unit

SPOR: A provincial data platform that enables researchers, MoH and health sector partners to unlock the value health data

The challenge

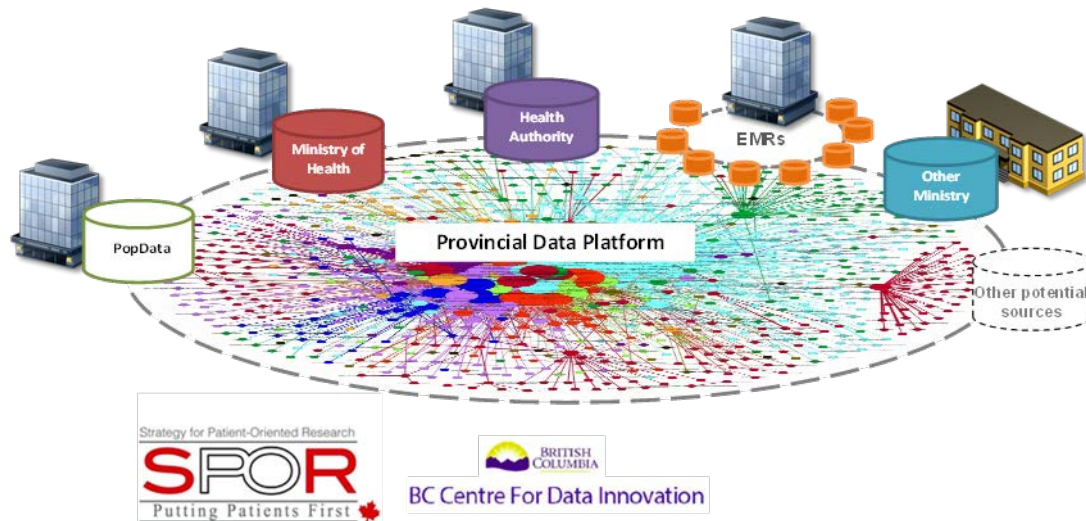
- The province of BC is committed to make fundamental change in the way BC sets priorities for, conducts, and applies health research – and how, collectively, the health sector, B.C citizens and the research sector will support continuous learning from these efforts. B.C would like to harness data platforms and services; methods support and development; health systems/knowledge translation/implementation; real world clinical trials; career development in methods and health services research; and consultation and research services to improve the capacity for patient-oriented research in B.C.

The opportunity

- The provincial data platform is a key component to achieve this goal. It will provide a common and secure shared environment for use by researchers, the MoH and health sector partners. The platform will provide a privacy-compliant technical environment to which participating data holders/providers can connect, ensuring trusted flows and storage of sensitive information. It will enable authorized researchers access to the same data sets and products available to MoH and health authority staff, resulting in access to a broader array of data sets that are more contemporaneous in their coverage and increased ability to share and leverage work across the participating groups.

The results

- The development of the provincial data platform will happen alongside significant provincial investments (outside the SUPPORT Unit) of over one billion dollars over five years to a) electronically capture clinical data in the health authorities and administrative data in the Ministry; and b) develop secondary use environments. A revised business plan was published in July 2015 and federal funding is secured to operationalize the plan. The funding described in the business plan relates to the small proportion of costs associated with providing researchers timely and secure access to this unprecedented resource.



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