

Alberta



ENTERPRISE DATA ANALYTICS STRATEGIC PLAN

TRANSFORMING GOVERNMENT DATA CAPABILITY

preface

Over the past few years there has been a growing demand for big data and data analytics within many sectors, including the public sector. In the Government of Alberta (GoA) many different programs have been exploring what that means with respect to core business and policy mandates. Service Alberta as an organization with an enterprise-wide mandate for Open Government, Information Management and Information Technology, has identified this growing demand for services to improve GoA-wide capabilities. The opportunity that presented itself was to take a broader strategic approach to meet this emerging and growing need for data analytics.

This document is a synthesis of a number of inputs. This included a review of other jurisdictions and sectors, and engagement with stakeholders from different disciplines across government. The complexity of this undertaking cannot be understated. This initiative sets out an innovative approach that has been undertaken by few public sector jurisdictions.

We would like to acknowledge the many contributors in the GoA who have been essential to the development of this plan. However the work is not yet done! Continued collaboration and dialogue on the *GoA's Enterprise Data Analytics Strategic Plan* is essential for successfully transforming our data capabilities.

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executive summary

Information is the greatest resource of the 21st century. Today, governments are creating, managing and collecting large and ever-growing amounts of information and data. As the amount of data generated by the Government of Alberta (GoA) continues to grow, the importance of leveraging the collected data to improve GoA-wide capabilities becomes critical. Data by itself does not possess value—we must process and use the data to enable decision making and analysis. The value of the data to support the business of government is currently limited by its ability to share, process and derive useful information from this data.

Enterprise Data Analytics

As a component of the IMT Strategic Plan, Open Government has finalized the Enterprise Data Analytics Strategy. The demand for enterprise data analytics arises from the government's desire to understand and address matters that cross department boundaries.

Outcomes

An enterprise approach to analytics will help develop and promote the culture of analytics in the GoA, facilitate policy development and achieve the following outcomes:

- One government—a unified approach to investing in data analytics and achieving economy of scale through establishment of enterprise infrastructure;
- Evidence-based policy and decision making integrated across the GoA;
- Improved data management practices supporting the broader sharing of data;
- Increased transparency and trust in GoA decision making;
- Service delivery aligned with citizens' needs that will facilitate improved interactions;
- Empower and establish a culture of innovation and collaboration in the public service;
- Reduced duplication of data and associated technical solutions, improved efficiencies, cost savings and resource utilization.

Enterprise Data Analytics Framework

This strategy paper introduces the framework for the transformation of data capabilities within the GoA. Data lies at the foundation of this and each pillar is focused on enhancing the value of the data through governance. The high level strategies include:

- **People** - establish capabilities both with the GoA, partnerships and vendors to ensure the skills necessary to provide analysis (data science), and to have capacity to manage enabling IMT systems and support change processes.
- **Process** - establish GoA data management, exchange and interoperability standards, and manage changes and business process improvement.
- **Technology** - partner with vendors to obtain scalable technical infrastructure that is broadly available to the enterprise as an asset.
- **Governance** frameworks to facilitate the organizational alignment and support, and measure performance as data capabilities are deployed.

Governance

Successful delivery of work streams and projects within Enterprise Data Analytics require a strong governance model with defined roles and responsibilities that is capable of making effective decisions and resolving complex business issues that cross organizational boundaries. An Enterprise Data Analytics Steering Committee will be established accountable to the ADM IM/IT committee within the framework of the Deputy Minister Information Management and Technology Integration Committee.

Measuring Success

We must adopt a Maturity Model approach in order to measure the success of this strategy. The Maturity Model is meant to enable program areas within the government to self-evaluate their analytics capabilities, as well as their enterprise readiness. Like the pillars of Enterprise Data Analytics, the model assesses program areas based on people, process, technology and governance.

Summary of Actions

Governance:

- Implement the accountability and governance model, with shared roles and responsibilities, to guide the implementation of this strategic plan.
- Develop a GoA Enterprise Data Management Program to provide guidance and coordinate the requirements of the shared data ecosystem.
- Establish a Centre of Excellence where data management professionals can share knowledge, best practices and develop standards for interoperability and data sharing.
- Establish and implement a GoA Analytics Code of Ethics that guides the responsible use of data.

Strategic Pillar: People

- Establish an Analytics Centre of Excellence to foster a culture of data sharing, analytics and innovation.
- Partner with external research partners to tap into extensive capacity to solve research and business problems.
- Develop training and skill development in collaboration with post-secondary and human resources sector to develop, maintain and attract data science skills.
- Establish a GoA “incubator lab” to facilitate holistic analysis of data that allows greater insight on policy and program issues.
- Identify opportunities for data and knowledge sharing through the GoA Data Analysts Network.

Strategic Pillar: Process

- Identify best practices that are currently in place within the organization and adapt them to meet the requirements of data analytics.
- Establish common GoA data management, exchange and interoperability standards that enable availability to reliable, timely and relevant data.
- Establish GoA data retention practices supported by a Data Value Framework.
- Establish mechanisms for change management and business process improvements.
- Develop consistent management process to connect all data domains through a comprehensive GoA data inventory.

Strategic Pillar: Technology

- Establish a sandbox environment with technology and tools to support the GoA incubator.
- Explore and evaluate opportunities to maximize the utility of current infrastructure, dissemination and web portal (e.g. Open Government Portal and GeoDiscover Alberta) deployed across the GoA.
- Design and build a scalable technical infrastructure that is broadly available to the enterprise as a Capital IMT Asset to facilitate the data transformation capabilities (see appendix one).

Measuring Success

- Work with the GoA professionals in the Evaluation and Assessment Network (EAN) to develop an evaluation plan that measures progress through the stages of maturity.

introduction

There is a growing demand for consistent, credible data to make well informed decisions and better support program delivery within the Government of Alberta (GoA). To support its activities, the GoA collects and processes a large volume of data at an ever increasing rate. To be relevant in the information economy, data needs to be treated as an asset and be able to move where needed in order to obtain the most value.



Vision: The Government of Alberta will be a leader in the use of data analytics to drive efficiency, collaboration, innovation and effective policy making in the public sector.

Currently, most GoA data is stored in many different difficult-to-access repositories. As a result, government policy and decision makers, and program support staff are confined to only the information that is available to them and therefore do not necessarily have access to the best available information. While the information may be safe and secure, it remains mostly stagnant. The GoA is therefore unable to achieve the best return on its investment.

The constraint on availability to information makes understanding the larger impacts of decisions more difficult and hides the dependencies. There is room to improve the efficiency of information transfer within the GoA and through this, improve government's interactions with citizens and increase trust in government through greater transparency and accountability.

As digital technologies continue to improve, the GoA is positioned to harness the wealth of information that resides within its repositories. We must set the foundation for a concerted effort on an enterprise approach to fully realize the potential of the data held within the GoA.

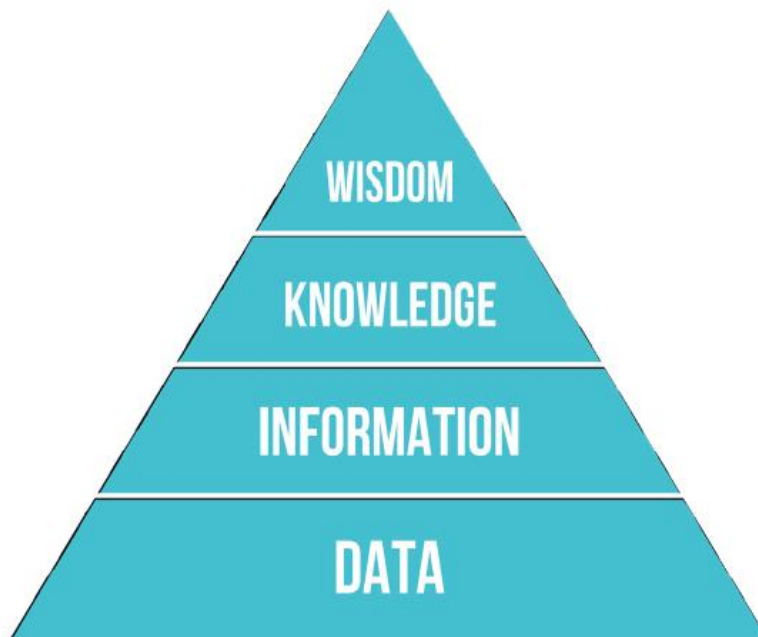


Figure 1: Data is the foundation of knowledge and wisdom.

data as an asset

As the amount of data generated by the government continues to grow exponentially, the importance of being able to leverage this information to drive innovation becomes more critical. Data by itself does not possess value; the ability to process and use this information in a coherent manner for decision making and analysis and to support daily operations is where benefits are realized.

Recently, two major paradigm shifts have further raised expectations for a more concerted effort to improve the way the GoA utilizes the data assets we steward:

1. **Open Data** raised the awareness for the potential of the data for citizens to derive value, improve transparency and accountability, and derive economic opportunity;
2. **Big Data** provides an opportunity to “lead with data” using high-performance digital technologies to harness the wealth of data that resides within our digital repositories.



“Data analytics is the science of drawing value from data”

The GoA has considerable capabilities in people, data infrastructure and the information itself, though capacity is not spread evenly throughout government. While some parts of government have invested heavily in data analytics capabilities, other areas are only beginning to realise the potential of the data they possess. The demand for data analytics arises from an organizational desire to understand and quantify the results of their business processes. In most cases, however, this demand ends at the need to improve reporting practices.

The field of data analytics puts a refined emphasis on going beyond the scope of reporting to actually generating insights to drive the decision making process. The transformational value of data analytics lies in moving from descriptive analytics (what happened) and diagnostic (why it happened) to predictive (what will happen) and prescriptive (how do we make it happen) analytics.

The **descriptive analytics** stage is retrospective and focuses on what has happened. Good examples of descriptive analytics are reports and dashboards. The GoA is focused on descriptive analytics at the present time.

Diagnostic analytics looks to identify the relations and identify the influences (positive or negative) that have an effect on the organizational or behavioural systems. In the **predictive** and **prescriptive** stages, this knowledge of the influencing factor can help forecast outcomes and encourage decision makers to analyze the impact of their decisions through the modelling of various scenarios. As a result, decision makers are well informed of the risks and impacts and can confidently stand behind their decisions and know that their decisions are equipped to enable the success of Alberta and Albertans.

enterprise data analytics

While the maturity of analytics is varied across the government, the focus of data analysis has been focused on serving the business needs of single programs or more rarely a single sector to solve specific sets of problems. This has resulted in departmental silos where data has been managed for its **Primary Use** and intrinsically tied to application development. It is the realization that every organization is part of a bigger system that interacts in a myriad of ways that puts a renewed focus on what “data analytics” means to the government as a whole. This **Secondary Use** of data has greater potential to impact policy and decision making once the data is able to flow through the system and be available when needed.

The value of the data to support the business of government is currently limited by its ability to effectively share and process data and to derive useful information from this data owing to:

- Fragmentation of data and analytical assets,
- Privacy, security and legal concerns,
- Technology and analytical systems,
- Organizational culture, and skills

The GoA will struggle to remain effective if it continues to operate in the traditional model of data collection, application focused IT development and information delivery, and business processes that create barriers to sharing the data. Innovative solutions are being obscured by not looking beyond departmental and program silos.

As the demand for data analytics grows within the government, fragmented and short term solutions have become luxuries which our economy can no longer afford. Harnessing opportunities requires significant and simultaneous investments in people, process and technology layers of the government. The current fiscal situation demands that the Government of Alberta use limited resources to help meet the growing demand across the organization. An enterprise approach will help develop and promote the culture of analytics and facilitate a more robust approach to policy development within our organization.



Mission:

To support a better understanding of the challenges and opportunities for Alberta by using data as a basis for decision making in the Government of Alberta.

business drivers

Fragmented Sources of Data and Information

There is growing demand for increased access to information in order to facilitate evidence-based decision making. As a result, program areas are now actively pursuing individual initiatives to utilize data analytics within their own areas. This fragmented approach will result in higher costs related to duplication of efforts, infrastructure and training. Through enterprise data analytics, there is opportunity to take a “one government” approach to data analytics that looks to achieve economy of scale through establishment of enterprise infrastructure, processes and people capabilities.

Outcome: “One Government” – A unified approach to investing in data analytics.

Need for Improved Information for Decision Making

Data transparency and sharing will enable the public service to gather insights from data that they may otherwise not have access to. The unification of multiple administrative datasets in combination with advanced analytics techniques and technologies will advance problem solving capabilities, thus improving predictive analytics to reveal insights that will help better assess risks, detect fraud and will drive evidence-based decision making.

Outcome: Evidence-based policy and decision making integrated across the GoA.

Inconsistent Data Management Practices

The need for collaborative data sharing and analysis would result in smarter data management practices which would in turn yield potential savings in time and money. Data sources from different operational areas could potentially be of great benefit to the GoA and be used for multiple purposes if data management practices were improved. Better management of data would contribute to reduced effort and increased efficiency across the government.

Outcome: Improved data management practices supporting the broader sharing of data.

Demand for Increased Transparency and Accountability

Governments across the globe are making strides in improving the transparency and accountability of their actions by making their data available and open to the general public. However the volume of data that can be publicly shared is limited by quality, technical and cultural considerations. In the absence of strong data literacy and standard processes, these concerns act as barriers to improving the transparency of government.

Outcome: Increased transparency and trust in GoA decision making.

Demand for Improved Citizen Engagement and Service Delivery

The success of the government lies in its ability to work with citizens and its ability to be responsive to the evolving needs of Albertans.

Outcome: Service delivery aligned with citizens’ needs that will facilitate improved interactions.

business drivers

Increased Demand for Innovation and Collaboration

There is a need for greater coordination and collaboration within the public service which will result in reduced duplication of data, associated technical solutions, and higher efficiency. Furthermore, the availability of a sandbox environment which enables the sharing and analysis of data will play a major role in addressing data literacy and cultural barriers and provide a platform to support innovation and collaboration.

Outcome: Empower and establish a culture of innovation and collaboration in the public service.

Demand for more efficiencies and resource utilization

Data intelligence has the potential to identify cost savings and opportunities to increase efficiency within the government, which will yield increases in productivity. Greater understanding of data assets and information products will have the potential to reduce if not eradicate redundant costly data collection processes and reduce duplication of effort. This will enable areas to focus on other scopes of work.

Outcome: Reduced duplication, improved efficiencies, cost savings and resource utilization.

strategic alignment

This Enterprise Data Analytics Strategy outlined in this paper supports, aligns with, and links to several pillars and strategies in the [GoA's 5-Year Information Management and Technology Strategic Plan](#).

- One IMT Enterprise - The infrastructure being developed as part of the technology pillar will benefit all GOA ministries.
- Digital Government – Data sharing and dissemination will primarily be through digital channels including the Open Government portal (public) and the Internal Data Discovery Portal (internal to GoA).
- Citizen and Organization Centric – Data (content) is the core of collaboration and making more high value, robust data analytics products available will foster citizen engagement, participation, and interaction.
- Culture of Innovation and Collaboration – Establishing the analytics culture will empower and encourage innovation and collaboration within the public sector, within the private sector, and between both sectors.

The strategic priorities in the **2016-19 Government of Alberta Strategic Plan and Ministry Business Plans** include a focus on shared responsibility and cross-ministry collaboration. The current economic conditions and fiscal situation require that all GoA departments optimize administrative and operational efficiencies to fulfill the Premier's assurance of "transparent and accountable government while managing public finances in a prudent and effective manner."

The business plans also focus on well-informed, transparent, and effective policy and decision making. A data-driven government will capitalize on existing data, improve information sharing, and develop better analytics to enhance government decision making. (See Figure 2).

GOA Strategic Priorities	A Diversified Economy that Creates Jobs and Opportunities for All Albertans	Demonstrated Leadership on Climate Change	Education and Training to Enable Albertans to Succeed in the Global Economy	Safe and Inclusive Communities that Embrace Fairness and Equality of Opportunity	Sustainable and Accessible Health Care Services and Social Supports
EDA Business Drivers	<ul style="list-style-type: none"> • Reliable, unified sources of data and information • Improved information for decision making • Increased transparency and accountability • Improved citizen engagement and service delivery • Increased demand for innovation and collaboration • More efficiencies and resource utilization 				
EDA Priorities	<ul style="list-style-type: none"> • GOA staff will use common, unified, reliable sources of information. • Reduce duplication of effort, and eliminate waste. • More efficient allocation and spending, as advised by advanced analytics. • Improve collaboration and coordination within and across ministries. • Capitalize on existing data, improve information sharing, and enhance policy and decision making. 				
Analytics Opportunities	<ul style="list-style-type: none"> • Ability to forecast labour shortages and booms in sectors to tailor education programs accordingly. • Understand global markets, supply and demand of national and international goods and services, to position Alberta better for economic development and trade. • Environmental monitoring, diagnosing changes to environment and climate, and prescribing required actions to rectify. • Quality improvements, health system management, delivery and research. • Assess and improve the level of inclusion and opportunities for women and girls, Indigenous peoples and other visible minorities, and the LGBTQ community. • Improve understanding of information to support vulnerable Albertans such as FASD. • Expand gender-based knowledge and capacity so that it is integrated into policy development and is included in government business planning, performance measurement, and evaluation. 				

Figure 2: Strategic Alignment with GoA Business Plan Priorities

GoA enterprise data analytics framework

This document introduces the framework for the transformation of data capabilities within the GoA. Data lies at the foundation of this framework and each element is focused on enhancing the value of the data through strong guidance (**Governance**). This strategy focuses on three overarching aspects to data capability based on the three pillars:

Who: the human capital (**People**) – a skilled workforce, and data-confident consumers.

What: the tools and infrastructure (**Technology**) which are available to acquire, store and analyze data.

How: the methods of sharing data (**Process**) where data itself as an enabler – data capability is underpinned by the ability of data consumers, both internal and external, to access and share data appropriately.

Where (everywhere it's needed) and When (whenever it's needed) are intrinsic to the nature of data analytics.

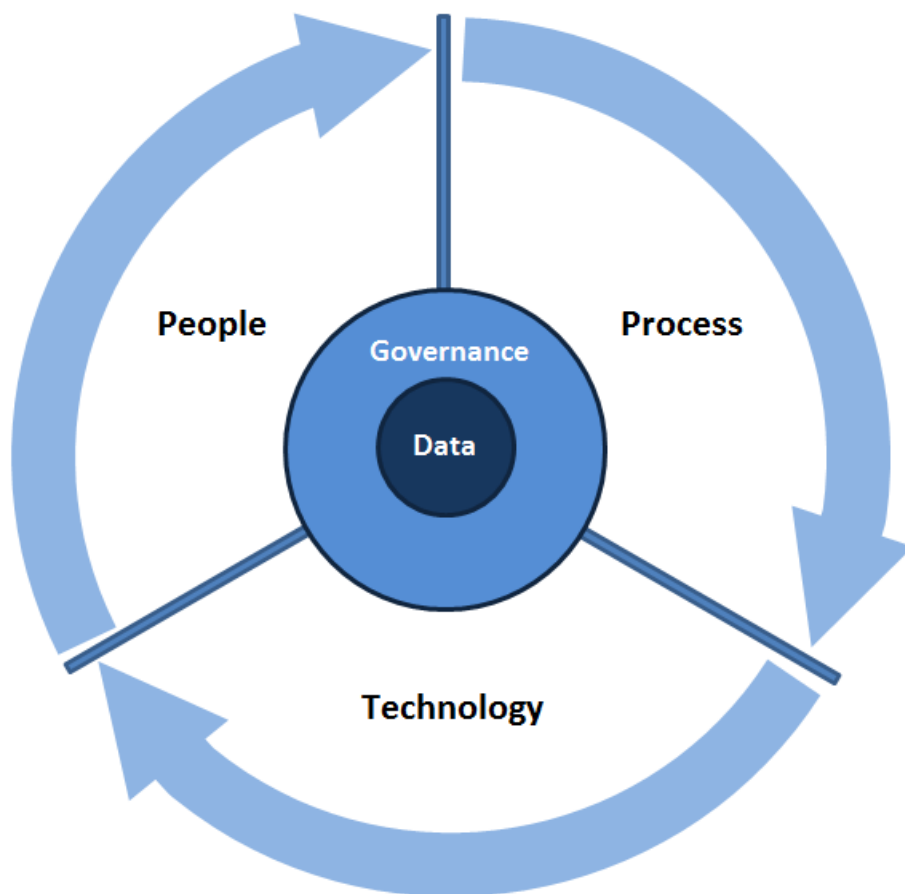


Figure 3: GoA Enterprise Data Capabilities Framework

Guiding Principles

The development of the framework and actions under each of the pillars was influenced by the following principles:

- Use data to drive policy and decision making – data is the foundation of good decisions
- Open by default – share as broadly as possible to optimize value
- Understand the need of stakeholders – collaborate to ensure alignment with the need of users
- Address the whole experience, from start to finish – take a holistic and integrated system view
- Coherent with ethical and privacy guidelines – ensure rights of citizens are preserved
- Use agile and iterative practices – maintain momentum, adapt best practices and evolve with system needs

governance

The business issues that the Enterprise Data Analytics Program will assist in resolving are complex in that they cross organizational boundaries, data domains, analytics and business process. These issues require a strong consensus-driven governance model that is focused on successful delivery of work streams and projects, portfolio, program and change management. An enterprise approach involves many different organizational structures within the government where questions of guidance and authority are bound to arise. Resolving these questions in a timely manner are key to ensuring effective deployment, avoiding duplication of effort/investments and delays to implementation.

The governance framework will facilitate the organizational alignment and support, and measure performance as data capabilities are deployed. Effective governance entails more than just the establishment of a framework, but must involve a rigorous approach that incorporates purpose, scope, structure, roles and responsibilities, processes and relations across the government. It should reflect a shared accountability model that is unique to the GoA ecosystem and will ensure the following:

- Clear roles, responsibilities and accountabilities are established across the government and at the appropriate levels.
- Relevance of the Enterprise Data Analytics Strategy to ensure that it aligns with and promotes the overarching business strategy of the government.
- Owners and impacted parties of key decisions are identified and supported by clear decision making processes.
- Risks and issues are actively managed with escalation mechanisms which support timely resolution.
- Continued focus on the long term investment plan for addressing the people, process and technology pillars of the Enterprise Data Analytics Strategy.
- Projects and other work streams are effectively delivered and the target benefits are realized. Changes to scope, schedule and cost are controlled at the appropriate levels.

Enterprise Data Analytics Governance Model

Accountable to the ADM IM/IT committee the Enterprise Data Analytics Steering Committee will also consult with both CIO Council and the Information Management Committee. (For more detail see appendix three).

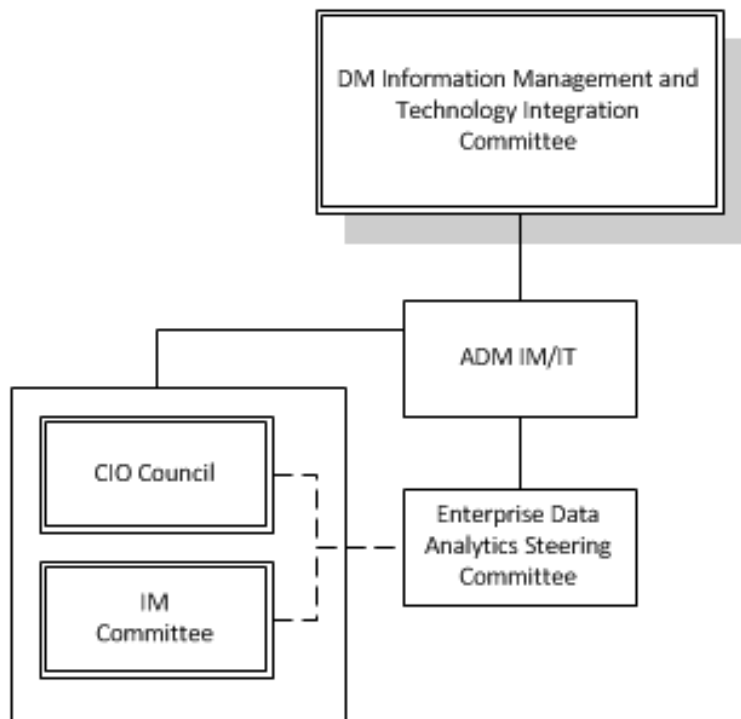


Figure 4: EDA Governance Model

Enterprise Data Management

The focus of this strategy has been to define the capabilities required to unlock and better utilize data assets. Data management has been the purview of individual departments. The value of data in a shared GoA environment requires an alignment as data starts to flow in an integrated system and therefore required enterprise data management. This will require a more thorough discussion and direction on elements of data governance and how best to action the GoA wide approach to data management.

Governance Actions:

- Implement the accountability and governance model, with shared roles and responsibilities, to guide the implementation of this strategic plan.
- Work with key stakeholders to assist in developing a GoA Enterprise Data Management program to provide guidance and coordinate the requirements of the shared data ecosystem.
- Establish a Centre of Excellence where data management professionals can share knowledge, best practices and develop standards for interoperability and data sharing.
- Establish and implement a GoA Analytics Code of Ethics that guides the responsible use of data

people

Data analytics is transformational in nature and change management is an important consideration for success. Resistance to change within the organization may also be compounded by the lack of funding resources and skills necessary to overcome organizational inertia. While data analysis is not entirely new to the government, the evolution of the analytics landscape will pose challenges in acquiring the right balance of skills that are required to glean valuable insights from diverse sources of data.

These skills include science, technological, research, statistical, analytical and interpretive skills, business acumen and creativity. An underlying understanding of the business process or policy intent is also essential. Developing, recruiting and retaining analytical talent will be a critical issue as data analytics begins to gain more prominence within the government.

While there is currently a lack of university degrees that have a curriculum focused on data analytics, there are areas within universities that have begun to develop in this space. Industry, research and academic sectors have been working on analytics projects for some time and continue to invest heavily in the skills, technologies and the techniques involved with data analysis. The government has the opportunity to leverage support from the expertise and experience and can use this as an avenue for attracting fresh talent into the organization.

The flexibility and capacity to continue to learn and apply new process, technologies and techniques will be the key to maintaining a workforce that is adaptable to the evolving nature of analytics.

Actions

- Establish an Analytics Centre of Excellence to foster a culture of data sharing, analytics and innovation
- Partner with external research partners to tap into extensive capacity to solve research and business problems.
- Develop training and skill development in collaboration with post-secondary and human resources sector to develop, maintain and attract data science skills.
- Establish a GoA “incubator lab” to facilitate holistic analysis of data that allows greater insight on policy and program issues.
- Identify opportunities for data and knowledge sharing through the GoA Data Analysts Network.



Figure 5: Growth in Job Trends for Data Science (Source: www.indeed.com, Dec 2015)

process

The availability of reliable, timely and relevant information is a necessity for accurate data analytics. The GoA analytic community is fragmented across the organization. The streamlining and ownership of processes will facilitate a collaborative approach to data analytics by addressing issues that may otherwise restrict or limit the sharing of data.

Processes should take into account the tension between data-driven innovation and the principle of data minimization. This principle essentially states that the collection of personal data should be limited to what is relevant and necessary to accomplish a specific purpose, and for only as long as necessary. This tension usually materializes when business areas are asked to share data that is secondary to its primary use.

The value of data analytics is in the generation of new insights among a wide range of seemingly unrelated data and in this context, perceptions leading to data minimization should be addressed. A key element of good data stewardship is to balance the tension between privacy and the needs of data analytics.

Data security must be a key consideration and is related to people's ability to collaborate. Where individuals and teams are working with sensitive data the culture must be compatible with data security. For data to reach its full potential, analytics must be built on a foundation of good data stewardship and trust. There is opportunity to strike the right balance between privacy and innovation..

Actions

- Identify best practices that are currently in place within the organization and adapt them to meet the requirements of data analytics.
- Establish common GoA data management, exchange and interoperability standards that enable availability to reliable, timely and relevant data.
- Establish GoA data retention practices supported by a Data Value Framework.
- Establish mechanisms for change management and business process improvements.
- Develop consistent management process to connect all data domains through a comprehensive GoA data inventory.



Different disciplines (IMT, Analytics, Big Data and other DM) and diverse business areas ultimately share the same broad professional goals:

*to collect/create, organize, store, use and manage information/data to support **the organization's strategic goals and business requirements***

technology

A technology framework that supports data discovery, ingestion, transformation and analysis form the third pillar of this framework. Currently the government operates as a diverse collection of systems that are based on a variety of technology architectures that are at different maturity levels. In most areas data remains tightly coupled within the application and is challenging to extract. Legacy systems and incompatible standards and formats pose a challenge to data integration and the ability to perform analysis on the data.

Some organizations may require greater investment to meet the growing demands of data analytics in their respective areas. Given the current maturity level, it is all too common within the government for discrete business units, in silo, to build their own data strategies without consideration of broadly sharing solutions across the organization. More often than not this results in a lack of common definitions and attributes which results in fragmentation and lower than optimum resource utilization. A fragmented approach not only creates inefficiencies but would also result in a lower adoption of data analytics. Across government the costs associated with individual approaches is substantial and not the optimal investment of taxpayer dollars.

The GoA will need to adhere to an enterprise data strategy that provides a framework to develop and manage the technology components in a manner that will enable the program areas to benefit from data analytics. Considerations around future proofing infrastructure to ensure it is scalable and flexible will need to be made to ensure relevance as the demands and skills around data analytics evolve.

Actions

- Establish a sandbox environment with technology and tools to support the GoA incubator.
- Explore and evaluate opportunities to maximize the utility of current infrastructure, dissemination and web portal (e.g. Open Government Portal and GeoDiscover Alberta) deployed across the GoA.
- Design and build a scalable technical infrastructure that is broadly available to the enterprise as a Capital IMT Asset to facilitate the data transformation capabilities (see appendix one).



The Open Government Program in collaboration with GoA stakeholders have defined the following Capital IMT Asset projects that are components of the technical infrastructure required:

***Internal Data Discovery Portal** – initially to support IRMS Informatics, but designed to scale for the broader GoA internal data sharing requirements*

***Self-Serve Visualization Platform** – an enhancement of the current open.alberta.ca portal to improve descriptive analytics and presentation capacity*

***Open Analytics** – A three-year roadmap with design and build phases to meet emerging demands for enhanced analytics*

measuring success

In order to measure the success of the transformation of people, process and technology capabilities a **Maturity Model** approach is proposed and illustrated below. It is meant to enable program areas within the government to self-evaluate their analytics capabilities, as well as their enterprise readiness. It is the collective maturity of the GoA as an integrated system that would demonstrate success.

Action

- Work with the GoA professionals in the Evaluation and Assessment Network (EAN) to develop an evaluation plan that measures progress through the stages of maturity based on the maturity model as described below.

Enterprise Data Analytics Maturity Model

The maturity model identifies five stages as shown in the figure below.

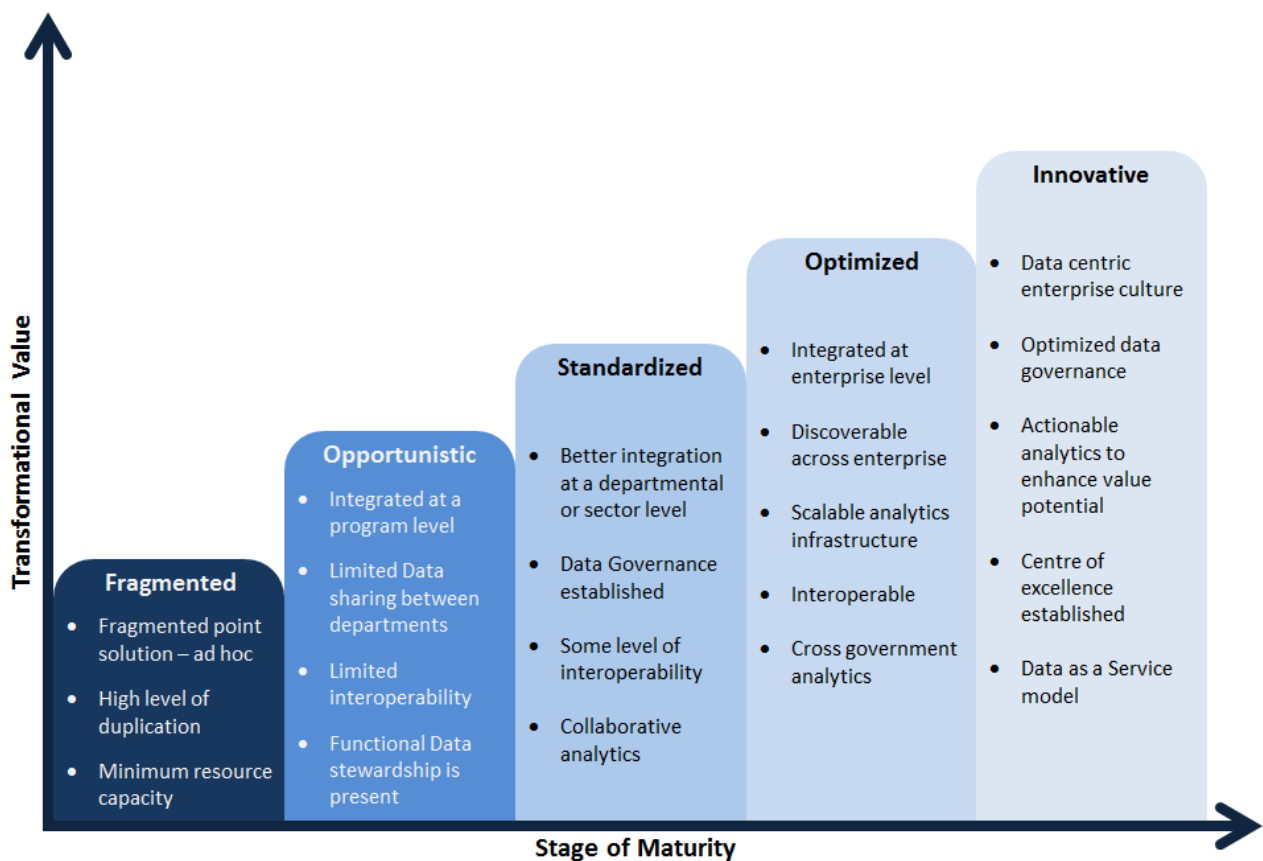


Figure 6: Maturity Stages and Transformational Value

Measuring capabilities within the maturity model

Fragmented

This stage is defined by fragmented point solutions which are often ad-hoc in nature. The result of which may include inefficiencies and inconsistent versions of the truth owing to no data management practices. One of the main characteristics of this stage is the multitude of vendor-based and internally developed applications that are used to address specific needs as they arise. There is often limited-to-no alignment with GoA standards. Analytics skills are non-existent and if any do exist, they are often fragmented across the program area. Efforts are labour intensive and data users spend a lot of time trying to identify trusted sources of data. Owing to complexities, program areas in this stage are severely limited in their ability to extract value from their data.

Opportunistic

At the opportunistic stage, program areas have achieved some level of data consolidation and may employ data warehouse solutions. Though some data is being shared within program areas, the vast majority of data assets still remained confined to their silos. Data is not discoverable and often relies on one's personal network. Access to shared data sets is limited and little or no data is being shared broadly to the organization. Analytical capacity is fragmented across the program areas, with little or no transparency and focus is mainly around reporting. Data is now being treated as an asset, governance is established and best practices for data management are incorporated.

Standardized

In the Standardized stage, program areas begin to take a data-centric view and are less resistant toward the sharing of data. Data is made available and accessible at a department and sector level. Metadata is aligned across the department and a semantic layer may be present. Standardized vocabulary is in place. Data takes a central role, and data governance and management practices are established. Data governance expands to raise data literacy. Infrastructure and technology services are optimized and economy of scale is realized through reduced duplication of technology acquisitions, resource procurements, interoperability and scalability. Analytics efforts begin to focus on insight generation through collaborative efforts.

Optimized

Program areas at the optimized stage are well integrated at the enterprise level with data being discoverable and accessible. With strong capabilities around data, program areas are focussed on value generation and use data to drive decisions. Program areas across the organization are able to use metadata to understand and trust the data owing to strong data management practices. Program areas leverage enterprise assets to develop their capabilities around analytics. Governance is centralized and expands to manage analytical model accuracy and data provenance becomes important.

Innovative

The innovative stage results when the organization functions collectively as one in a data-centric environment. Data governance is optimized and the organization advances in policy and service delivery with mature and governed prescriptive analytics capabilities. Knowledge sharing and data exploration are core to the culture of the organization. Prescriptive analytics are embedded in every level of the strategic and business decisions. Governance is optimized to resolve problems pertaining to cross functional issues. Best practices are identified and communicated. A center of excellence may be established to provide guidance and analytical support to those program areas that may be limited in their analytical capabilities.

assessing risk

This is a preliminary assessment and will be reviewed as actions under each pillar are implemented to better understand barriers and challenges. Key risks will be identified, monitored and managed using the GoA Enterprise Risk Framework.

Risk	Mitigation Strategy
Success at all phases depends on willingness of individuals in departments to collaborate.	Develop and approve a clear and concise policy with clearly defined rules.
The initiative is being undertaken in a shifting and complex government environment.	<p>Develop and approve a clear and concise strategy and policy.</p> <p>Develop, approve and implement initiative charters for each action (i.e., initiative scope).</p>
Unwanted challenges and/or low uptake may occur due to lack of buy in at some or all levels. In spite of a clear case for change, enthusiasm continues to wane for those departments resisting change.	<p>Ensure stakeholders understand the benefits of the program</p> <p>Develop and implement a proactive change management plan.</p> <p>Define the processes departments want to lead (analytics product development, data acquisition, retain budget control, etc.).</p>
Resistance to change from already established processes and technology acquisition	Assess the opportunity to leverage existing process and infrastructure investments as a capital asset.
Budget, resources are not available to meet growing demands from GOA clients, partners and stakeholders	<p>Project planning and prioritization will need to be clear.</p> <p>A process for sharing funding and resources is required.</p> <p>Leverage capacity of partners where available.</p>
The initiative may slow data decisions due to unclear roles and responsibilities, impeding its ability to achieve success.	<p>Develop, approve and implement the governance model as first priority.</p> <p>Project Resource Plan for each action is supported.</p>
Inconsistent messages about opportunities and benefits being delivered (e.g., are we telling the audience what they want to hear?) may reduce ability to achieve success.	<p>Develop, approve and implement a proactive communications plan.</p> <p>Strategy should include key messaging and regular/frequent engagement with all stakeholders</p>
The initiative faces the risk of creating unnecessary effort for departments if communications re: processes are confused (e.g., between departments, OGP and externals).	Identify change champions to serve as communication resources, providing departmental data users with processes and procedures documentation and orientation.

Risk	Mitigation Strategy
An enterprise approach will enable benefits for the many but could increase administrative overhead.	Define service standards (e.g. data/product will be accessible). ROI and cost-sharing arrangements will need to be reconciled to achieve benefits for all
Departments will go around the strategy because of urgency and/or demands/needs not being addressed.	Establish on-boarding and collaborate with departments through ongoing engagement to define requirements clearly
Departments who don't share data will have added costs to participate in the initiative as they become aware of data are of value to their core businesses.	Establish on-boarding and collaborate with departments through ongoing engagement
Consultants/contractors working on behalf departments acquire and develop data through their contracts and these transactions will go undetected, continuing the inefficiencies associated with the current environment and risking the success of the initiative.	Departments arrange data acquisition for their contractors. This ensures department retains access to the data once contract terminates.

appendix one: conceptual architecture

Architecture and roadmap specifically developed in collaboration with IRMS Informatics, Office of Statistics and Information, Human Services, Service Alberta (Enterprise Architecture team). This conceptual model is adapted from best practices across industry and leading vendor organizations, and provides a view of the components/capabilities required of the ecosystem. However it is neither a detailed solution nor a technical architecture and is technology agnostic.

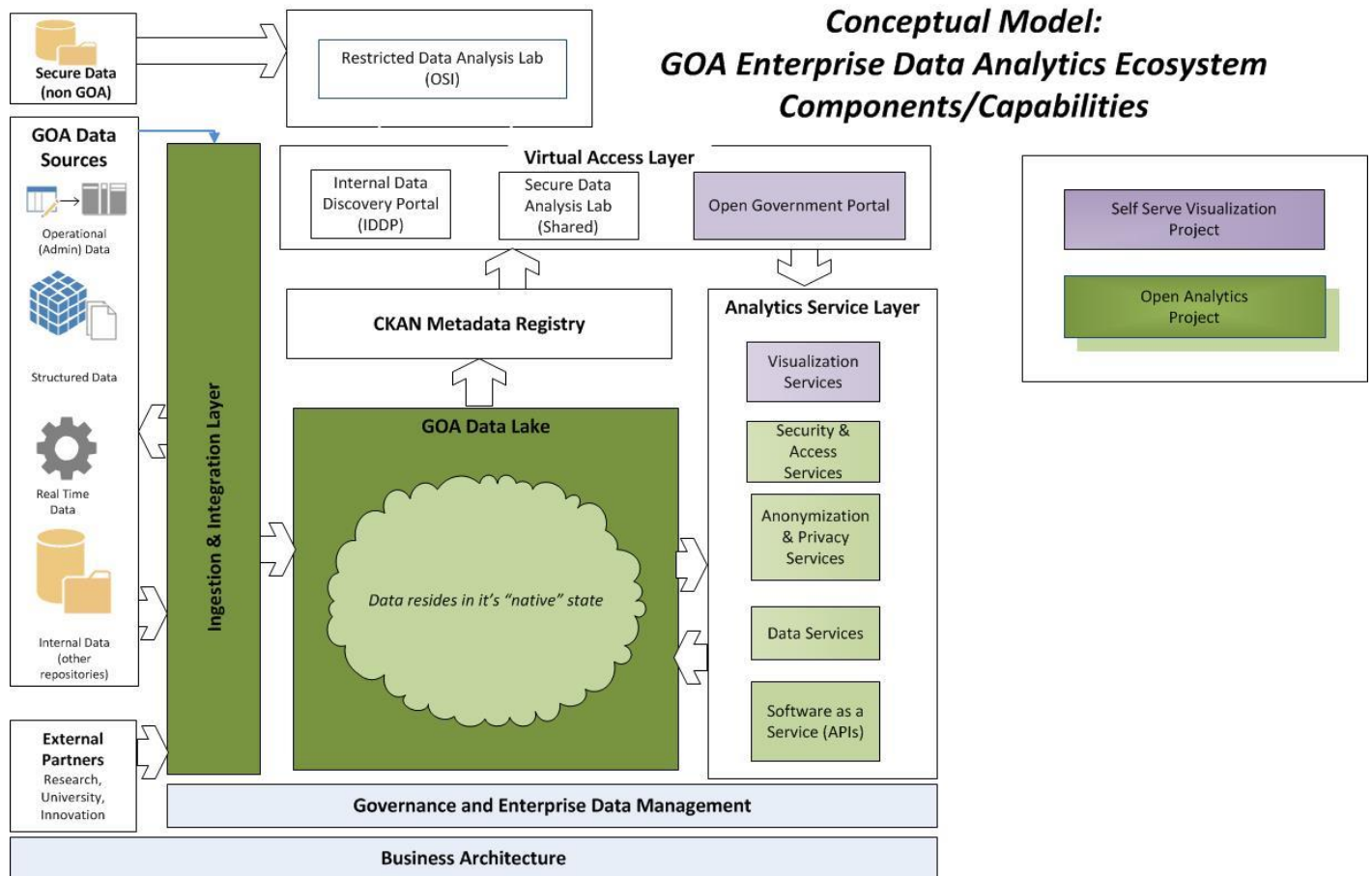


Figure 7: GoA Enterprise Data Analytics Ecosystem

appendix two: case studies and opportunities

As the *GOA's Enterprise Data Analytics Strategy* is developed (in consultation across the GoA and partners) a number of projects and initiatives have surfaced at department and cross-ministry levels. Continued dialogue and collaboration will enable a better understanding of the issues in order to take a more enterprise view to optimize the value proposition for GoA investments in data capabilities. Some examples:

- **Integrated Resource Management System (IRMS)** (Environment & Parks; Energy; Agriculture & Forestry; Indigenous Affairs, Service Alberta; Alberta Energy Regulator) - providing the platform for internal data discovery and sharing within partners. Opportunity to scale the environment for broader GoA requirements (e.g. Big Data).
- **Labour** – Labour Economic Statistics, Advanced Labour Market Analytics. Improving accessibility and comprehension of labour statistics (e.g. visualizations available on the Open Government portal).
- **Community and Social Services & Children's Services** (with partnership across GoA ministries) – Child and Youth Data Initiative that connects child and youth data from multiple sources for research, with opportunity to securely share linked data. Fetal Alcohol Spectrum Disorder (FASD) - data sharing to provide insight into social supports. Work Outcome Reporting Project (WORP) - assess the performance of programs for which learners have received skills investment funding.
- **Service Alberta** - Vital Statistics, Consumer Affairs, Registries. Enhancing citizen experience with open data (visualization, infographics, etc.).
- **Treasury Board & Finance** - Office of Statistics and Information. Providing dissemination services within a collaborative data sharing ecosystem (access to custom analytics products, open data and official statistics, secure data lab, communities of practice).
- **Health** (with Alberta Innovates Health Solutions, AHS and Industry) – Secondary Data Use Initiative and opportunity for open access and platform alignment (Big Data).
- **Justice and Solicitor General** – Transforming the provincial justice system initiative. Establishment of departmental data analytics program and community of practice as a core pillar.
- **Executive Council and Public Service Commission** – Exploring requirements for data acquisition (collection), internal data sharing and tools to support workforce analytics (APS and broader public sector).
- **Labour** - Occupational Health and Safety (OHS). Needs for integrated data acquisition, technical capacity for sharing data both open and secure.
- **Economic Development and Trade** (with **Advanced Education**). Leveraging the Apps for Alberta competition to build data analytics capacity and integration of open data dashboards (regional and economic).
- **Transportation** - Centre for Smart Transportation (led by University of Alberta with industry). Framework for data sharing that could potentially be leveraged for future data partnerships outside GoA.
- **Environment and Parks** – Climate Change Strategy. Text analytics on consultation responses to demonstrate the sentiment and clustering.
- **Status of Women** - to increase availability of research and data analysis that will enhance understanding of Alberta women and girls' issues.

appendix three: governance model-roles and responsibilities

Good governance is responsive to partner ministries and agencies. It exercises prudence in policy-setting and decision making and takes into account the interests of all stakeholders. Governance will approve, guide, coordinate and implement the Enterprise Strategic Plan.

Executive Leadership

The executive leadership tier comprises of the Deputy Minister's Information Management and Technology Integration Committee (DM IM/IT) and the Assistant Deputy Minister's Information Management Information Technology committee (ADM IM/IT). The executive leadership layer is responsible for ensuring that the Enterprise Data Analytics (EDA) program execution and delivery is in alignment with high level organizational strategy and meets the strategic goals set out by the GoA.

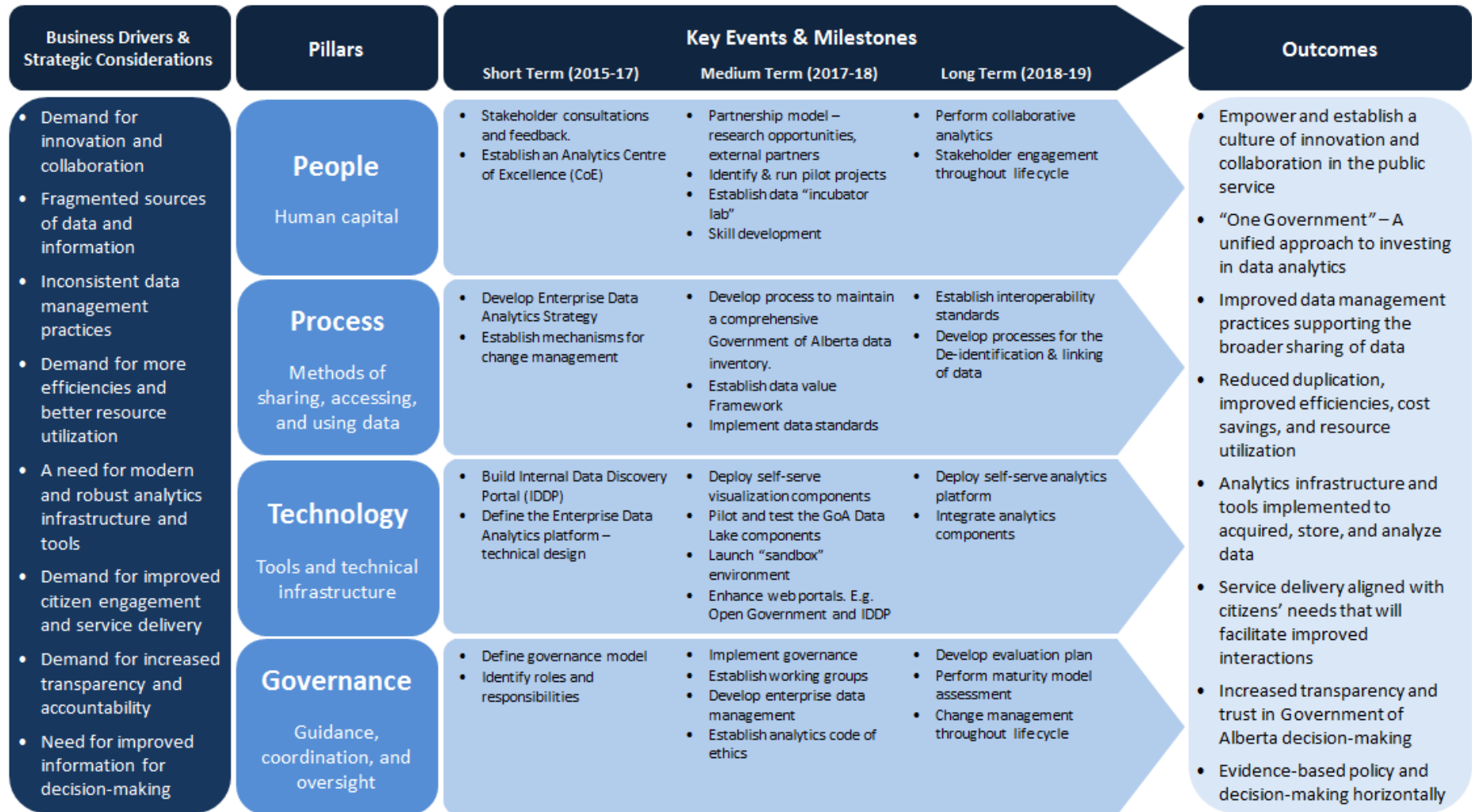
Strategic

EDA Steering Committee

The EDA Program Leadership is responsible for enabling the execution and implementation of the Enterprise Data Analytics Strategy by providing direction, focus, timely decision making and fostering collaboration.

- Determine the overall direction of the Program and authorize course corrections where they are deemed necessary by the committee, or where suggested by the executive leadership layers;
- Focus on the whole system and the integration of content and efforts, analyze and resolve issues and conflicts in the work streams delivering the Enterprise Data Analytics Strategy;
- Assess and approve mitigation plans associated with escalated risks/challenges/issues from the Working Group;
- Oversee delivery and management of all projects and program outcomes;
- Manage the distribution, integration and interdependencies of program scope between integrated projects within the program, and review/approve any associated changes to schedule and budget at the appropriate level;
- Approve major communications being made to internal or external stakeholders;
- Consult with the broadest of stakeholders to ensure an enterprise focus is maintained that meets the broadest needs of the organization;
- Identify issues that span across the government as it relates to data analytics and address these issues through the establishment of EDA Working Groups;
- Approve matters that are administrative in nature such as those customarily made to confirm the accuracy and completeness of own minutes, and to approve meeting agenda and any changes to the agenda;
- Act as the escalation point to the ADM IM/IT;
- Support change management at the appropriate level.

appendix four: roadmap



connect

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selected bibliography

Andrade, Pedro; Hemerly, Jess; Recalde, Gabriel; Ryan, Patrick;. (2014). From Big Data to Big Social and Economic Opportunities: Which Policies Will Lead to Leveraging Data-Driven Innovation's Potential? The Global Information Technology Report. Public Policy Division, Google, Inc. , World Economic Forum.

(2015). Australian Public Service Better Practice Guide for Big Data. Commonwealth of Australia.

BC Centre for Data Innovation: Final Report of the Working Group. (2014, 11). Retrieved 03 2016, from Government of British Columbia: http://www.gov.bc.ca/citz/down/BC_Centre_for_Data_Innovation-FINAL.pdf

Blanchard, S., & Morison, R. (2013). Governance for Analytics. In T. H. Davenport, Enterprise Analytics (p. 187).

(2013). Data-Driven Innovation , A guide for Policymakers: Understanding and Enabling the Economic and Social Value of Data. THE PUBLIC POLICY DIVISION OF THE SOFTWARE & INFORMATION INDUSTRY ASSOCIATION (SIIA).

Hilbert, M. (n.d.). Big Data for Development: From Information- to Knowledge Societies (January 15, 2013). <http://ssrn.com/abstract=2205145> or <http://dx.doi.org/10.2139/ssrn.2205145>.

Jones, A. (2014, June). KDnuggets. Retrieved March 2016, from Data Science Skills and Business Problems: <http://www.kdnuggets.com/2014/06/data-science-skills-business-problems.html>

Mandy Chessel. (2014). Ethics for big data and analytics. Retrieved 03 2016, from IBM Corporation: http://www.ibmbigdatahub.com/sites/default/files/whitepapers_reports_file/TCG%20Study%20Report%20-%20Ethics%20for%20BD%26A.pdf

Perrin, S., Barrigar, J., & Gellman, R. (2015). Government Information Sharing. Office of the Information and Privacy Commissioner of Alberta.

Rethinking Personal Data: Strengthening Trust. (2012, 05). Retrieved 03 2016, from World Economic Forum: http://www3.weforum.org/docs/WEF_IT_RethinkingPersonalData_Report_2012.pdf

Succession Planning: Retaining skills and knowledge in your workforce. (2012, 09). Retrieved 03 2016, from <http://www.albertacanada.com/files/albertacanada/successionplanning.pdf>

TechAmerica Foundation. (2012). Demystifying Big Data. Retrieved from IBM: <https://www-304.ibm.com/industries/publicsector/files/serve?contentid=239170>

(2013). The Australian Public Service Big Data Strategy. Commonwealth of Australia.

UK data capability strategy: seizing the data opportunity. (2013, 10 31). Retrieved from Government of UK: <https://www.gov.uk/government/publications/uk-data-capability-strategy>

Yiu, C. (2012). The Big Data Opportunity: Making government faster, smarter and more personal. London: Policy Exchange.

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