



An Automated Future: Data, Open, and AI in the Canadian Public Service

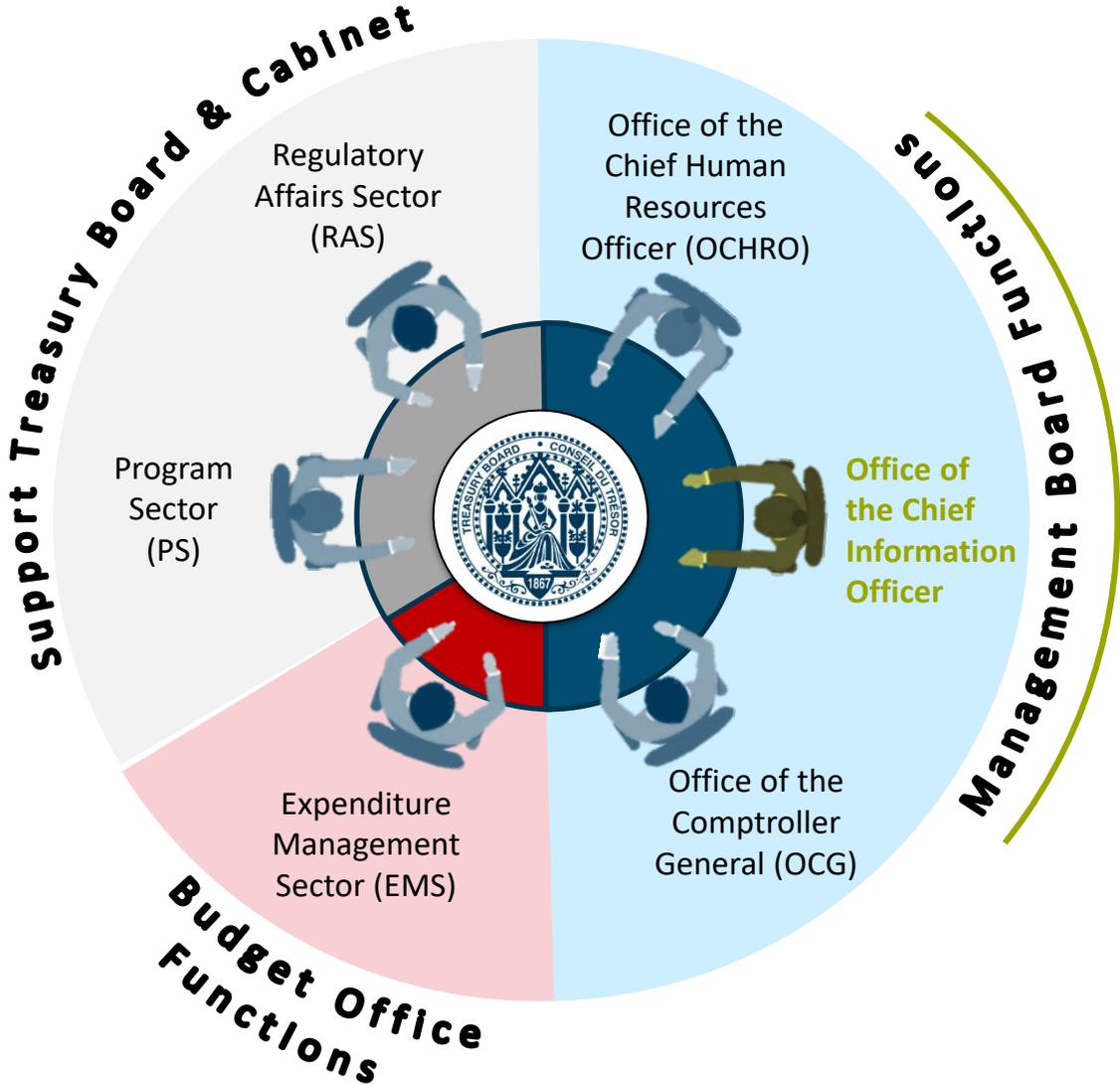
World is being re-defined and re-shaped



“As a country, or as leaders, you have a choice: you can say, okay, this disruption is coming. Let’s try and put it off as long as we can and protect the way things are for people because we don’t want to deal with these challenges. Or else you can say, okay, it’s coming. Let’s be part of it. Let’s shape it. Let’s own it and try and make sure we come out of this transition as strong as possible, and that’s the choice that Canada has made, investing massively in AI, for example, and having the added benefit of being able to be part of the conversations around what is moral or ethical use of AI? ”

- Justin Trudeau, Prime Minister of Canada

The Office of the Chief Information Officer (OCIO)



Establish administrative guidance

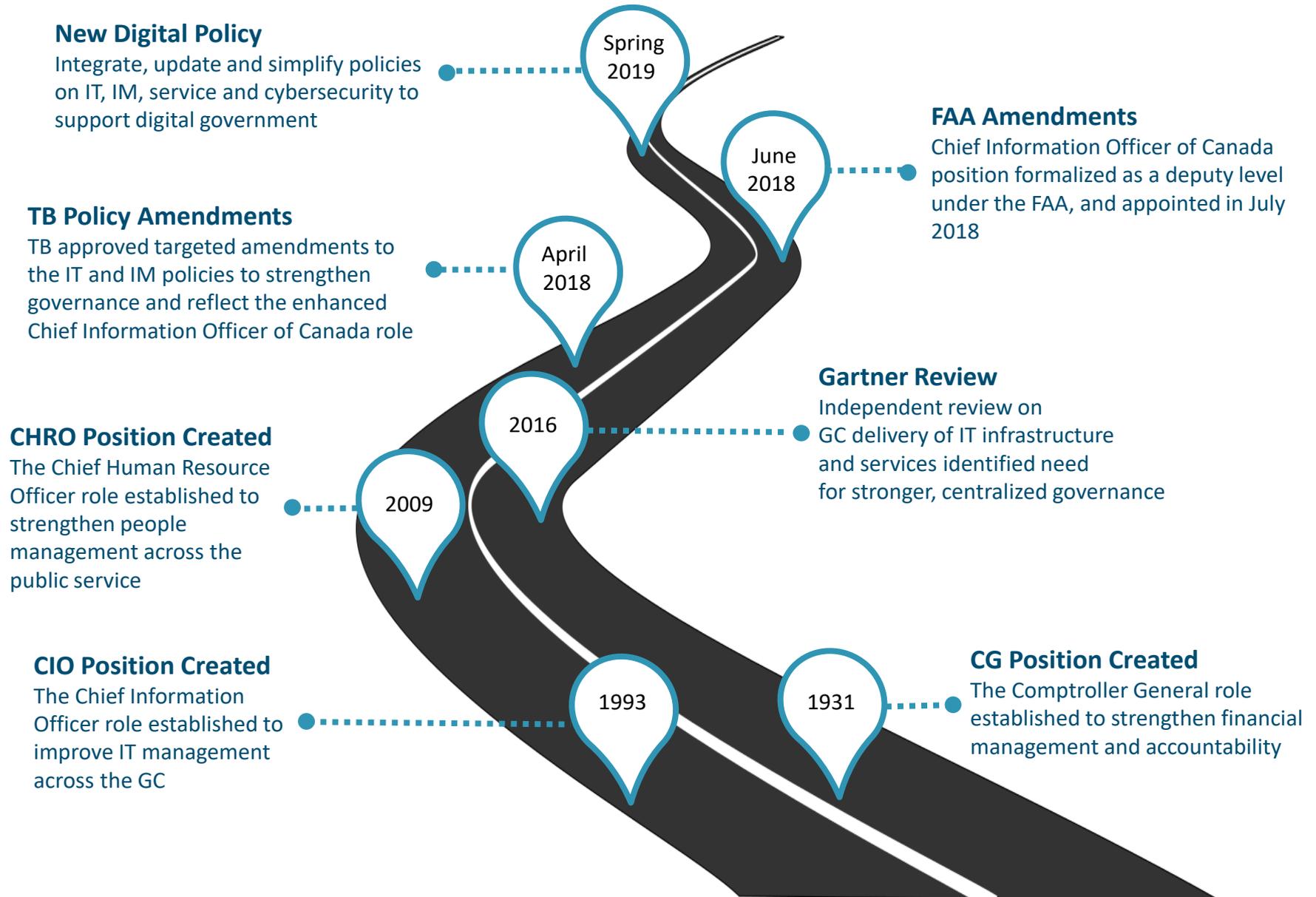


Support community enablement



Provide enterprise leadership and support Treasury Board

Maturing the function of the Chief Information Officer



Our living *Digital Standards*

The Government of Canada's Digital Standards form the foundation of the government's shift to becoming more agile, open, and user-focused. They will guide teams in designing digital services in a way that best serves Canadians.



Evolving the guidance and communities



Administrative Guidance

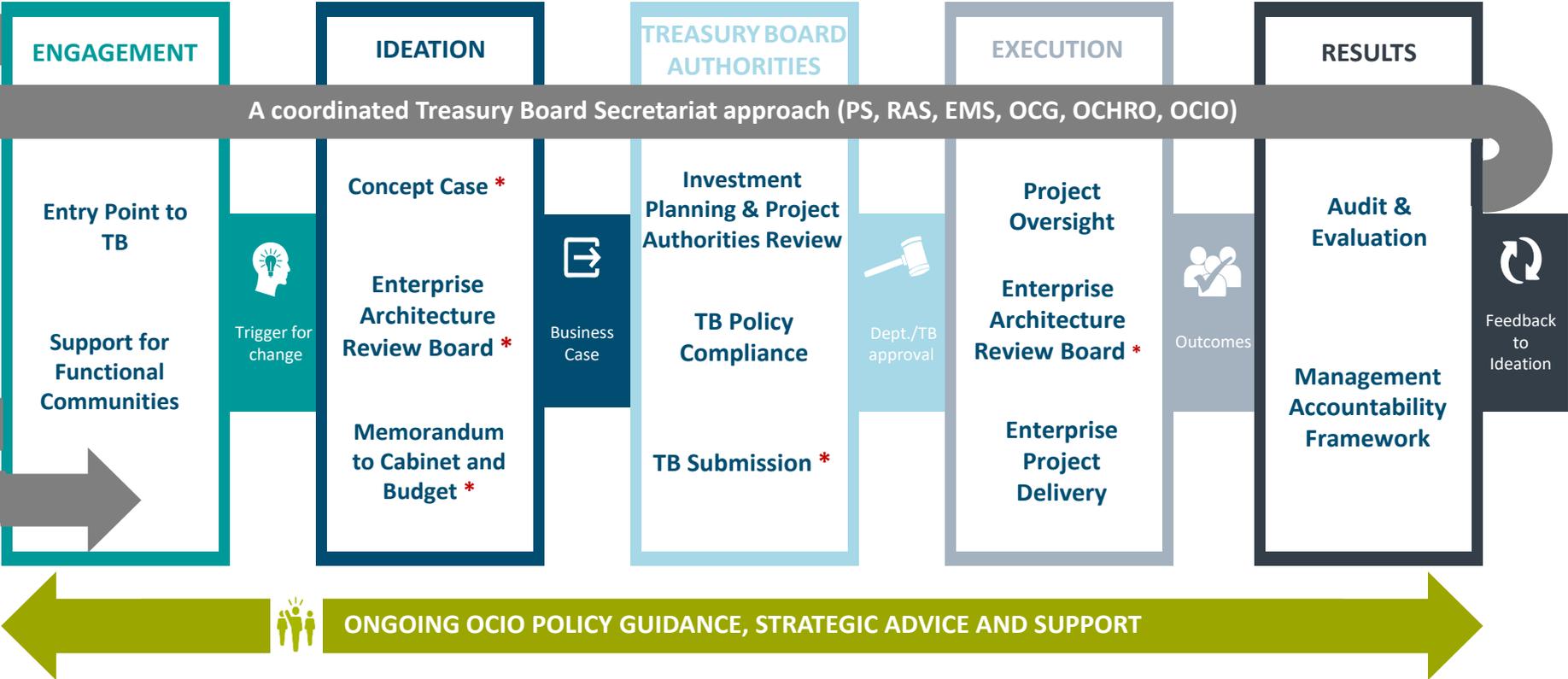
- Amendments to IT/IM Policies to strengthen IT governance, management and investment (April 2018)
- Amendments to the IT Directive to clarify the Enterprise Architecture Review Board process and Architecture Standards, and technical standards for Application Program Interface (API) (December 2018)
- Directive on Automated Decision-making Support to responsibly deploy automated decision systems (January 2019)
- Digital Policy to consolidate and evolve the policies on service, IT, IM and cyber-security (Spring 2019)



Community Enablement

- Enhanced role of departmental Chief Information Officers (April 2018)
- Launched GC Talent Cloud with Canada School of Public Service to match workers skills and interests with managers needs (September 2018)
- Launched Digital Academy to promote public service digital literacy hosted by Canada School of Public Service (October 2018)
- Developing digital competencies with Office of the Chief Human Resources Officer (ongoing)

Evolving enterprise digital leadership



* Recently changed / evolving

Putting it all together: Targeted points of influence



ONGOING OCIO POLICY GUIDANCE, STRATEGIC ADVICE AND SUPPORT

IDEATION

TB AUTHORITIES

EXECUTION

CONCEPT CASE
Mandatory Procedure

KEY QUESTIONS

- Has the problem or opportunity been well defined?
- Is there a clear vision of the desired business outcomes and future state?
- Is there alignment to using **Digital Standards**?

GC EARB
Directive

KEY QUESTIONS

- Have the **Digital Standards** and **Architecture Standards** been applied?

TB SUBMISSION
Authorities

KEY QUESTIONS

- Does the initiative and/or project comply to **TB policies**?
- Is it aligned with **GC Strategies**?
- Has the project been to **GC EARB**?

PROJECT OVERSIGHT
Ongoing Project Monitoring

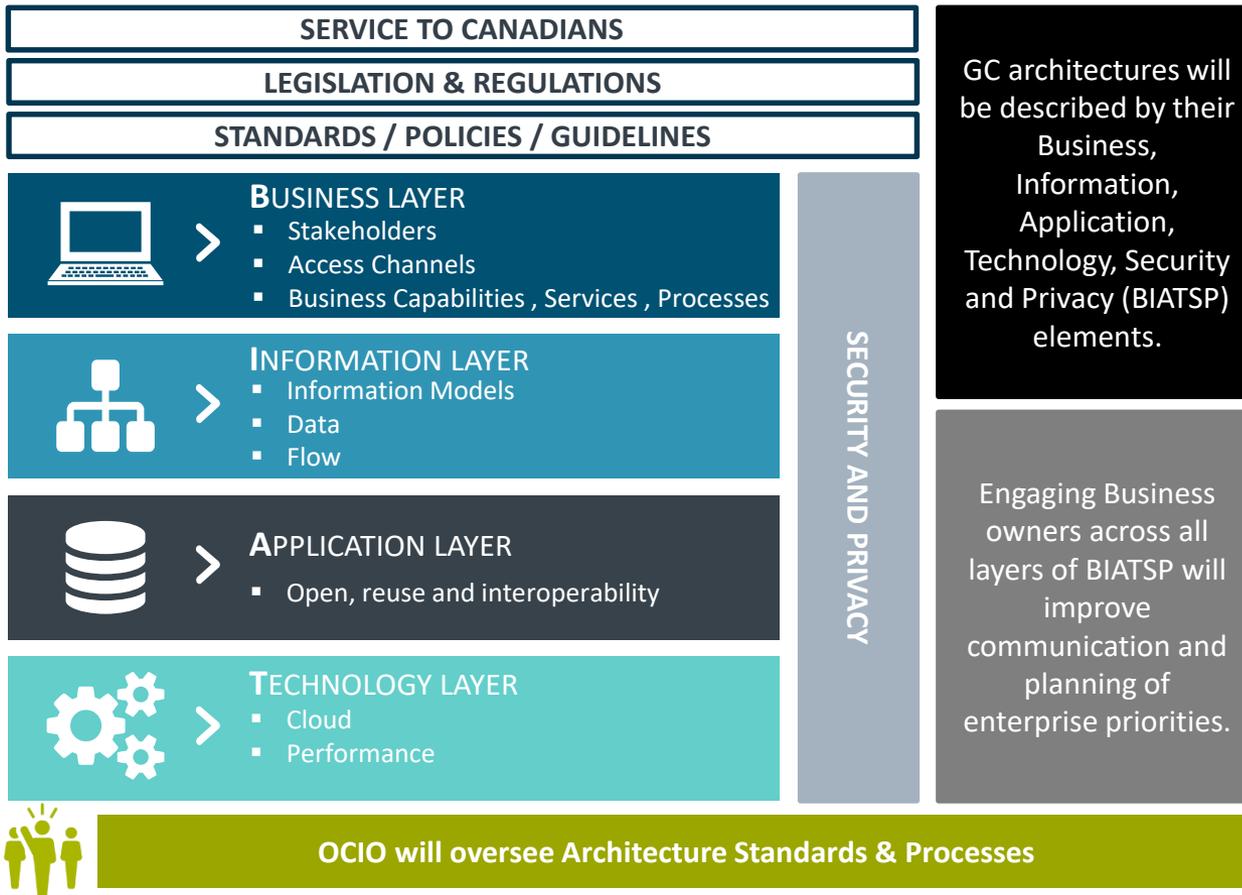
KEY QUESTIONS

- Is the project positioned for success?
- Are course corrections needed?

APPLY LESSONS LEARNED

Putting it all together: Enterprise Architecture

Enterprise Architecture defines the current and target Architecture Standards for the Government of Canada, reviews departmental plans to ensure alignment, and looks ahead to disruptive technologies that will have an impact on the Government of Canada in the future.



GC architectures will be described by their Business, Information, Application, Technology, Security and Privacy (BIATSP) elements.

Engaging Business owners across all layers of BIATSP will improve communication and planning of enterprise priorities.

- Focus is on Business, Information, Application, Security and Privacy Layers, not just technology.
- Supported by the Enterprise Architecture working group, with over 450 members across the Government of Canada.
- Sub-groups formed to create whitepapers, evaluate new technologies, and produce reference documents to support departments.

Artificial Intelligence

Why use AI in government?



Enhanced Decision Making

- Improved analysis of complex data and information
 - Large Data
 - Unseen Patterns



Greater efficiency in operations

- Automation of routine activities
- More rapid provision of information and analysis
- Increased accuracy of forecasts



Greater use of risk-based approaches

- Improved surveillance, monitoring, and tracking
- Better targeting of inspections and testing



Improved effectiveness

- Sustainable and inclusive growth
 - Safety and security
 - Innovation

Canada is well positioned to lead

- ▶ Early AI pioneer with continued research strengths in AI subfields such as deep learning and reinforcement learning
- ▶ Global reputation as a human rights champion
- ▶ World leading tech incubators and academic labs
- ▶ Multicultural nation
- ▶ Strong adoption of digital services
- ▶ Open economy

Starting to Define AI

AI is a term given to a variety of computer applications that automate human cognitive abilities such as perception, reasoning, pattern recognition, and problem solving.

After significant research and consultation with academia and industry, the Government of Canada (GC) has identified the following categories to describe AI:

- ▶ Insights and Predictive Modelling
- ▶ Machine Interactions
- ▶ Cognitive Automation

Insights and Predictive Modelling

- A lot of data is being collected from all across the government, but it's not being used to it's full potential
- Machine learning, natural language processing, and data analysis can help
- Use cases:
 - ▶ Analyze and predict outcomes, gain deeper insights into behavioural patterns, undertake comparative analysis to more quickly and accurately make evidence-based policy decisions
 - ▶ Match individuals with the right government services by analyzing user base trends to determine what service would best meet their need
 - ▶ Analyze patterns in accounting, cost forecasting, and resource allocations.

Machine Interactions

- Use digital channels to talk to Canadians
- By using tools that do semantic analysis, natural language processing, speech recognition and rule based-pattern matching government can improve how we interact with Canadians.
- Use cases:
 - ▶ Chatbots and virtual agents can help answer questions and direct Canadians to the services and information they need
 - ▶ Automate filtering of information through online services to reduce amount of time spent searching
 - ▶ Improve search results
 - ▶ Directly reach Canadians when they are eligible for a service

Cognitive Automation

- Opportunity to automate routine and information-intensive tasks often where there is a backlog from an expensive manual process
- This will allow the government to maximize the value of GC employees and support more efficient business processes.
- Use cases:
 - ▶ Automate decision systems to process and review application information, classify cases in terms of risk and priority, make recommendations and/or render decisions
 - ▶ Automate content generation to summarize and compare notes, write backgrounders or meeting scenario notes
 - ▶ Speech, audio and visual recognition to allow for easier access to services

Using AI in the GC

- ▶ There are currently over 50 use cases of AI projects underway in the GC, some highlights include:



Public Health

Early warning analytic tool to detect potential public health threats worldwide



Natural Resources

Early emergency warning and real-time extreme forest fire prediction and flood mapping



Transport

Risk-based oversight of air cargo information

Challenges

- Training and skills
 - Resources and training to help departments and agencies effectively leverage and use AI
 - Developing new skills sets/training for staff
 - Timely access and training to latest advances in computing
 - Technical advice on how to apply AI into business practices
 - Assistance to identify needs and structure projects
 - Assistance to identify appropriate solution providers
- Policy and Governance
 - Guidance related to stewardship of data
 - Proper management of ethical issues and potential biases
 - Balance of transparency and privacy
- Infrastructure
 - Access and use of high quality data
 - In-expensive computing capacity
- Funding
 - Necessary support for SBDA's to experiment (like GRDI)
- Procurement
 - Ability to easily procure AI services, solutions, and products

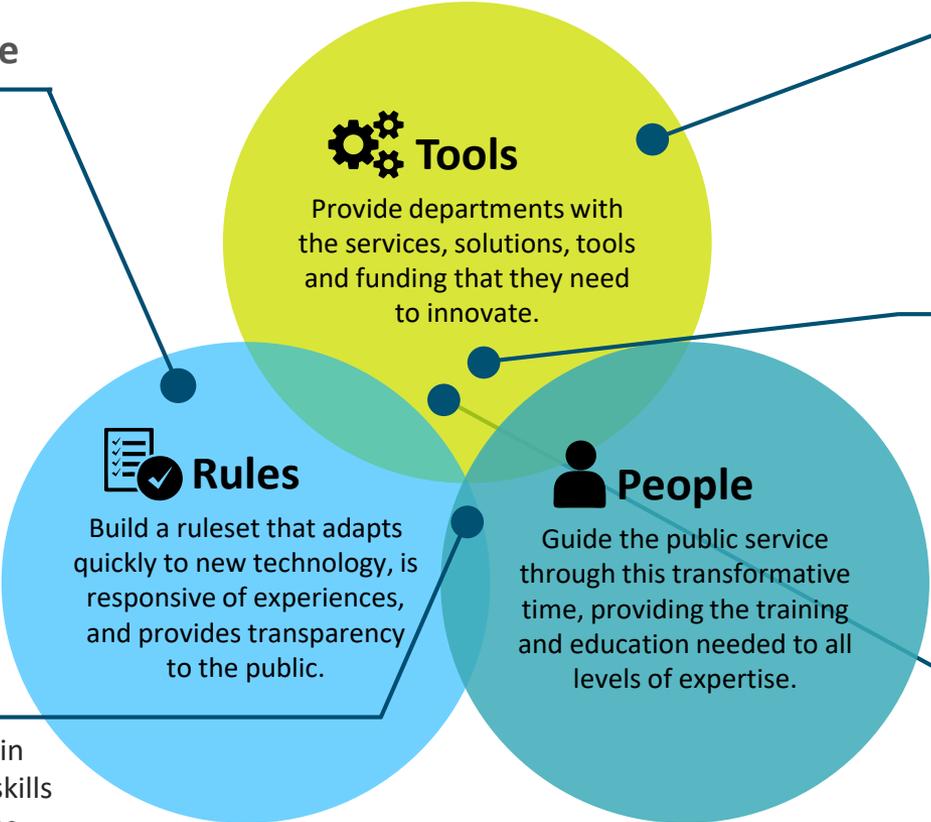
Opportunities: Our collaborative response

Policy and Governance

A Centre of Expertise on AI focused on policy, project oversight, application coherence, government-wide reporting, stakeholder relations, community enablement

Training and Skills

A renewed mandate to train all public servants in new skills (e.g. digital applications), as well as assist with project incubation



Procurement

An up-to-date supply arrangement for AI products, services, and solutions

Infrastructure

Work is underway to address significant challenges related to the management, governance, and storage of data through the Data Strategy Framework and Cloud First strategy

Funding

- Applied R&D for specific development solutions (pathways to existing programs) Disruptive technologies fund.
- New collaborative funding mechanism for large-scale and complex initiatives, to fund depts to apply AI into major parts of their business (e.g. GRDI like fund)

Collaborating on AI

AI is a transformative technology that requires a collaborative enterprise approach, leveraging the strengths of many key departments. As departments are starting to work with AI, the following departments are providing support to the enterprise

Treasury Board Secretariat – Provides central leadership to GC on digital government, TB policy suite and oversight, Project review, Lead on open government/data, Employer of the Public Service

ISED – Coordinates external AI stakeholders, including the AI Advisory Council, Pan-Canadian AI Strategy, Supercluster Initiative, and Government's of France and Canada Working Group

Canada School of Public Service – Offers training and enables experimentation

Justice Canada – Reviews and provides legal opinions related to the intersection of AI and the law

Statistics Canada – Performs enterprise data management, governance, and analysis

Employment and Social Development Canada – Leads social policy lead

Canada Digital Services – Supports business transformation through direct departmental support

Shared Services Canada – Provides large scale/centralized IT support

NRC – Supports departments and external stakeholders through education and funding opportunities

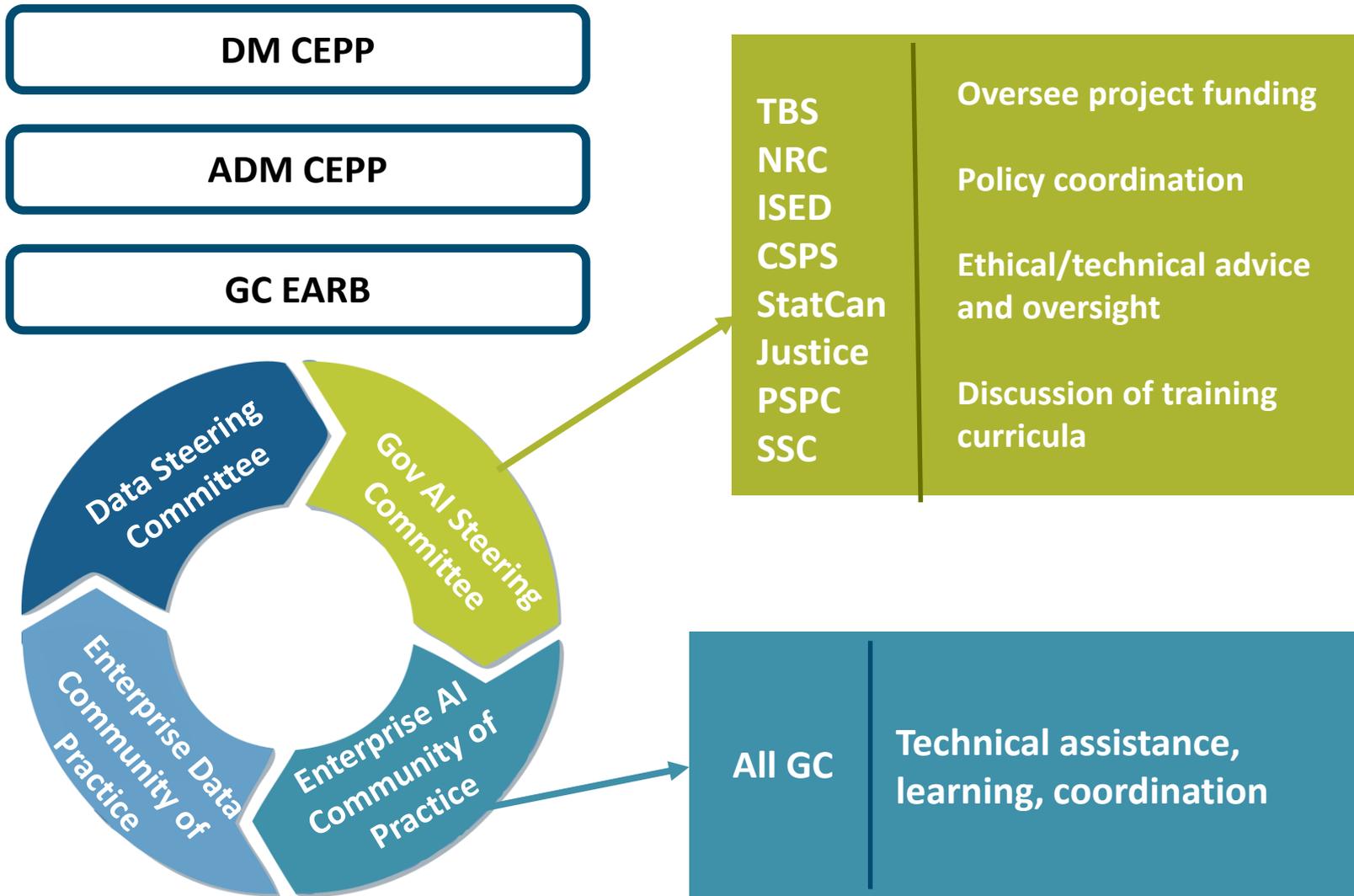
PSPC – Provides departments with procurement vehicles and support

Providing Central Leadership on AI

- Design and deploy rules, standards, and tools necessary to implement AI responsibly
 - [Directive on Automated Decision Making](#)
 - [Algorithmic Impact Assessment](#)
 - [Pre-qualified source list for AI vendors](#)
- Establish standards and IT infrastructure required to collect, use, and share data in a more efficient and organized fashion, which is vital to the success of any AI project
- Support departments and agencies to experiment with disruptive technologies and allow for policy and guidelines to occur simultaneously to experimentation

Interdepartmental governance

Governance aligned with existing enterprise practices will support the effective and responsible implementation of AI in the GC



Data

Enterprise Data Objectives

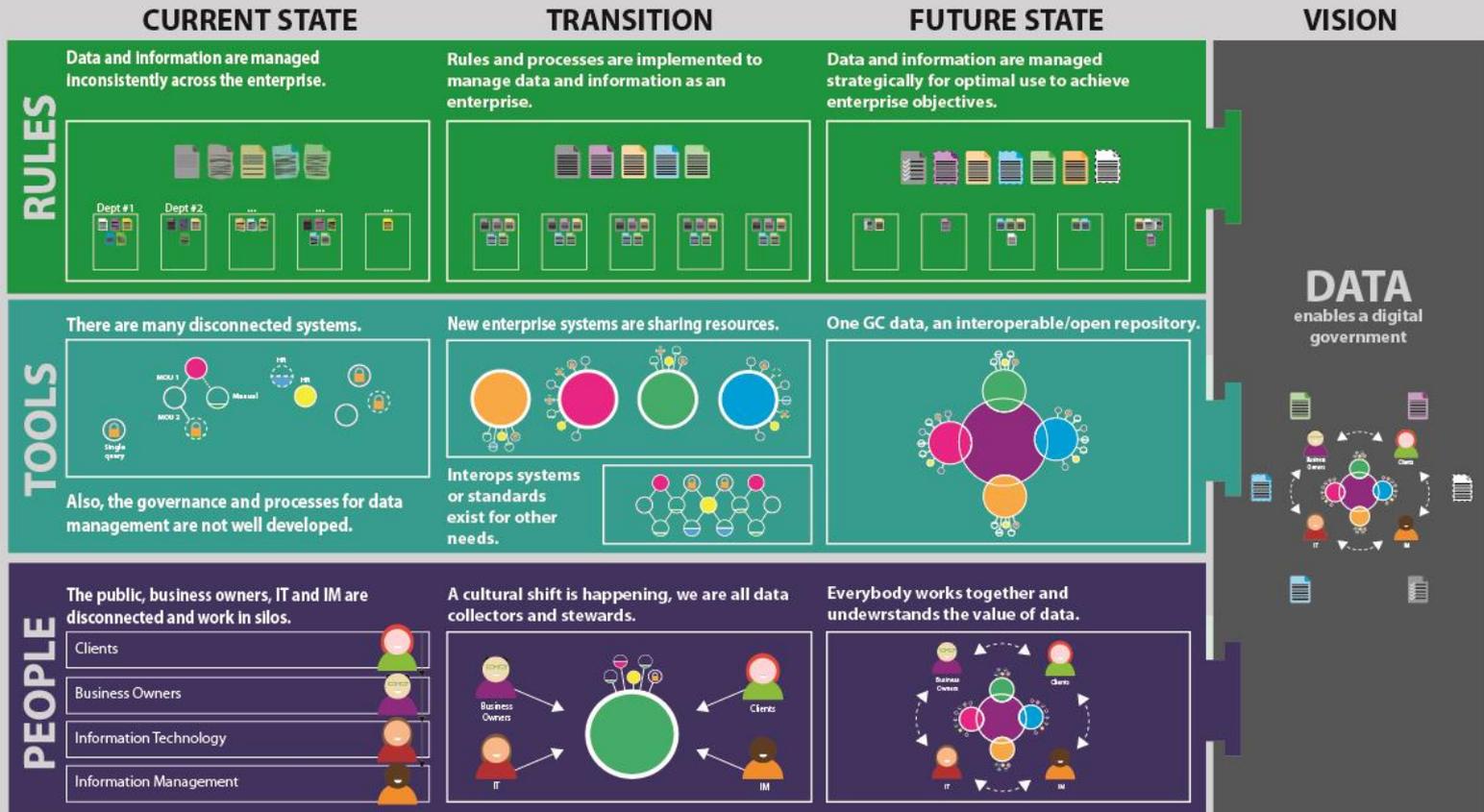
1. Develop an **enterprise data architecture** which provides a clear understanding of the GC Data landscape providing the ability to establish authoritative data, reduce redundant collection and improve overall quality.
2. Create a strong **enterprise data governance** which provides authoritative policies and guidance to enable the most effective collection, storage, and sharing of data within individual organizations and across the enterprise.
3. Establish intelligible and accessible **enterprise data assessment tools** for each phase of the implementation life-cycle.

DATA

A FOUNDATION FOR DIGITAL GOVERNMENT

Legend:

 Outside GC




Alignment with GC Data Strategy Roadmap

- Final report to be shared in the next couple of weeks
- Key recommendations include:
 1. *By September 2019, all departments and agencies have a data strategy in place appropriate to their line of business.*
 2. *Provide greater clarity on who is in charge of data within individual organizations and for the government as a whole.*
 3. *Develop overall standards and guidelines that govern how departments access, collect, use, safeguard and share data, and a clear process for developing and refining these over time.*
 4. *Clarify the governance around data to ensure that the Government of Canada manages valuable data assets for the public good.*
 5. *Improve recruitment and professional development practices to ensure that we have the skilled people we need to do data work in a digital environment.*
 6. *Ensure we have the right information technology environment that allows skilled professionals to use the disruptive technologies that will support the ambitious agenda outlined in this report.*

Recommendations at a glance



GOVERNANCE



PEOPLE AND CULTURE



ENVIRONMENT AND DIGITAL INFRASTRUCTURE



DATA AS AN ASSET

	GOVERNANCE	PEOPLE AND CULTURE	ENVIRONMENT AND DIGITAL INFRASTRUCTURE	DATA AS AN ASSET
<p>Short-term (to Sept 2019)</p> <p>Laying the foundation and building momentum</p>	<ul style="list-style-type: none"> Establish a senior level decision-making body for horizontal data issues by modifying the mandate and membership of DM CEPP Strengthen and clarify roles and responsibilities around enterprise data leadership, including by establishing a Government of Canada Chief Data Steward Develop and implement new frameworks and standards with respect to the ethical and secure use of data Require all departments, agencies or portfolios to develop data strategies that are relevant, scaled and customized to their needs and aligned with the Government of Canada Data Strategy Require all departments and agencies to ensure proper accountabilities, roles and responsibilities with respect to data Convene a central agency-led working group to evaluate and make recommendations to the way data are considered in the decision-making process 	<ul style="list-style-type: none"> Assess the current state of data literacy as well as skills and competencies required Pilot and launch a digital academy to develop digital and data skills of existing employees Ensure the government is competitive in its hiring practices 	<ul style="list-style-type: none"> Accelerate work to assess the legislative and policy framework and practices to support greater strategic use of data while ensuring the protection of personal information Leverage work underway to support and build the digital identity ecosystem 	<ul style="list-style-type: none"> Foster innovation within the public service and leverage the outcomes of existing pilot projects Leverage and expand secure, user-friendly environments to facilitate access to Government-held data for decision-makers and Canadians
<p>Medium-term and transition advice (Oct 2019+)</p> <p>Expanding and scaling across the Government</p>	<ul style="list-style-type: none"> Provide regular updates on data to the Clerks and Cabinet Secretaries table, and encourage departments and agencies to pursue collaboration on specific issues or needs with other levels of government and Indigenous Peoples Recognizing that Indigenous Peoples have an inherent right to self-determination, co-develop with Indigenous partners distinctions-based strategies to advance Indigenous data governance and institutional capacity. The Government of Canada should also work with Indigenous partners, who are the custodians of their data, to co-develop indicators and data collection strategies 	<ul style="list-style-type: none"> Renew HR strategies with targeted training and development, including engagement with colleges, universities, and unions 	<ul style="list-style-type: none"> Work with departments to establish a common set of data needs and establish a process for easy adoption of data tools Assess required digital/data infrastructure needs 	<ul style="list-style-type: none"> Establish a centralized view of government-held data, develop a Government data quality framework, and develop guidance for the long-term management of digital government assets Enhance the rigor of analysis of program administrative data and increase the generation of new data to assess outcomes and strengthen performance measurement, program evaluation and policy development Develop an approach to increase access to public and private sector data to drive insights for enhanced global competitiveness and social impact