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Service and Digital Target Enterprise Architecture White Paper

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Service and Digital Target Enterprise Architecture White Paper

From Treasury Board of Canada Secretariat

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Executive summary

The Service and Digital Target Enterprise Architecture is an enabler for the *Policy on Service and Digital*.

The Service and Digital Target Enterprise Architecture defines a model for the digital enablement of GC services that address many of the critical challenges with the

current GC enterprise ecosystem. It seeks to reduce the silos within the current GC ecosystem by having departments adopt a user- and service-delivery-centric perspective when considering new IT solutions or modernizing older solutions. It advocates a whole-of-government approach where IT is aligned with business services and where solutions are based on reusable components implementing business capabilities optimized to reduce unnecessary redundancy. This reuse is enabled using published application programming interfaces (APIs) shared across government. This approach allows the government to focus on improving its service delivery to Canadians while addressing its challenges with legacy systems.

The *Policy on Service and Digital* and the Service and Digital Target Enterprise Architecture are guided by a commitment to the guiding principles and best practices of the Government of Canada Digital Standards:

- design with users
- iterate and improve frequently
- work in the open by default
- use open standards and solutions
- address security and privacy risks
- build in accessibility from the start
- empower staff to deliver better services
- be good data stewards
- design ethical services
- collaborate widely

Purpose of this paper

This paper is intended to assist federal institutions by providing recommendations on how systems could be implemented over the next several years to provide Canadian citizens with a more cohesive and sustainable digital landscape when interacting with the Government of Canada.

The intended audience is those involved in the delivery of digital services within the Government of Canada including deputy heads and chief information officers. The

white paper will also inform suppliers of the enterprise architecture direction, assisting them to align their services when interacting with the government. Finally, the white paper will inform the Canadian public and the international community of the Government of Canada's enterprise architecture direction for digital transition.

Unless otherwise specified, any example mentioned in this white paper does not represent any existing plans of the Government of Canada.

This white paper is not meant to replace existing documents that address the government's strategic direction on digital services.

Digital government

A digital government puts people and their needs first. It is accountable to its citizens and shares information with them. It involves them when making policies and designing services. It values inclusion and accessibility. It designs services for the people who need them, not for the organizations that deliver them.

> The Government of Canada is an open and service-oriented organization that operates and delivers programs and services to people and businesses in simple, modern and effective ways that are optimized for digital and available anytime, anywhere and from any device.
>
> Digitally, the Government of Canada must operate as one to benefit each and every Canadian.

Policy on Service and Digital

The *Policy on Service and Digital* and supporting instruments serve as an integrated set of rules that articulate how Government of Canada organizations manage service delivery, information and data, information technology, and cybersecurity in the digital era. Other requirements, including but not limited to, requirements for privacy, official languages and accessibility, also apply to the management of service delivery, information and data, information management and cybersecurity. Those

policies, set out in Section 8, must be applied in conjunction with the *Policy on Service and Digital*. The *Policy on Service and Digital* focuses on the client, ensuring proactive consideration at the design stage of key requirements of these functions in the development of operations and services. It establishes an enterprise-wide, integrated approach to governance, planning and management. Overall, the *Policy on Service and Digital* advances the delivery of services and the effectiveness of government operations through the strategic management of government information and data and leveraging of information technology.

Section 4.1.2.3 of the *Policy on Service and Digital*. The Chief Information Officer (CIO) of Canada is responsible for: Prescribing expectations with regard to enterprise architecture.

Section 4.1.2.4 of the *Policy on Service and Digital*. The Chief Information Officer (CIO) of Canada is responsible for: Establishing and chairing an enterprise architecture review board that is mandated to define current and target architecture standards for the Government of Canada and review departmental proposals for alignment.

Section 4.1.1.1 of the *Directive on Service and Digital*. The departmental Chief Information Officer (CIO) is responsible for: Chairing a departmental architecture review board that is mandated to review and approve the architecture of all departmental digital initiatives and ensure their alignment with enterprise architectures.

What problems does the Service and Digital Target Enterprise Architecture address?

▼ **In this section**

- What is the issue?
- How did we get here?
- Why is the problem so intractable? Why isn't "business as usual" a workable way forward?

Canadians rely on the federal government for programs and services, which in turn depend on reliable, authoritative data and enabling information technology capabilities to ensure successful delivery. The GC enterprise ecosystem consists of all the information technology used by the Government of Canada and all related environmental factors. The interdependence of all elements with the ecosystem is an essential aspect of what makes it an ecosystem. When discussing information technology within the GC enterprise, one must consider the ecosystem.

What is the issue?

The Government of Canada has reached a critical point in its management of the IT systems that are used to enable the delivery of government services. There is an increasing gap between the expectations of Canadian citizens and the ability of the government's legacy systems to meet those expectations. The total accumulated technical debt associated with legacy systems has reached a tipping point where a simple system-by-system replacement approach for individual systems has increasingly become cost and risk prohibitive. The business processes in place to manage the life cycles of these IT systems have become barriers rather than enablers.

How did we get here?

Changing expectations

The rapid evolution of the internet as the ubiquitous platform for service delivery has outstripped the government's ability to address the demand. Citizens have an increased expectation that all government services will be reliably delivered 24 hours a day, 7 days a week with no artificial differentiation based on which department provides the service. The introduction of new disruptive technologies outside of government can quickly shift the citizen's expectations as they become aware of new approaches or capabilities.

Separate mandates

Government information systems have long mirrored the legislative separation of the functional mandates of departments. In part, this is because the original approaches to a delegation of authority and accountability in legislation did not contemplate the cross-cutting dependency on information technology that exists today. Beyond authority and accountability, there are legislative constraints on intragovernmental information sharing has historically impeded the integration of business processes across government. Budget and funding models have further reinforced this separation. As a result, there have been limited opportunities to reduce overhead and eliminate redundancies across systems and across government.

Evolution of technology

Initially, business process automation within government was implemented as standalone solutions, in many cases monolithic and mainframe solutions. As time passed, the life cycle evolution of individual systems tended to limit their scope to those individual systems; reinforced by a desire to restrict procurement, technical, and change complexity and risk. Current technologies that could be used to implement cohesive enterprise approaches were introduced relatively recently, many years after most government systems were implemented. This gap has been exacerbated over time by the significant difference between the ability of the private sector and the public sector to adopt and leverage new technologies.

Why is the problem so intractable? Why isn't "business as usual" a workable way forward?

"Business as usual" not effective

The "business-as-usual" approach would be to try to address each legacy system in isolation; in other words, a simplistic system-by-system replacement. The costs and risks associated with this approach for major legacy systems are prohibitive in most cases. Dealing with each system in isolation results in missed opportunities for reuse

and for eliminating redundancies. In addition, these “big bang” methods dramatically increase business service delivery risk. By the time a significant replacement project is completed, there is also a substantial possibility that the underlying technology is out of date. To mitigate these issues, approaches that allow for an incremental and managed transition over time are suggested.

An alternative strategy

One alternative strategy is to incrementally migrate legacy systems by gradually replacing functional elements with new applications and services; in other words, an “evolve-and-transcend” strategy. This strategy implements an architectural pattern named the “Strangler Fig,” a metaphor for refactoring rather than replacing legacy systems, by incrementally replacing functional parts of a legacy application slowly and systematically over time, thus spreading costs and mitigating risks.

Service and Digital Target Enterprise Architecture

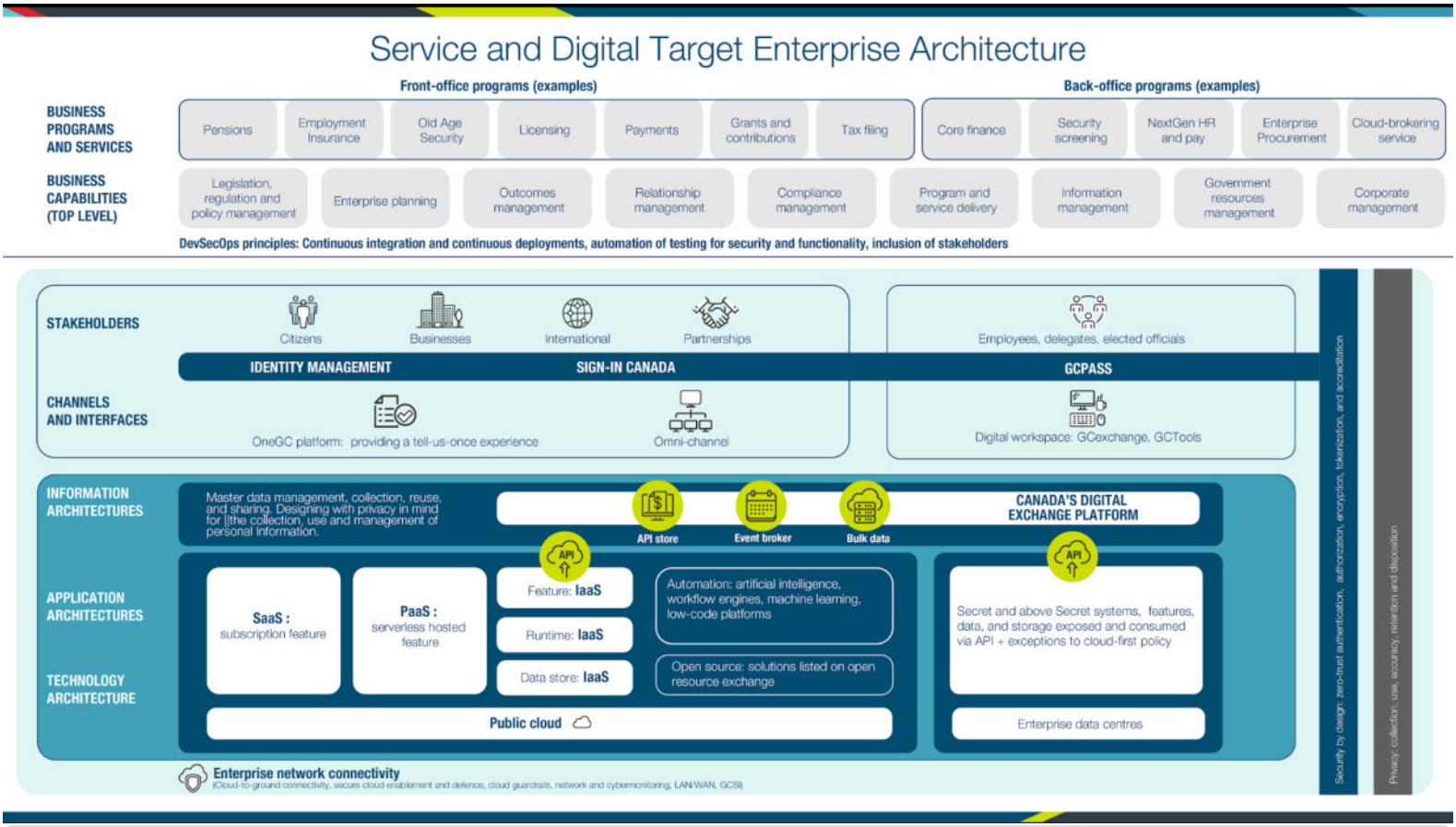
▼ **In this section**

- Improved outcomes
- Realization practices and principles

The Service and Digital Target Enterprise Architecture defines a model for the digital enablement of Government of Canada services that address many of the critical challenges with the current GC enterprise ecosystem. It seeks to reduce the silos within the current GC ecosystem by having departments adopt a user- and service-delivery-centric perspective when considering new IT solutions or modernizing older solutions. It advocates a whole-of-government approach where IT is aligned to business services and solutions are based on reusable components implementing business capabilities optimized to reduce unnecessary redundancy. This reuse is enabled using published APIs shared across government. This

approach allows the government to focus on improving its service delivery to Canadians while addressing the challenges with legacy systems.

Figure 1: Service and Digital Target Enterprise Architecture



▶ Figure 1 - Text version

The goal of the Service and Digital Target State Enterprise Architecture is to depict the Government of Canada's future state in one picture. The diagram is divided into several parts, which are based on The Open Architecture Framework (TOGAF) framework explained in a subsequent section. This framework views business, information and data, applications, technology and security each as separate layers, having their own concerns and architecture.

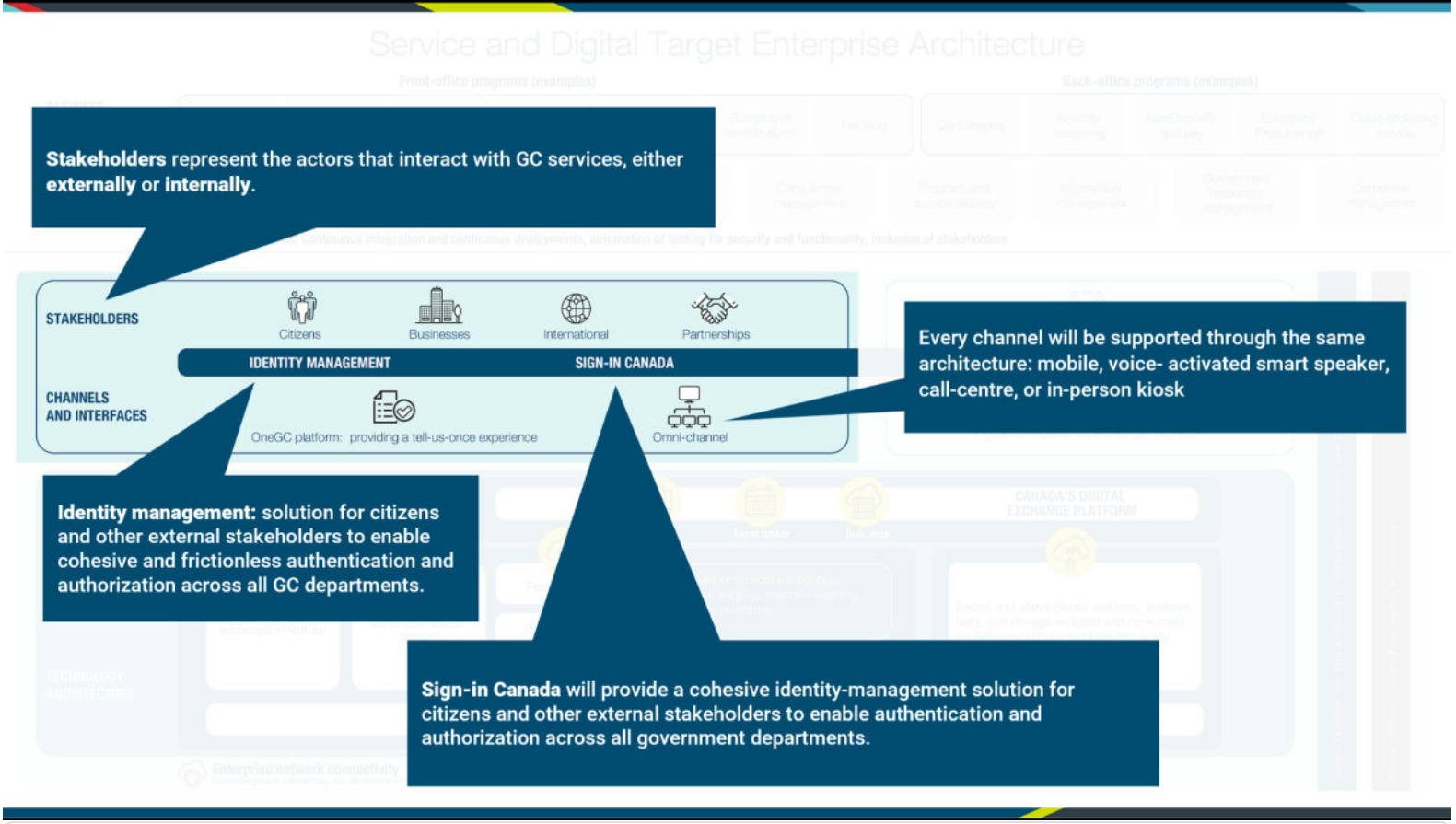
The top layer of the diagram represents business architecture. The programs in this layer are categorized as front office, which provides services directly to citizens, academic institutions, and Canadian businesses, and back-office services which support the government itself. Examples of front office programs include Employment Insurance and tax filing services, and examples of back-end programs

include finance security screening, pay, enterprise procurement, and business continuity.

Figure 2: Focus on alignment with the Digital Operations Strategic Plan

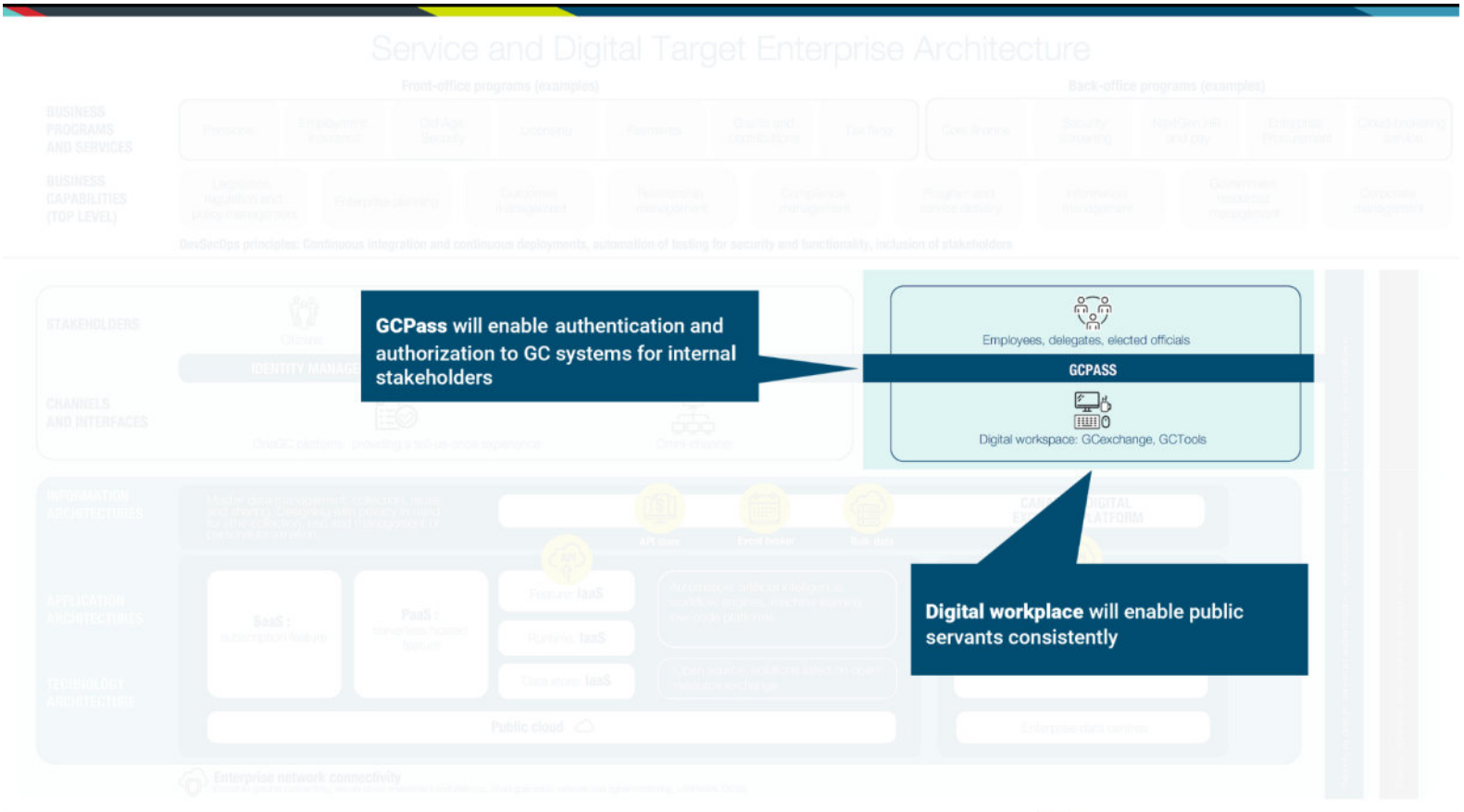
▶ Figure 2 - Text version

Figure 3: External stakeholders



▶ Figure 3 - Text version

Figure 4: Internal stakeholders

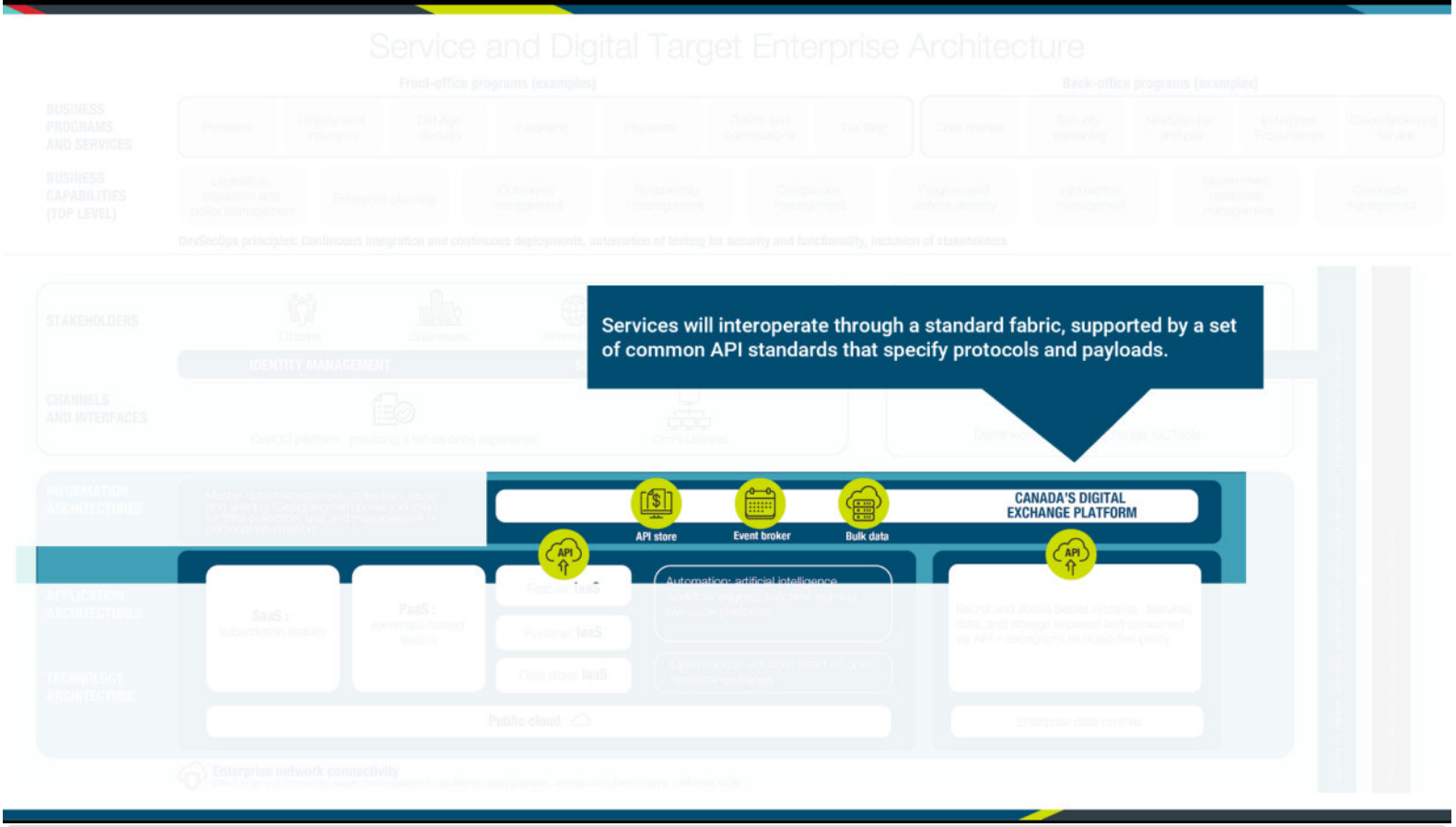


▶ Figure 4 - Text version

Figure 5: Information architecture

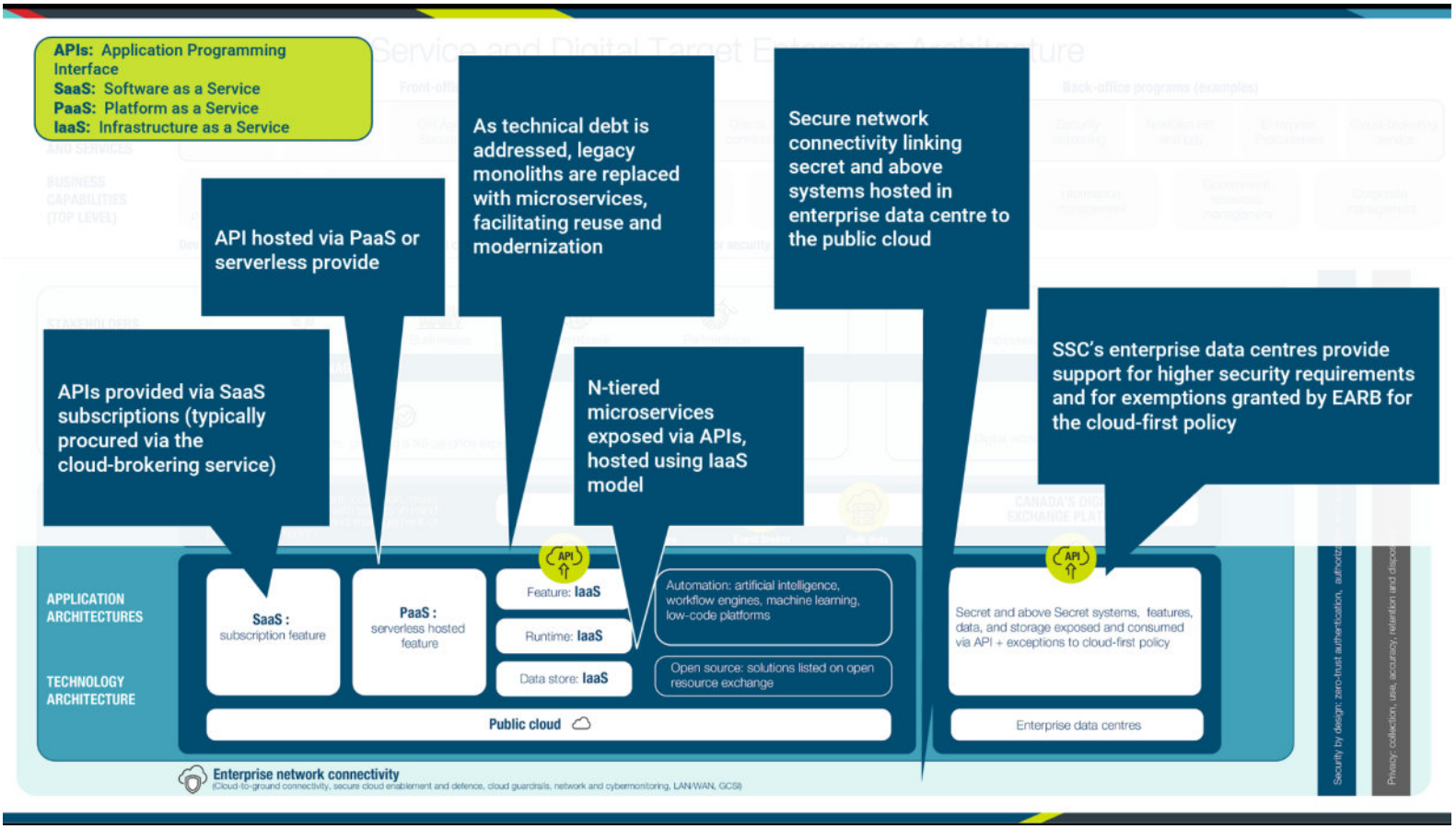
▶ Figure 5 - Text version

Figure 6: Interoperability



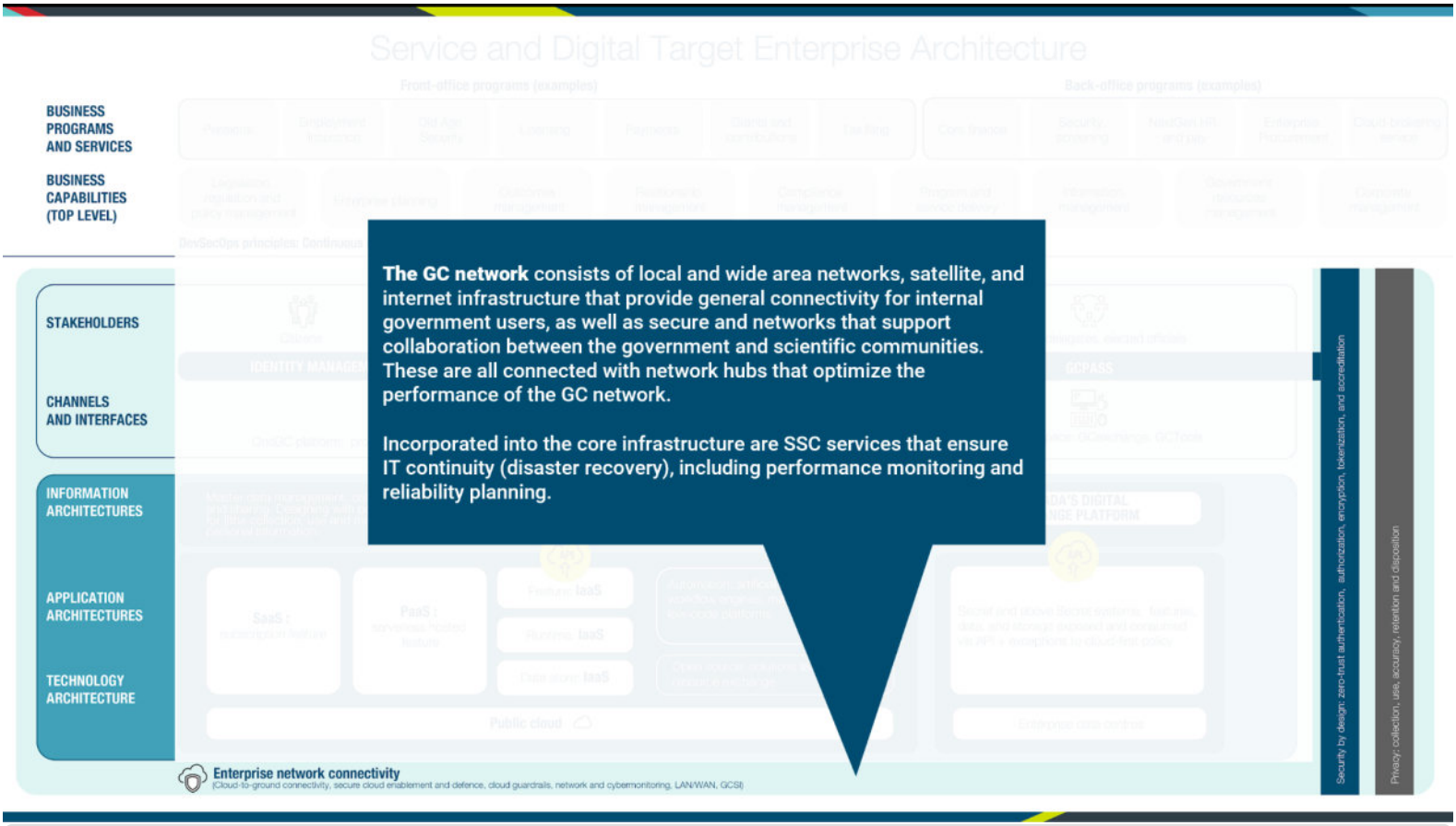
▶ Figure 6 - Text version

Figure 7: Application architecture and technology architecture



▶ Figure 7 - Text version

Figure 8: Enterprise Network Connectivity (Technology Architecture Continued)



▶ Figure 8 - Text version

Figure 9: Security Architecture

▶ Figure 9 - Text version

Improved outcomes

Improved digital services that meet citizens' expectations

Canadian citizens expect reliable digital services that deliver a cohesive user experience.

Their expectation for cohesive user experience is founded on their perception that digital services are being delivered by "one" government and not a collection of departments. By aligning digital service delivery to a common set of services defined within a GC Service Inventory and implemented using reusable components based on a common taxonomy of business capabilities, GC can improve the user experience.

Their expectations for reliability and availability are based on their experiences with modern private-sector internet services. By transitioning to public cloud offerings

and infrastructure, GC can leverage private sector investments to meet citizens' expectations for reliability and availability.

Managed costs and improved agility

GC needs to achieve economies of scale realized by modernizing and standardizing IT and by reducing its reliance on costly and outdated technology.

By encouraging the sharing of reusable components based on business capabilities and by leveraging private sector cloud solutions and open source software, GC can both reduce redundancy and help manage costs.

By transitioning to an architecture that leverages public cloud offerings and infrastructure, GC can become more agile in responding to changes in business needs, thus delivering future-ready IT systems that can support the GC digital transformation journey.

Engaged and effective workforce

Retention has been identified as a significant IT workforce and talent management issue. The ability to attract and retain new talent is challenging due to the perception that government IT is decades out-of-date. Besides the drain on workforce capacity, attrition has negatively impacted morale, the level of engagement and overall workforce effectiveness.

By adopting modern technology and practices, the government is in a better position to attract and retain new talent. Reducing attrition and boosting recent talent acquisition will have a positive impact on morale and foster an engaged and effective workforce.

Realization practices and principles

To realize the GC Enterprise Ecosystem Target Architecture, departments should align with the practices and principles as outlined below, when considering new IT

solutions or modernizing older solutions. The architectural approach was developed to facilitate managed incremental transitions but requires more strategic planning on the part of departments to be implemented effectively.

The Government of Canada Enterprise Architecture Framework defined below presents the evaluation criteria being used by GC Enterprise Architecture Review Board to align solutions to the Service and Digital Target Enterprise Architecture. In the interest of effective communication to the architecture community of practice, the material has been organized based on the architectural domains business, information, application, technology, and security.

GC enterprise ecosystem transition

▼ **In this section**

- Enabling policy and regulation
- GC enterprise focused practices
- GC enterprise IT ecosystem

The realization of the Target Service and Digital Target Enterprise Architecture involves dozens of departments and thousands of applications and will involve many interim states. The technical strategy is to incrementally migrate legacy systems by gradually replacing functional elements with new applications and services thus spreading costs and mitigating risks. However, the fundamental nature of the change required demands more than just a technical strategy. To meet Canadians' expectations for coherent digital service delivery, the government must modernize its policy and practices to support the technological transition to the target enterprise architecture.

Figure 10: GC enterprise ecosystem transition steps

▶ Figure 10 - Text version

Significant progress has already been made, particularly around enabling policy, and work has begun on changing practices, but much work remains.

Enabling policy and regulation

To support the change needed, the enabling policy and regulation must be aligned with the strategic direction. The policy must support the required changes and not be a barrier to adoption.

Integrated policy and directive to enable change

Treasury Board approved a new *Policy on Service and Digital* and *Directive on Service and Digital*, which serve as an integrated set of rules that articulate how Government of Canada organizations manage service delivery, information and data, information technology and cybersecurity in the digital era. TBS, through the Office of the Chief Information Officer, developed guidance informed by departmental feedback, reviewed existing Treasury Board policy instruments and identified emerging areas.

- enhanced and integrated governance with an Enterprise Approach
- increased focus on the client and the digital enablement across all services and channels
- better use and sharing of information recognizing its value as a strategic asset
- leverage technology to better manage and protect systems and information
- strengthen and train the federal workforce to meet the needs of a digital government

TBS, through the Office of the Chief Information Officer, and departments will continue to update guidance and evolve Treasury Board policy instruments.

GC enterprise focused practices

The proposed strategies and architectural principles are significant departures from past practices. Existing departmental practices for the management of IT have locked the government into a cycle that reinforces siloed approaches. The emphasis must shift from isolation and control to collaboration and sharing with the focus on cohesive service delivery to citizens rather than individual mandates.

GC Target Enterprise Architecture

The Service and Digital Target Enterprise Architecture provides a framework and focal point for making informed decisions on the alignment of business solutions to GC needs.

GC Enterprise Architecture Framework

Business, information, application, technology, security, and privacy architecture domains defined by the GC to align solutions to the Service and Digital Target Enterprise Architecture.

GC Enterprise Architecture Review Board (GC EARB)

The GC Enterprise Architecture Review Board (GC EARB) provides a governance mechanism to assess if proposed solutions are aligned to the GC Enterprise Architecture Framework.

Establishment of GC Enterprise Portfolio Management (GC EPM)

GC Enterprise Portfolio Management (GC EPM) will support integrated planning, prioritization, and optimization of an achievable enterprise investment portfolio by enabling the integration of critical processes and data to inform decision-making, visibility, and transparency.

- Alignment: ensuring that all investments, services, and applications are aligned to GC strategy
- Collaboration: reducing the burden and balancing the portfolio by ensuring the right work is being completed at the right time
- Visibility: accessible information provides stakeholders visibility on delivery capacity and enhances oversight and reporting
- Decision-making: prioritization allows for informed decision-making while offering the opportunity to re-balance the portfolio

Including the business capability perspective in the IT plan

The inclusion of Business Capability Model mapping in the IT plan investment framework provides another mechanism to identify potentially redundant investments in business capabilities across government and opportunities for rationalization and to identify opportunities for enterprise solutions.

Including the application capability perspective in the Application Portfolio Management framework

The inclusion of Application Capability Model mapping into the GC Application Portfolio Management framework provides another mechanism to identify overlapping application capabilities and unused functions. Reducing the technology footprint will decrease operational expenses and free up funds for other priorities.

GC Cloud Brokering

The GC Cloud Brokering provides a way for departments to obtain public cloud services already vetted. It simplifies the procurement and fulfillment of cloud services by providing a unified process for requesting cloud services that have been thoroughly investigated and approved to comply with the requirements of the GC, as well as to offer central agencies with the visibility of all environments in the cloud.

API store

The API store provides a mechanism to publish reusable business capabilities and access to data.

Open source software

The Open Source Policy and White Paper guided the use of software, the need for contribution to open source software, the publishing of open source software, and the acquisition of open source software.

Digital workspace standards and profiles

GC EARB created standards for internal enterprise services, defined digital workspace user profiles, set departmental consumption of IT services, and sets consumption metrics and limits for each of SSC's 31 services.

Framework for Government Wide Data Governance and Stewardship

GC EARB introduced a government-wide framework for data governance and stewardship, for TBS work on the development of principles, policies and guidance concerning "prescribing enterprise-wide data standards."

GC enterprise IT ecosystem

The government has made some limited progress in common application capabilities such as document management and others. However, the predominantly monolithic architectures of departmental applications have effectively limited sharing and reuse across government. The transition towards the GC Target Enterprise Architecture is needed to achieve progress in that area.

GC enterprise solutions

The establishment of GC enterprise solutions has provided a standard implementation for common application capabilities such as document management (GCDOCS), collaboration (GCshare), and Customer Relationship Management CRM (GCcase).

GC enterprise digital workplace platform

The acquisition of Office 365 provides a secure cloud-based, software-as-a-service solution for the digital workspace. Its rollout will provide a coherent user experience across government over multiple devices and channels.

Sign in Canada

Sign-in Canada is a proposal for a unified authentication mechanism for all government digital engagement with citizens. Users would only need to tell Sign-in Canada one time who they are, and subsequently, there would be no need to sign up multiple times to access different government services.

GC internal authentication

Internally within the government, GCPass, when fully implemented, will provide streamlined secure and appropriate access to GC systems for public servants.

Canadian Geospatial Platform

Natural Resources Canada (NRCan) is launching the Canadian Geospatial Platform (CGP) as the next evolution of the Federal Geospatial Platform, with the transition to a new architecture for a GC enterprise platform that will enable NRCan to host solutions from other GC departments in a platform-as-a-service model. CGP will continue to be aligned with the principles of open government and open data and thus is currently configured for unclassified data only.

Summary

The Government of Canada is responding to the challenge of meeting Canadian citizens' evolving expectations for cohesive digital service delivery in the face of aging IT systems and rising technical debt. To meet this challenge, the government is changing the way it approaches acquiring new solutions and modernizing older solutions. By advocating a whole-of-government approach where IT is aligned to business services, and solutions are based on reusable components implementing business capabilities optimized to reduce unnecessary redundancy, it is maintaining a clear focus on improving its service delivery to Canadians while addressing the technical challenges with its legacy systems.

The future digital landscape of the Government of Canada will be more agile in responding to changes in business needs and better able to leverage new disruptive technologies. Significant progress has already been made, particularly in enabling policy, and work has begun on changing practices, but much work remains.

An ongoing commitment is needed from everyone involved in digital service delivery to be engaged and active participants in these changes by adopting:

- a service-centric perspective; and focusing on delivering a cohesive user experience for our citizens
- a business capability-centric perspective when considering solutions, and embracing sharing and reuse
- a whole-of-government perspective; and embracing change

This white paper is just another small step of the larger journey.

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