ICT INFRASTRUCTURE REPORT

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ISYS90048 Managing ICT Infrastructure

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Question 1

The achievement of high levels of interoperability is a key requirement of any enterprise-wide systems.

What evidence is there in the case study that the Chief Information Officer Branch has considered the complex issues of interoperability for the Government of Canada?

Interoperability refers to the ability of different systems and organizations to coordinate and work together. It relies on the ICT and is a necessary condition for enterprise integration and networking (Vernadat, 2010). It can be divided into three parts: Semantic (language), technical and organisational interoperability (Vernadat, 2010).

The case indicates that the Government of Canada is under huge transformation and current tools and applications can not realise the interoperability. Hence, based on these issues, the evidence which the CIOB considers issues is shown below from these three aspects.

- Semantic interoperability

Semantic interoperability is the ability of computer systems to exchange data with a clear shared meaning. It is a necessary condition for the realisation of machine computable logic, reasoning, knowledge discovery and data association between information systems (Ceusters, 2018). For a business or government agency, if there is no semantic interoperability between its different IT systems, it is impossible to share data efficiently.

For this kind of interoperability issues, the Chief Information Officer Branch (CIOB) considered:

Evidence	1. "The CIOB already offers departments an element of guidance in the area of business design and promotes the GSRM, which provides a formal definition of a business "service". By looking at services in a consistent way it is possible to begin to bring together collections of related services in a more synergistic manner." 2. "Citizens can access the service they want without the need to understand the intricacies of the government bureaucracy." 3. "Thus "service orientation" in this context is the planning and delivery of all

	services by formally componentizing each of the services and their subordinate services such that the overall collection of services work as a whole and supports a high level master-plan (or strategic design)." 4. "The GC SOA Principles are key. They provide: Logical consistency for design across multiple business areas. "
Analysis	The pieces of evidence indicate that CIOB provides some solutions to ensure consistent and accurate transmission of data and services, but in the case, it did not point out specific measures to clarify information and prevent information from being misunderstood.

Table 1. The evidence and analysis for semantic interoperability.

- Technical interoperability

Technical interoperability refers to that two or more ICT systems, or applications can appropriately provide data communication standards, exchange data and perform a given task without additional operator intervention (Ec.europa.eu, 2012).

For this kind of interoperability issues, the Chief Information Officer Branch (CIOB) considered:

Evidence	1. "SOA is a standardization of their interfaces." 2. "The initial set of standards will cover key areas such as registering new services, how to discover reusable services, service mediation, service negotiation and other interoperability issues." 3. "Departments are therefore asked to keep these principles in mind when planning, defining, implementing or changing business services or any of their supporting processes or technical components."
Analysis	The pieces of evidence demonstrate that CIOB has developed standards to guarantee interoperability of services. However, the case does not contain specific interfaces and protocols for information and service transmission.

Table 2. The evidence and analysis for technical interoperability.

- Organisational interoperability

Organisational interoperability refers to that makes information easy to identify and available to facilitate collaboration between different organisations to achieve their mutually agreed goals. Organisations require to reach detailed agreements on the collaboration and synchronisation of their business processes to provide integrated services based on demands (Kubicek & Cimander, 2009).

For this kind of interoperability issues, the Chief Information Officer Branch (CIOB) considered:

Evidence	1. By broadening the scope of SOA to also encompass the business levels helps to ensure department can interoperate to deliver a more agile, effective and efficient government overall. 2. "The emphasis on service orientation is synergistic with a number of other TBS directives and is consistent with the TBS policy renewal process." 3. "The GC SOA defines a uniform approach to layering computer applications and their components to enhance interoperability and reuse."
Analysis	The pieces of evidence illustrate that CIOB defines some methods to collaborate with other business processes of the organisation through SOA, without conflict, to provide integrated services, which basically satisfy the requirements of organisational interoperability.

Table 3. The evidence and analysis for organisational interoperability.

Question 2

Consider the statement on Page 7 (Section 4.2. The Value of SOA):

"One of the key goals of a service-oriented design is to cut through the current information silos, promote interoperability and enable services to be delivered more effectively and uniformly. SOA adoption has the potential to erase the barriers that separate the business and technology sides of any organization, dramatically improving productivity, and increasing overall harmony and agility."

How does the Service-Orientated Architecture (SOA) adopted in this project address the key goals that are specified for the Government of Canada?

The case shows that the key goals that are specified for the Government of Canada are to realise the consistency and interoperability of the GA services.

The case points out that as services increase, the Canadian government faces some transformations and demands from the people:

1. The Government of Canada is in a transformation, including adequate citizenship and the full use of resources to make it more cost-effective and efficient.

2. Canadian citizens want to integrate government services and connect important initiatives seamlessly.

3. The demand for consistency and interoperability of the services has increased, but tools and applications in the technology are currently unable to achieve this goal.

4. Duplication and overlap in federal and multi-jurisdictional areas and government plans are sometimes too complicated.

Service-Oriented Architecture (SOA), a tool to cut off the current information isolation, promote interoperability and make services more efficient and uniform. There are eight principles, that is the Standardized service contract, Service loose coupling, Service abstraction, Service Reusability, Service autonomy, Service statelessness, Service discoverability and Service composability. The requirements above expose that the coupling of the services are too high and the current circumstance is with low reusability and composability, which requires the SOA to improve the situation. Particularly, decreasing the coupling between the services, improving reusability to make full use of resources and allowing services and significant initiatives to connect closely to improve composability.

Aspects of SOA	Evidence from Case Study	Relevance to SOA
Loose coupling	1. “By looking at services in a consistent way it is possible to begin to bring together collections of related services in a more synergistic manner.” 2. “SOA extends these benefits and treats services as freestanding units that can be invoked between disparate applications – so that the same function can be used by many applications, no matter what their technology platform.” 3. “SOA doesn’t standardize how individual processes work, or how different applications function, or how different programming languages in different machines work. It is a standardization of their interfaces.”	The SOA's loose coupling principle guarantees the consistency of services but meanwhile decrease the dependencies between services. It does not set the working methods of each service, programming language and operation modes, and increases the independence between different applications and services, which satisfy the government of Canada's key goals for improved consistency and interoperability.
Reusability	1. “The impact to the monolithic and single purposed applications of the past is to increase their useful lifespan, maximize the government’s return on investment and potentially reduce any immediate needs for obsolescence due to potential problems in interoperability and non-compliance.” 2. “The adoption of SOA in accordance with the GC SOA can greatly extend the reach and value of existing services, streamline processes, and generate measurable improvements in the efficiency and effectiveness of departments and their service delivery capabilities.” 3. “Using the GC SOA, the Government of Canada’s services will be highly reusable and fully interoperable from the higher-level business concepts, to their supporting technical components.”	The SOA's reusability principle increases the lifespan of single-use applications and reduces their elimination demands so that they can be fully utilised. Meanwhile, it expands the scope of existing services and simplifies the process to increase efficiency. According to the predictions used by the GC SOA, the Government of Canada’s services will be highly reusable, which corresponds to the government of Canada's key goals for improved interoperability.

Composability	1. “By broadening the scope of SOA to also encompass the business levels helps to ensure department can interoperate to deliver a more agile, effective and efficient government overall.” 2. “Thus “service orientation” in this context is the planning and delivery of all services by formally componentizing each of the services and their subordinate services such that the overall collection of services work as a whole and supports a high level master-plan (or strategic design).” 3. “The emphasis on service orientation is synergistic with a number of other TBS directives and is consistent with the TBS policy renewal process. In some ways service orientation is not new, but brings together a number of initiatives and programs that have been underway for some time. For instance the push towards service modernization and horizontal service delivery has been underway for some time. Their success requires a clear understanding of how the many services delivered to Canadians impact one another and add-up to the desired Results for Canadians. The formality that GC SOA brings to service orientation augments these efforts.”	The SOA's composability principle makes it easy for different components of the system to communicate and transfer data while ensuring that services and operations between departments are performed more efficiently. The various services are integrated into a single unit and coordinated with other systems, align with the government of Canada's key goals for improved interoperability.

Table 4. The evidence and analysis for SOA.

Question 3

This case study does not refer to the use of any ICT governance framework in this Statement of Direction.

If you were engaged as a consultant to the project described in this case study, what ICT governance framework(s) would you consider relevant to the development of this Service Oriented Architecture by the organisation?

Briefly justify your recommended ICT governance framework, based on the information available in the case study, and your understanding of the development of a Service Oriented Architecture to support the systems used by the Government of Canada in this case study.

The case does not mention any ICT governance framework which leads to the difficulty of implementing services and the increase of the cost. The Information Technology Infrastructure Library (ITIL) is suitable for being selected as the ICT governance framework because compared to COBIT and other well-known frameworks, ITIL displays comprehensive IT service management and related practices. ITIL provide a powerful framework for identifying, planning, delivering and supporting IT services that can be adapted and applied to all business and organisational environments, and through some standards, manages service quality, availability, reliability and service costs., ITIL is appropriate to be the ideal ICT governance framework for the Government of Canada.

ITIL Guidelines/Criteria	**Evidence**	**Assessment/Findings**
1. Demand Management The Government of Canada should understand the customer's demands and be flexible in responding to changes in demand and assessing requirements promptly based on the services provided.	Section 3.2, P5: ● "A well-managed SOA environment enables rapid response to changing business demands." Section 3.2, P6: ● "Business Application Architecture" ● "The top layer allows business owners to package a tailored selection of GC (and non-GC) services to be used in alignment and support of specific business requirements."	The Government of Canada clearly recognises the demands of its customers and provides a solid SOA environment and architecture and the corresponding expansion to satisfy the changing demands. **(Conforms)**

	Section 4.2, P8: ● "By broadening the scope of SOA to also encompass the business levels helps to ensure department can interoperate to deliver a more agile, effective and efficient government overall."	
2. Business Relationship Management The Government of Canada should maintain customer relationships, understand their needs and provide services that satisfy their requirement.	Section 5.1, P9: ● "Citizens can access the service they want without the need to understand the intricacies of the government bureaucracy." Section 5.3, P10: ● "Their success requires a clear understanding of how the many services delivered to Canadians impact one another and add-up to the desired Results for Canadians. The formality that GC SOA brings to service orientation augments these efforts."	The Government of Canada provides services that fit the needs of the customers. However, it does not process the relationship management. **(Partially conform)**
3. Service Level Management The Government of Canada should measure the performance against the set goals and use Service Level Agreements (SLA) to measure and compare actual service performance.	Section 6.0, P10: ● "**Business Implications** include changes to government program design and the manner in which they invoke shared services through service level agreements along with the impacts to start-up costs, service sustainability and privacy; plus associated changes to existing operational procedures especially during the transition."	The Government of Canada mentions the use of SLA but does not specify the specific measurement methods and comparison objectives. **(Partially conform)**
4. Availability Management The Government of Canada should guarantee that the	Section 4.2, P8: ● "The private sector and other governments have repeatedly demonstrated the benefits of SOA. The adoption of SOA in accordance with the GC SOA	The GC SOA proposed by the Government of Canada monitors the infrastructure and extends the scope of existing services, streamlining services

services it provides remain available and always serve customers.	can greatly extend the reach and value of existing services, streamline processes, and generate measurable improvements in the efficiency and effectiveness of departments and their service delivery capabilities." Section 6.0, P11: ● "The introduction of the GC Service Oriented Architecture will also give rise to a new GC SOA oversight infrastructure and the need to support community development."	processes and increasing the efficiency in order to ensure that customers are always served. **(Conforms)**
5. Supplier Management The Government of Canada should monitor the relationships of all suppliers to guarantee they comply with contracts and agreements, fulfilling the objectives of the contract and agreement.	Section 6.0, P11: ● "**Technical Implications** include areas such as authentication, authorization and identification with respect to service invocation. Selection of vendor products will now be scrutinized more closely with an eye not just towards satisfying the immediate application requirements, but how well does a particular product blend into a standardized interoperable service-oriented environment."	The Government of Canada mentions the choice of reviewing supplier products but does not monitor supplier relationships and the situation that fulfils contracts and agreements. **(Partially conform)**

Table 5. The table of analysis through ITIL framework.

References:

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Vernadat, F. (2010). Technical, semantic and organizational issues of enterprise interoperability and networking. *Annual Reviews in Control*, 34(1), pp.139-144.