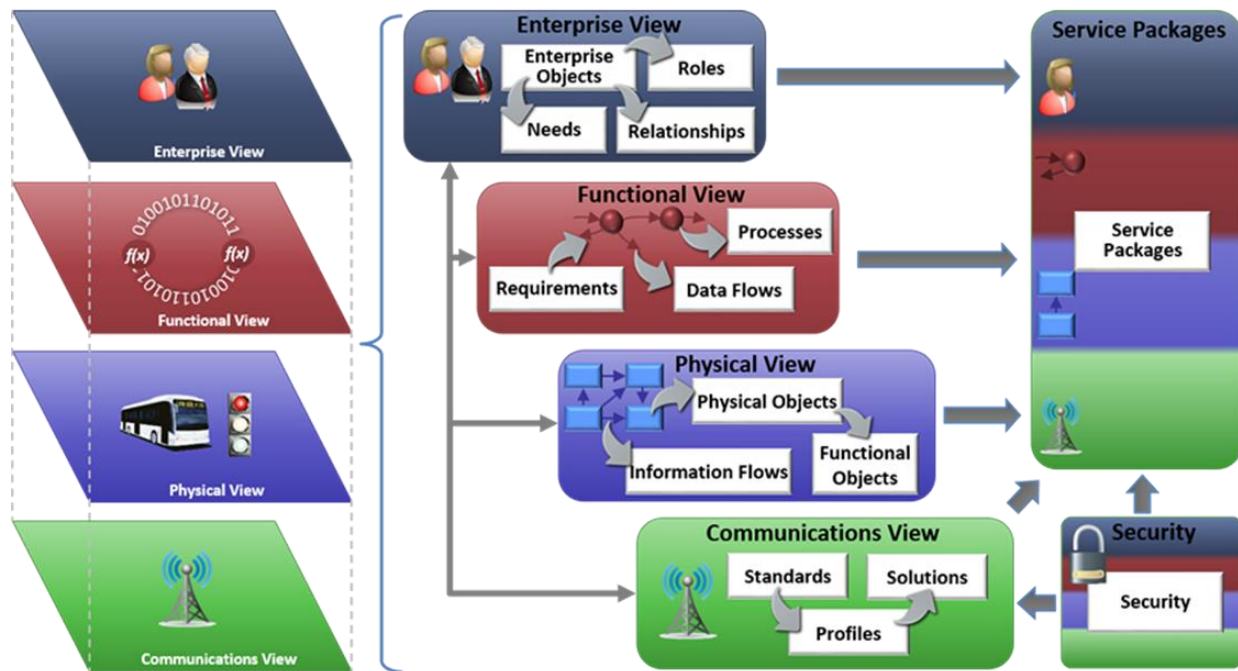TRANSPORT CANADA

UPDATING THE ITS ARCHITECTURE FOR CANADA PHASE II – ENGLISH UPDATE AND SCOPING FOR FRENCH UPDATE

FINALIZED UPDATE APPROACH

NOVEMBER 26, 2019

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FINALIZED UPDATE
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TRANSPORT CANADA

TECHNICAL MEMORANDUM (VERSION 1)

PROJECT NO.: 18M-01683-00
DATE: NOVEMBER 26, 2019

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1 INTRODUCTION

Since the last update to the *ITS Architecture for Canada*, to Version 2 in 2010, the U.S. has subsequently undergone two major revisions and integrated the *Connected Vehicle Reference Implementation Architecture* (*CVRIA*).

The objective of this project is to undertake an English update of the *ITS Architecture for Canada* to re-align with the current *U.S. Architecture Reference for Cooperative and Intelligent Transportation* (*ARC-IT*) and incorporate the recent and substantial Connected Vehicle (CV) related enhancements. The update will provide a framework and tools that have a national and international benefit. The update will:

— Better reflect new and emerging technologies and initiatives;
— Re-align with the current *U.S. ARC-IT* to better support current and future cooperation; and
— Map to current and relevant standards.

This project focuses on developing an updated English version of the *ITS Architecture for Canada*, including working *RAD-IT* and *SET-IT* tools. As was similarly done for the previous Version 2 update in 2010 (*CAN_V2*), the choice to defer a French version is based on the following:

— Establishes an 'Early Win', as an English version can be prepared with less effort required (as the US architecture is in English) and with a clearer understanding of scope; and
— Establishes a baseline target for a French version, which will allow for a better understanding of the level of effort and amount of translation required.

This Technical Memorandum provides a concise summary of the technical approaches to be followed to complete the update effort. These approaches have been finalized and approved by the Steering Committee established for this project (see in **Table 1**) and were based on the following:

— Assessment of Current Differences and Proposed Update Approach Technical Memorandum (July 24, 2019);
— Stakeholder feedback from Update Approach Review Webinar Series (July30-31, 2019);
— Stakeholder input from online Update Approach Review Surveys (August 8-19 and September 9-13, 2019); and
Subsequent review and analysis of the above findings and feedback.

Overall, the finalized technical approach, detailed in **Section 2**, fully aligns with the current U.S. ARC-IT Version 8.3, and is structured to minimize of the Canadian architecture content and easily facilitate adoption of subsequent updates and changes in the U.S. architecture.

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Table 1: Project Steering Committee

Member Name	Agency/Company
Peter Allaby	Crandell Engineering
Oliver Audet	Ville de Montréal
Richard Beauregard-Long	NB Department of Transportation and Infrastructure
Pierre Bolduc	Infrastructure Canada
Brigid Canil	BC Ministry of Transportation and Infrastructure
Richard Chylinski	Parsons
Selma Coban	Ministère du Transport du Québec
Jonathan Foord	City of Winnipeg, and subsequently KPMG
Trevor Hanson	University of New Brunswick
Keenan Kitasaka	Associated Engineering
Barry Pekilis	National Research Council (NRC)
Amanda Price	Yukon Government
Pierre Rasoldier	Transport Canada
Tony Qiu	Tony Qiu, U of A / ActiveAurora
Rajeev Roy	Regional Municipality of York

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2 FINALIZED TECHNICAL APPROACH FOR UPDATE

2.1 STRUCTURE AND ORGANIZATION

The updated version of the *ITS Architecture for Canada* will subsume the most recent *US ARC-IT* (i.e. Version 8.3), and as such will support the same organization and the following four (4) complimentary and related views:

— Enterprise View
— Functional View
— Physical View
— Communications View

Service Packages represent slices of the Physical View, and help organize and provide linkages between all views, and the updated version of the *ITS Architecture for Canada* will adopt and conform to the organization and groups of Service Packages in the current *US ARC-IT*.

2.2 NEW AND UPDATED ARC-IT_V8 SERVICE PACKAGES AND SUPPORTING ELEMENTS

As documented in the previous Assessment of Current Differences and Proposed Update Approach Technical Memorandum, there are forty-five (45) new Service Packages that have been added to the U.S. architecture since the previous *CAN_V2* update. Additionally, the majority of the remaining common Service Packages have themselves been updated or modified in some way (e.g. added functionality and interfaces related to connected vehicles).

These new additions and modifications at the Service Package Level are correspondingly supported by many new and/or modified lower level elements within *ARC-IT_V8* (i.e. physical objects, information flows, and functional objects) that have been added to support these new Service Packages, as well as the Service Packages that have been modified since US_V6.

The updated version of the *ITS Architecture for Canada* will subsume all of the most recent *US ARC-IT* (i.e. Version 8.3) elements and supporting material (see **Table 2**)

Table 2: Summary of the Scope of U.S. ARC-IT Adoption

Element Type	Count
Service Packages	141 Total (137 core US, 4 linked to Australia)
Physical Objects	139 Total (135 core US, 4 linked to Australia)
Information Flows	809 Total (793 core US, 16 linked to Australia)
Functional Objects	361 Total (355 core US, 6 linked to Australia)

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2.3 CANADIAN-UNIQUE FUNCTIONALITY

Based on previous experience, and in line with guiding principles of minimizing ongoing maintenance and facilitating adoption of future U.S. updates, the approach for the current update is to ensure that all unique elements are isolated to separate Canadian-specific Service Packages. In this way, all Service Packages that the new architecture has in common with ARC-IT reflect a complete 1-to-1 mapping, and this can be maintained through subsequent U.S. updates.

The Assessment of Current Differences and Proposed Update Approach Technical Memorandum identified a number of Service Packages that were assessed as either fully or partially unique in comparison to the current version of *US ARC-IT*. Based on stakeholder feedback (e.g. through webinars and surveys), and through a process of warrant analysis and detailed comparison with ARC-IT, the updated version of the *ITS Architecture for Canada* will include the Service Packages identified in **Table 3**.

Table 3: Canadian Unique Service Packages

Shortform	Name	Overview
CVO101	International Border Registration	Address the portions of registration in programs for expedited border crossings for shipments and travelers, which are not accounted for in *ARC-IT*'s CVO05 International Border Electronic Clearance Service Package.
CVO102	International Border Coordination	Address the portions of international coordination between border agencies, which are not accounted for in *ARC-IT*'s TM23 Border Management Systems Service Package.
TM101	Signal Enforcement	Fully address the functionality and intent of the ATMS102 Signal Enforcement Service Package from Version 2 of the *ITS Architecture for Canada*.
WX101	Roadway Micro-Prediction	Fully address the functionality and intent of the MC101 Roadway Micro-Prediction Service Package from Version 2 of the *ITS Architecture for Canada*.

For each of the unique Canadian Service Packages, lower level elements and supporting material will be developed and defined to support all four ARC-IT views (see **Section 2.1**).

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2.4 OTHER NON-FUNCTIONAL CONSIDERATIONS

The Assessment of Current Differences and Proposed Update Approach Technical Memorandum identified a number of non-functional areas where, in the past, the Canadian and U.S. architectures differed, including spelling (e.g. Center and Traveler vs. Centre and Traveller), a limited number of element names (e.g. HAZMAT vs. Hazardous Materials), and the use of local or program names (e.g. State vs. Province, U.S. Food and Drug Administration (FDA) vs. Canadian Food Inspection Agency (CFIA) and the Department of Health Canada (Health Canada)).

These non-functional differences, particularly as they relate to common services and elements, can lead to potential confusion for users of both architectures, as well as results in something other than 1-to-1 mapping, which impacts maintenance and the ability to easily adopt U.S. updates to elements in common between the architectures.

Given the above considerations, stakeholder feedback was receptive to the following approaches that will be followed for the update for the *ITS Architecture for Canada*:

— **Spelling**: U.S. spelling will be used;

— **Element Names**: The names from ARC-IT will be used in all cases; and

— **Country-specific References**: Instances of such cases in element descriptions in ARC-IT will be inventoried and a technical memorandum developed with suggested changes to either remove the reference, make the reference more generic (i.e. not U.S.-specific) or inclusive (i.e. including U.S. and Canadian examples). The technical memorandum will be reviewed and discussed with the USDOT for consideration. At our previous meeting earlier in June 2019, the USDOT expressed interest in ensuring ARC-IT is transferable and useable by other countries, and it is hopeful that many of the suggested may be accepted and implemented into the next version of ARC-IT. Any remaining country-specific references that remain in ARC-IT will also be in the *ITS Architecture for Canada*.

As the above differs in how these non-functional considerations were address in Version 2 of the *ITS Architecture for Canada*, to minimize confusion and ensure a clear understanding, an introduction primer on the update will be developed and included with the architecture that will detail the alignment with the U.S., highlighting where U.S. content is included and how it maps to corresponding Canadian references. Additionally, a glossary will document the mapping between U.S. and Canadian terms.