Canada Trade Intelligence Assistant (CTIA)

The CTIA project pivots Global Affairs Canada (GAC) and the Trade Facilitation Office (TFO) from static trade reports to dynamic, AI-driven intelligence. This modular, multi-agent platform is designed to automate complex data synthesis, providing GAC staff with instant, actionable clarity for faster decision-making, better policy support, and improved export promotion for Canadian SMEs.

Business Statement and Challenge Alignment

Problem Statement:
GAC and TFO analysts spend hours manually reviewing fragmented trade data from Statistics Canada, CBSA, and CFIA. Critical trade signals (price shocks, import dependencies, food safety patterns) remain buried and underutilized, hindering quick policy responses and export support.
CTIA Solution:
CTIA acts as an intelligent analyst, capable of orchestrating resilient supply chains. It leverages advanced multi-agent architectures to navigate the dense regulatory thicket, translating raw, siloed data into actionable insights for exporters, policymakers, and trade officers.Challenge
Alignment:
This solution directly addresses the RSL challenge by improving the speed, accuracy, and efficiency of processing and accessing information for public servants. The MVP automates the hardest part of the workflow: understanding massive amounts of trade data and giving GAC staff instant clarity.

Key MVP Features

The Minimum Viable Product (MVP) focuses on automating the core analytical functions of a Trade Officer concerning agri-food import/export inquiries, specifically targeting the fastest path to actionable compliance and market intelligence.

Core CTIA MVP Features
1.HS Code Classification: Automatic, LLM-guided classification of a user-defined product (e.g., 'Fresh Potatoes') into the correct 8-digit Customs Tariff HS Code for downstream use.

2.SPS/FIDO Compliance Check: Real-time query against the CFIA's AIRS data using the determined HS Code and country of origin to instantly provide a list of required phytosanitary certificates, permits, or soil restrictions.

3.Dynamic Market Trend Visualization: Automated plotting of monthly import/export volume trends by HS Code, sourced from Statistics Canada, to instantly visualize market shifts (e.g., US demand decline vs. Mexican demand rise).

4.Duty and Incentive Lookup: Calculation of base duty rates (MFN, GPT, CUSMA) and flagging of relevant trade incentive programs (e.g., Duties Relief Program) for the specified trade flow.

5.Buyer/Supplier Identification: Scout-level search against the TFO Canada exporter/importer database to identify potential partners in the target market based on the agri-food commodity.

CTIA Architecture

The CTIA architecture is conceptually layered into three stages to clearly separate data input, agent processing, and final output experience.

The Ingestion Layer (The "Senses")
•What it does: Constantly 'listens' to and structures the core trade datasets.
•Key Specific: Separates 'static' data (legislative RAG, policy reports) from 'dynamic' signals (real-time price shocks, truck queue data, monthly trade volumes) to ensure the intelligence layer operates on fresh context.

The Intelligence Layer (The "Brain")
•What it does: This is the multi-agent core where planning, research, and synthesis occur.
•Flow: The Orchestrator breaks down the user's prompt, routes tasks to specialized Researcher Agents (Compliance, Logistics, Tariffs), and the Synthesizer combines these findings into a coherent, single-source answer.

The Experience Layer (The "Interface")
•What it does: Presents the final visualization and actionable one-pager.
•How it is presented: Presents the final output as a dynamic chart and a "Day in the Life" one-pager, focusing on time-saving and usability, e.g., a "Green Cashew Export Strategy" document with guardrails embedded into the system.

The Intelligence Layer: Multi-Agent Roles and Data Sources

Agent	Role	Goal / Task	Key Data Source	Context
Supervisor Agent (The Orchestrator)	Workflow Management	Analyzes user input (LLM) and routes state (Compliance vs. Duty Calculation)	LLM Context / Agent State	Manages all agent dependencies and ensures sequential execution

Classification Agent (The Taxonomist)	Taxonomy & Indexing	Determines correct HS Code (e.g., 0801.31) from natural language query	Customs Tariff (Vector Search), StatCan HS Code Guides	Distinguishes product state based on keyword analysis
SPS/FIDO Agent (The Compliance Officer)	Compliance Check	Simulates the AIRS decision tree to return required certificates/restrictions	CFIA AIRS Database, Safe Food for Canadians Act (RAG)	Answers "Why is this blocked?" questions with legal citation/explanation
Market Scout (Market Intelligence)	Sourcing Specialist	Scrapes/queries TFO Canada data to find potential buyers or suppliers Scrapes the Trade Commissioner database to find Trade Commissioner contacts in/outside Canada	TFO Canada Exporter/Supplier Search Database Trade Commissioner in/outside Canada Database	Resourceful, investigative specialist focused on widening the funnel of partners
GAC/TFO Strategic Agent	Signal Detection	Visualizes volume trends; monitors farm-gate vs. global export prices	Statistics Canada Trade Data, TFO Exporting Food to Canada Guide (RAG)	Learns soft requirements (packaging preferences) from TFO RAG ingestion
The Logistics Agent (The "Port Authority")	Supply Chain Visibility	Monitors real-time truck queue data at key land ports (e.g., Lacolle, Windsor)	CBSA Border Wait Times (BWT), Port Vancouver Metrics	Provides critical timing data for trucking and port operations
Trade product pricing Agent	Product Price Visibility	Monitors real-time retail pricing data	Monthly Real-Time Food prices	Provides critical pricing data for retail products

Duty and Incentive Agent (The Accountant)	Fiscal Compliance	Calculates base duty rate; advises on incentive programs (e.g., Duties Relief Program)	CBSA Duties & Taxes Calculator,Tax Relief	Applies “Lesser of Two” rule for drawback calculations

Challenge Application

Statement 4:

Clients have a wide variety of communication needs, and interactions with the government can be challenging and frustrating and exacerbate existing barriers.

Design a solution to communicate with people in a way that is accessible to a wide range of languages, cultures and/or abilities.

Submission Title

Canada Trade Intelligence Assistant (CTIA)

Submission Description (50 words maximum)

CTIA uses multi-agent AI to streamline agricultural trade by unifying fragmented data and bridging communication gaps between government agencies and diverse global traders. By making trade information accessible to everyone, we remove costly barriers to entry, improving outcomes and successfully diversifying Canada’s international market.

Short explanation of how the solution solves the stated problem and could be applied to a real-world setting (100 words maximum)

CTIA bridges the gap between fragmented government data and global traders using multi-agent AI to synthesize complex trade market information into clear strategies. This technology enables Trade Commissioners and TFO officers to provide instant, accessible guidance to clients regardless of language or ability. In a real-world setting, an officer can generate a compliant 'Mango Export Strategy Roadmap' for a SME in the Philippines in seconds. By replacing multiple portals with a single, inclusive interface, CTIA bridges digital literacy gaps, enabling government agents to facilitate trade efficiently and diversify Canada’s markets.

Short explanation of the data used to produce the solution. Make special note if any of this data is sensitive. Please be specific (75 words maximum)

We rely strictly on Open Source Intelligence (OSINT), ingesting public data from CFIA AIRS, CBSA Customs Tariffs, Statistics Canada, Trade Facilitation Office,Global Affairs Canada and federal acts from the Department of Justice like the Safe Food for Canadians Act. The solution requires no PII or sensitive government data. This low-risk data structure eliminates security

clearance barriers, ensuring the platform is immediately deployable and compliant with privacy standards.

Short explanation of how the solution was designed to consider bias in the outputs (75 words maximum)
We mitigate generative bias through Retrieval-Augmented Generation (RAG). Unlike standard LLMs, our agents do not 'invent' advice; they strictly retrieve deterministic legal texts. We enforce standardized HS Code taxonomies to ensure commodities from developing nations receive the exact same objective analysis as G7 nations. This guarantees 'Fact-Based' outputs driven by treaty status (MFN/GPT) rather than historical AI biases.
Short explanation of how you have considered data protection (75 words maximum)
Our solution utilizes Privacy-by-Design with a strict 'Zero-Retention' policy. All interaction data is encrypted (TLS 1.3), processed solely in volatile memory, and purged instantly after use. We explicitly do not use client data for model training. This guarantees that sensitive commercial intent and trade secrets remain private, eliminating data leakage risks for businesses.

Explain how the solution has the potential to bring demonstrable positive benefits to clients and society (100 words maximum)
CTIA unlocks global economic potential by transforming complex trade information data into clear, actionable opportunities. This removes economic entry barriers for SMEs, fostering competition and resilience. For the government, the platform serves as a force multiplier, automating technical research so officers can focus on strategic support. Crucially, CTIA champions social equity with our multilingual, plain-language interface ensures equal access for non-native speakers and those with lower digital literacy. This fulfills G7 inclusivity mandates by guaranteeing that every Canadian business has the tools to succeed globally.

Describe how your solution has incorporated responsible AI principles (75 words maximum).
We incorporated OECD principles of Transparency and Accountability while developing CTIA, enforcing a 'Citation-First' framework. Every AI-generated insight is hyperlinked directly to the source statute, ensuring total traceability and instant verification. We prioritize Robustness through a 'Supervisor Agent' that detects ambiguity, automatically triggering a Human-in-the-Loop review for edge cases. This design empowers users to make informed decisions rather than ceding control to the AI.

Is this solution limited to use by a single organization? Explain briefly (50 words maximum)
No.
While optimized for import/export clients, Global Affairs Canada and TFO, the architecture is Agency-Agnostic. It functions as a modular platform applicable to Customs Brokers or international agencies.The underlying engine is universal and organizations can adapt it for diverse operational goals by simply connecting the system to their unique trade data libraries.

Is the solution set up to work with existing systems or processes? Explain briefly (50 words maximum)

Yes.

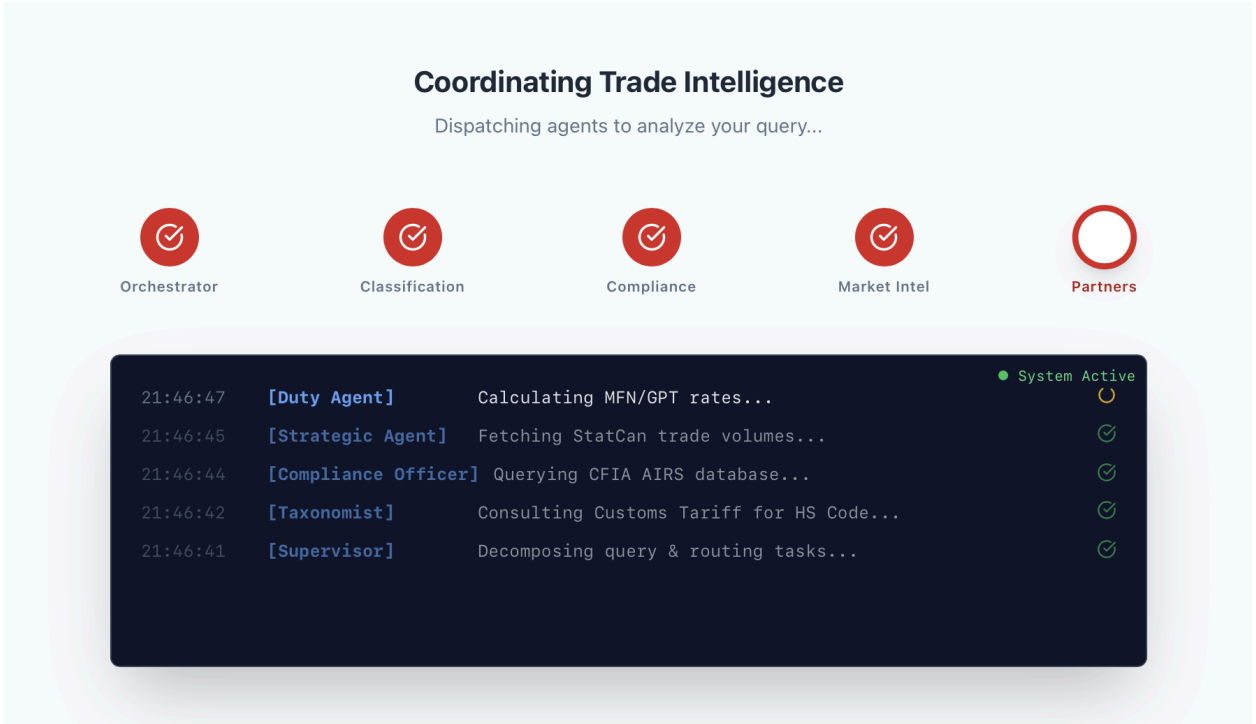
CTIA is designed as a Non-Invasive Overlay. It integrates via standard APIs to work alongside legacy databases such as AIRS, CARM, Canadian International Merchandise Trade Web Application etc. rather than replacing them. This allows immediate, low-risk adoption within government IT ecosystems without requiring disruptive or expensive backend re-engineering.

Describe how the model came to the outputs and/or decisions (100 words maximum)

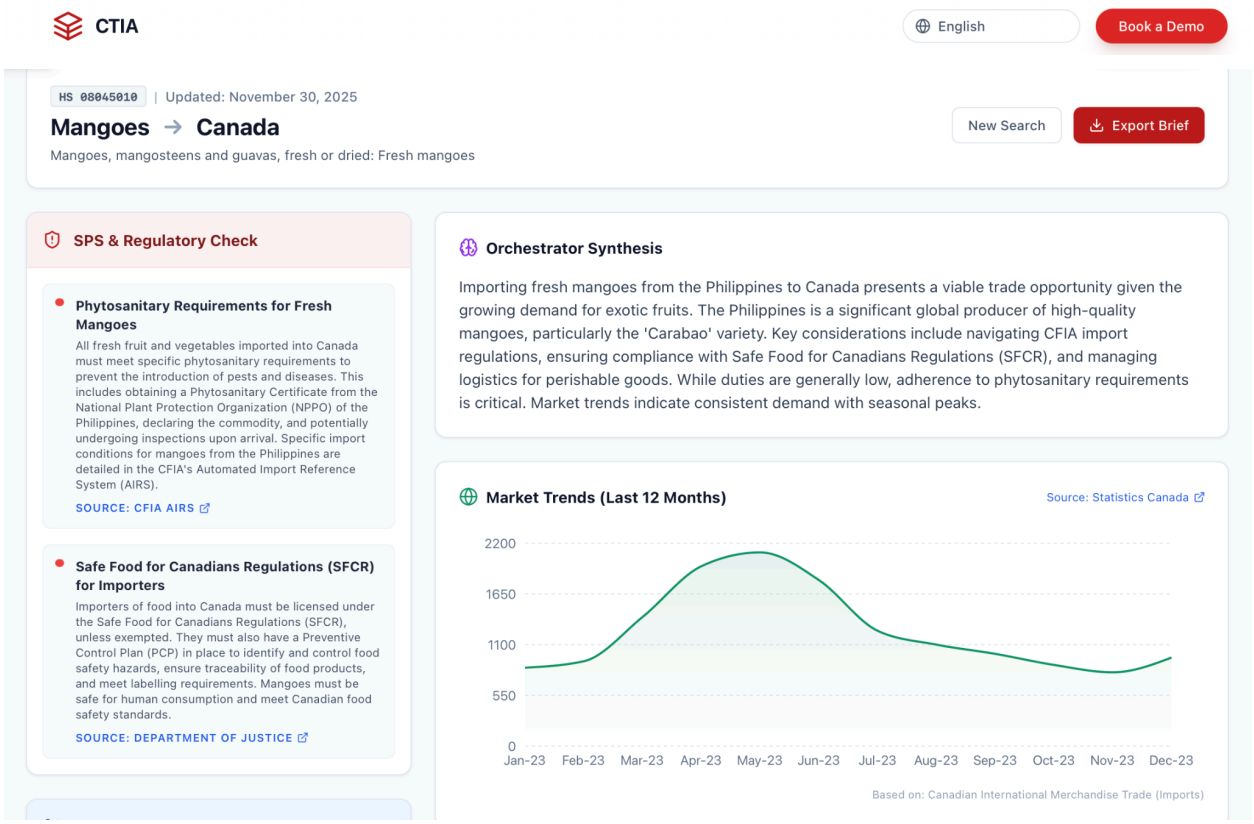
The system employs a verifiable Chain-of-Thought workflow.

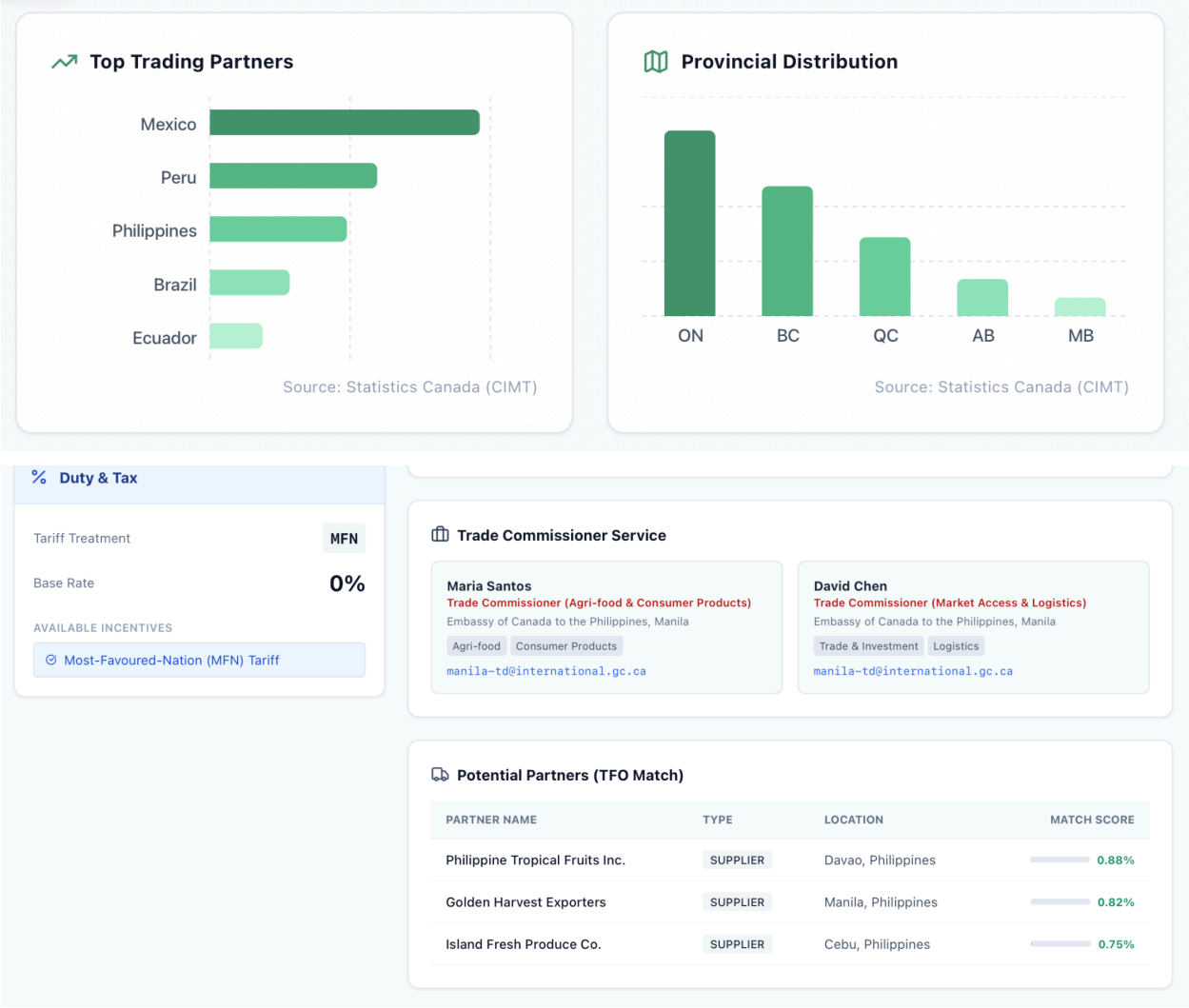
First, the core model orchestrates the request by parsing user intent.

It then decomposes the problem, delegating tasks to specialized, deterministic agents that query hard data sources like Tariff APIs and AIRS.



Finally, a 'Plain Language Synthesizer' aggregates these findings. This ensures the output is a translation of verified facts rather than a probability-based guess, providing users with a transparent, auditable decision trail they can trust.





How can this solution be expanded to serve more users, clients, regions or use cases? Explain briefly (75 words maximum)

The platform's Microservices Architecture ensures rapid horizontal scaling. Expanding to new regions such as the Indo-Pacific region or EU involves simply integrating localized datasets. Similarly, new functionalities such as real-time port operation logistics for supply chain visibility are added by deploying specialized agents without disrupting existing services. This modularity allows the system to evolve alongside changing global regulations, serving diverse client bases without core system downtime.

Can the solution be easily updated to add more features? Explain briefly (75 words maximum)

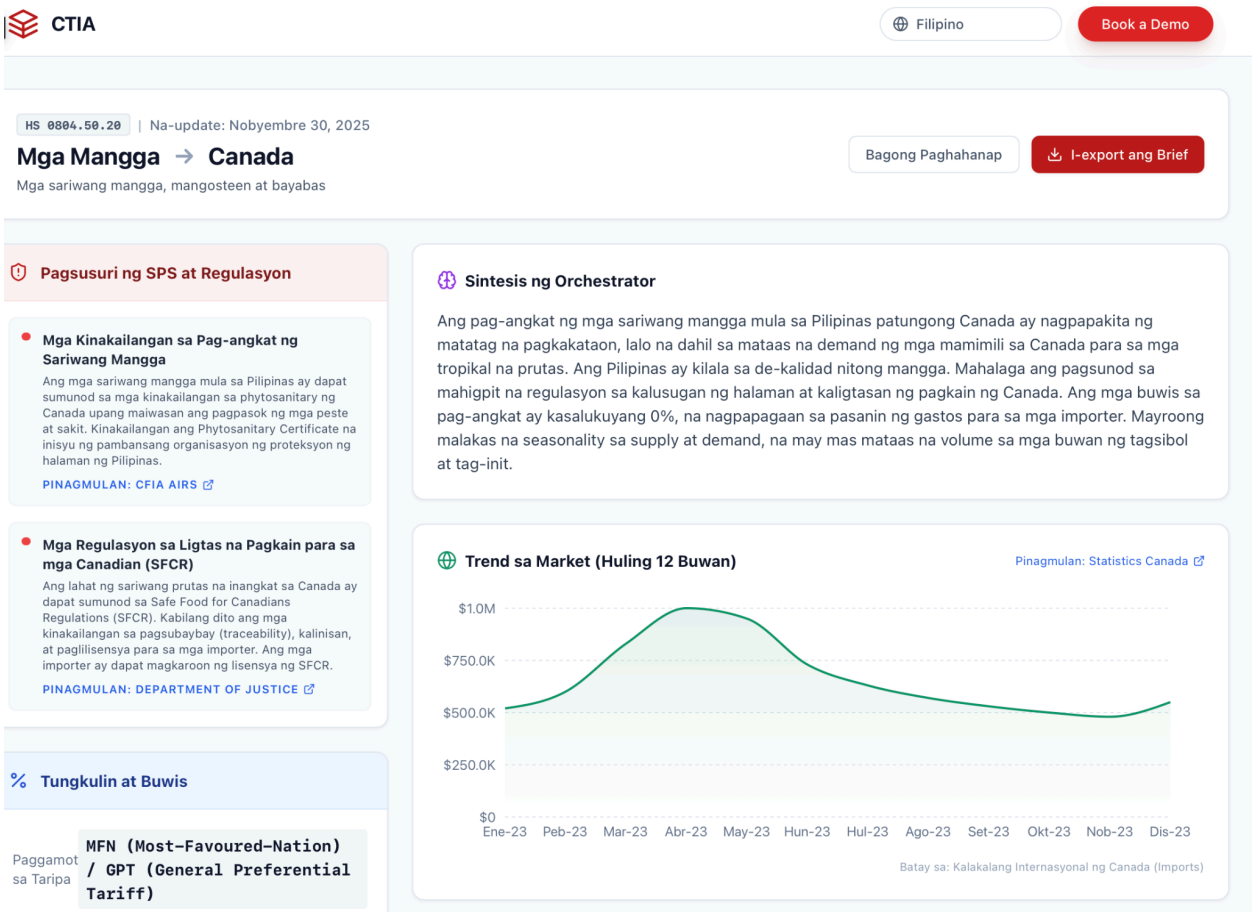
Yes.

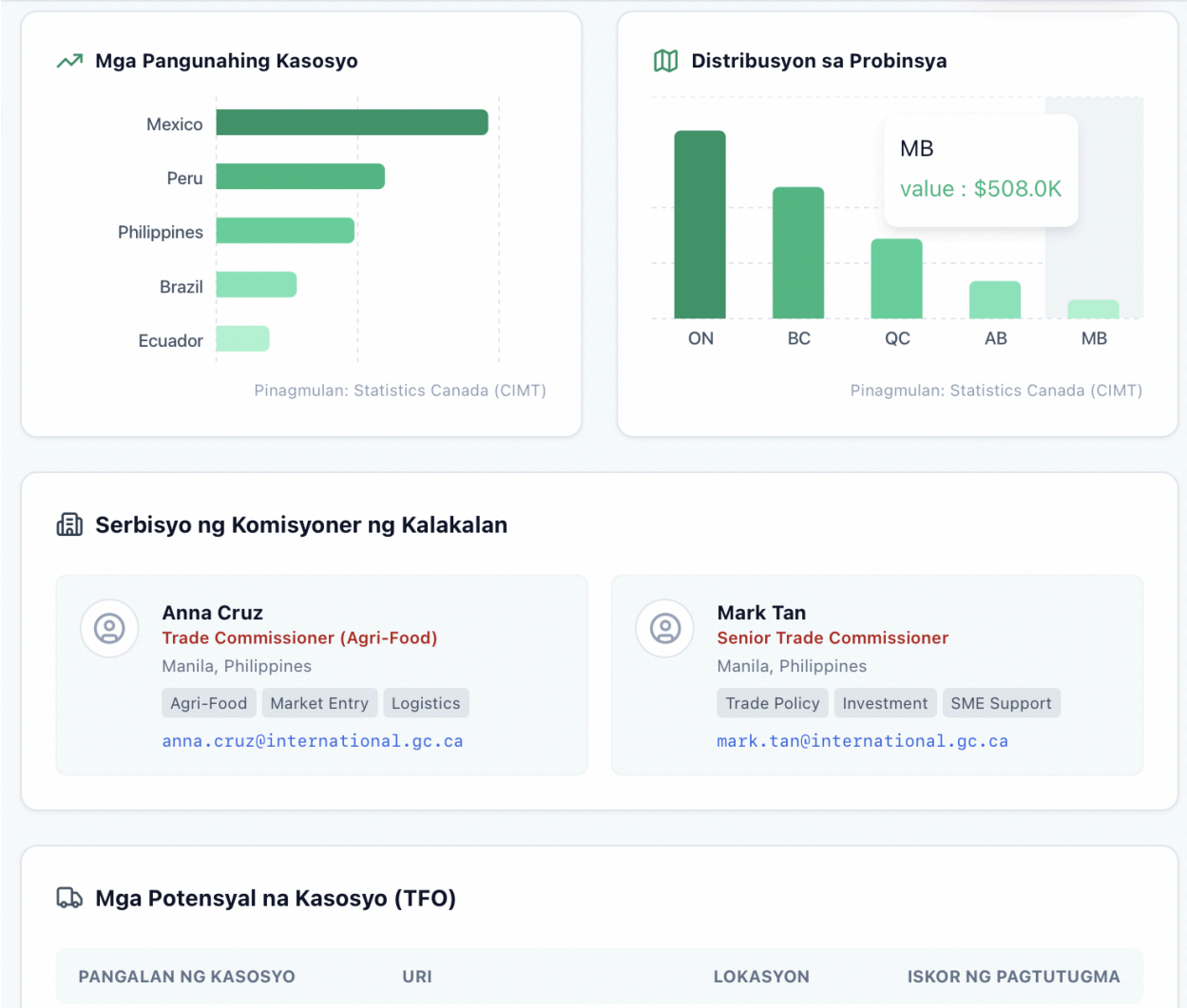
The system separates execution logic from regulatory data. We handle policy updates like MFN (Most-Favoured-Nation), CUSMA revisions by updating the vector knowledge base, eliminating the need for complex software patches. Furthermore, new features like logistics support or a real-time import/export product prices can be added on demand as modular agent skills. This

allows the platform to remain agile and responsive and evolve continuously without downtime or expensive re-engineering.

Briefly describe how this solution is accessible for persons with disabilities or varying literacy levels (100 words maximum)
CTIA tackles communication inequity by prioritizing a 'Design for All' strategy. Our Plain Language Engine bridges literacy gaps by converting bureaucratic text into clear, Grade 8-level guidance. We ensure technical inclusion through strict WCAG 2.1 compliance for assistive devices. Furthermore, our Multilingual AI empowers diverse immigrant business owners to navigate regulations in their native language. This ensures that essential government services are equitable and accessible to users regardless of disability or language origin.

Accessibility for multi-lingual (Example: Filipino)





How much effort will it take to shift this solution to an implementable product? Include an estimate of the number of personnel-hours as well as any assumptions that should be considered to initiate a pilot deployment within government (100 words maximum)

We project 1,200 engineering hours (3 FTEs) to deliver a government-ready Pilot in 12 weeks. This accelerated timeline is achieved via our composable agentic architecture. By orchestrating pre-validated AI components rather than training monolithic models from scratch, we eliminate foundational R&D latency. The critical path executes API Gateway hardening and Vector Knowledge Base construction (Weeks 1-4), transitions to rigorous Security Assessment & Authorization (SA&A) (Weeks 5-8), and concludes with WCAG 2.1 Compliance and UAT (Weeks 9-12). While access to target sandbox environments (specifically CFIA's AIRS, CBSA's CARM, and StatsCan's CIMT) is preferred for end-to-end validation, we explicitly mitigate provisioning delays via Mock Service Virtualization. We will deploy a containerized API gateway seeded with synthetic trade data to simulate regulatory and financial logic. This architectural decoupling ensures development velocity is maintained regardless of government IT lead times, allowing us to validate critical logic without ever exposing live production systems to risk.

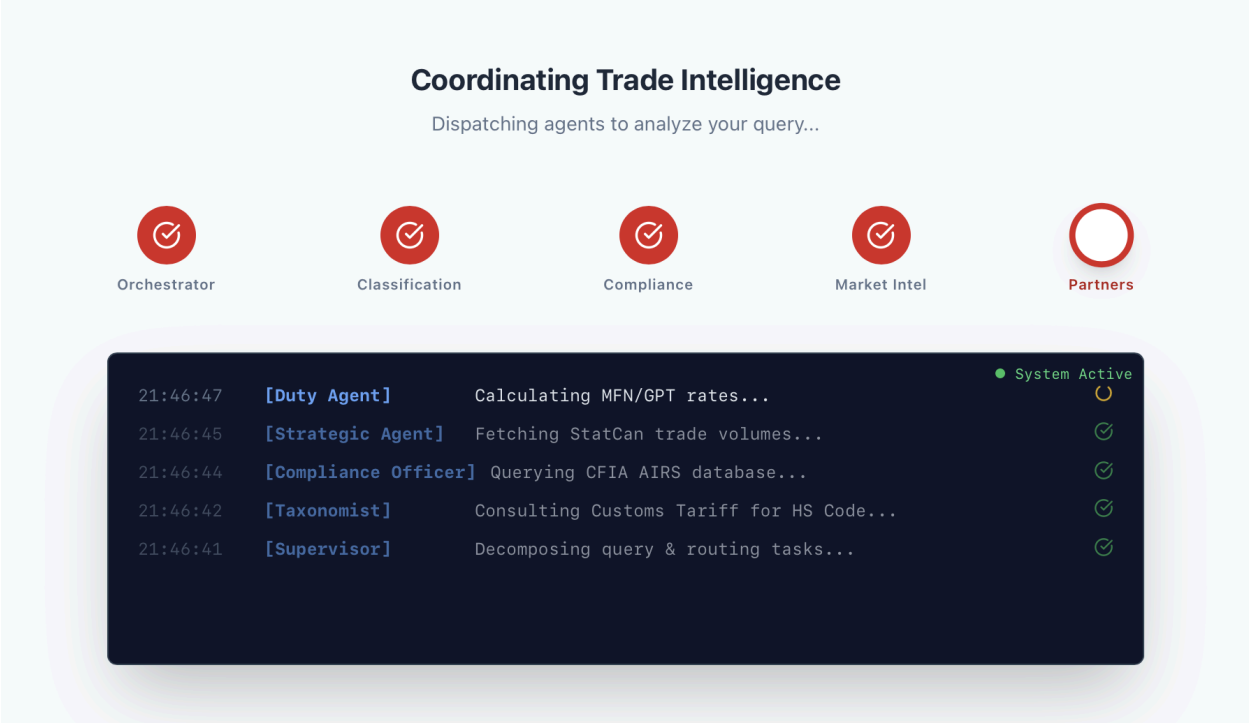
How did you incorporate human-centred design principles? (75 words maximum)
We anchored our design in Service Journey Mapping by identifying the cognitive load of cross-referencing disjointed data as a primary friction point. To address this, we implemented Progressive Disclosure, presenting clear, conversational insights first while keeping deep technical data accessible on demand. Furthermore, we prioritized Intent Recognition, allowing users to query in natural language (example: 'Import mangoes from Philippines') rather than requiring rigid HS code lookups. This design shifts the burden of complexity from the user to the AI, ensuring true accessibility.

Describe how you documented system development and operation (75 words maximum)
Our documentation strategy relies on Living artifacts. We map every feature to user needs via dynamic PRDs and capture engineering context through Architecture Decision Records (ADRs). Operationally, we standardize agent interfaces using OpenAPI Specifications. Crucially, the system logs the AI's 'Chain of Thought' for every interaction, providing a transparent, verifiable audit trail of all decision-making.

Script

The G7 Leaders' Statement on AI for Prosperity explicitly calls on us to "close the digital divide" and support SME adoption of AI. When government communication is too complex, we fail that mandate.
That is why we built the **Canada Trade Intelligence Assistant (CTIA)**. Designed for the GovAI Grand Challenge, CTIA uses multi-agent AI to unify trade data, making it accessible to everyone, regardless of language or ability.

Here is how it works.



The process follows a strict five-stage pipeline through a verifiable Chain-of-Thought workflow.

1) It begins with the Orchestrator. As seen in the system logs, the Supervisor agent decomposes your natural language query such as in this case.
   You want to import mangoes from the Philippines to Canada

It then delegates tasks to specialized, deterministic **Agents parallelly**.

Instead of navigating five different portals, a Trade Commissioner or client simply asks a question in natural language. In seconds, the system synthesizes a compliant trade strategy roadmap.

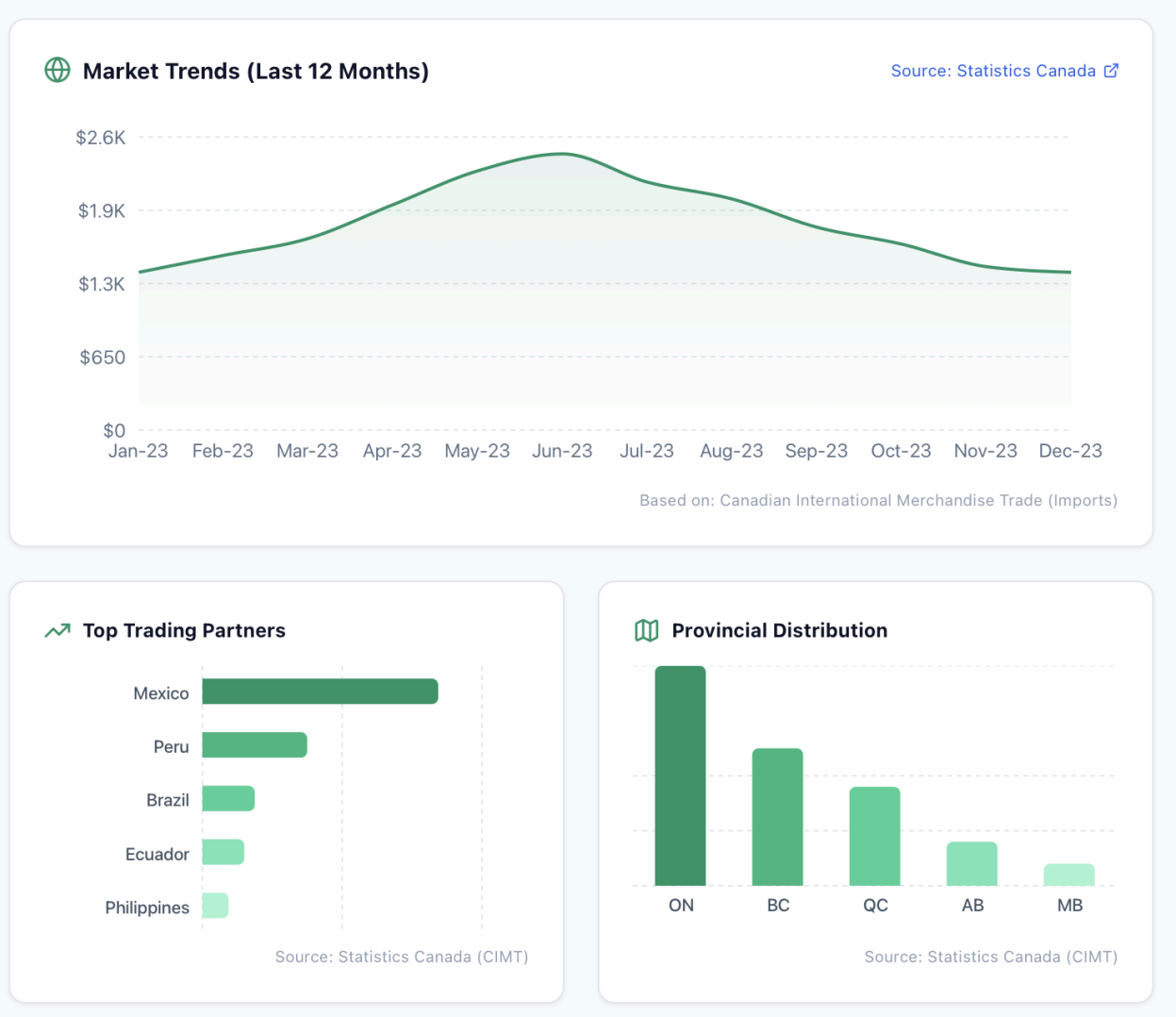
2) Next, we move to Classification.

Our Taxonomist agent consults the Customs Tariff to identify the correct Harmonized System (HS) Codes. This ensures we are talking about the exact same commodity as the border agents.

3) Then, we verify **Compliance**.

The Compliance Officer queries the CFIA AIRS database to check for safety regulations, permits, and labeling requirements. It retrieves this strictly from official Open Source Intelligence (OSINT) repositories.

4) Simultaneously, the **Strategic Agent** generates **Market Intelligence**.



By pulling live data from Statistics Canada, it visualizes **Market Trends** to identify seasonal price peaks and tracks **Top Trading Partners** to assess your competition. It even maps **Provincial Distribution**, showing you exactly where the highest demand is so you can optimize your supply chain logistics. It even maps **Provincial Distribution**, showing you exactly where the highest demand is whether that's in Ontario or British Columbia, so you can optimize your supply chain logistics.

5) Finally, this intelligence is synthesized for our **Partners**.
Whether you are a Trade Commissioner or a TFO client, the system aggregates these findings into a clear, plain-language roadmap, along with key contacts to facilitate the

process.

Orchestrator Synthesis

Importing fresh mangoes from the Philippines to Canada presents a viable trade opportunity, leveraging the Philippines' strong agricultural sector for tropical fruits. Key considerations include adherence to Canadian food safety regulations, particularly those enforced by the CFIA, and managing logistics for perishable goods. The market for mangoes in Canada shows consistent demand with seasonal peaks, and the Philippines is a recognized supplier. Importers should focus on quality control, phytosanitary requirements, and efficient supply chain management to succeed.

Trade Commissioner Service

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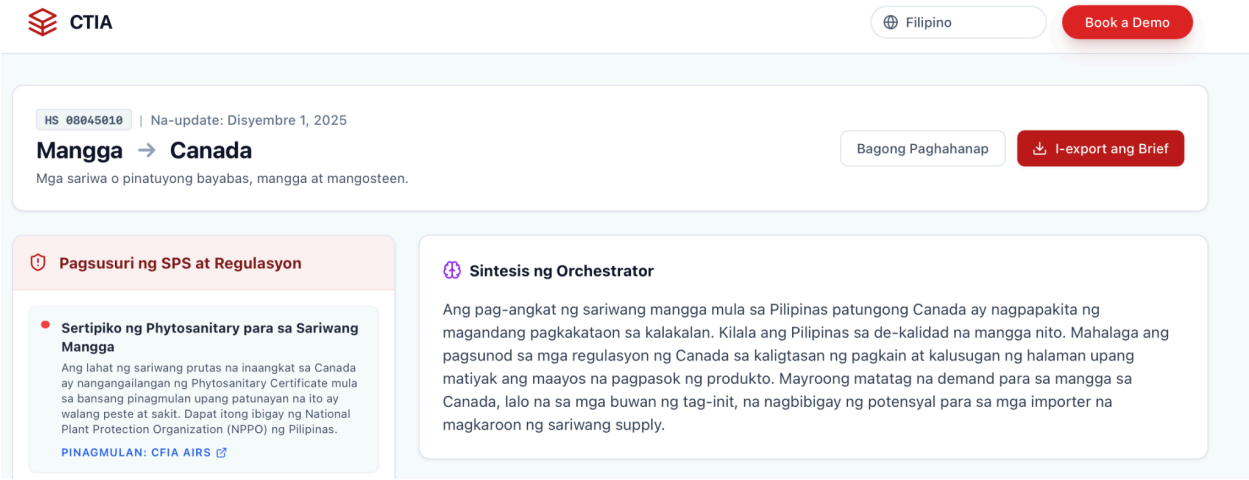
Potential Partners (TFO Match)

PARTNER NAME	TYPE	LOCATION
Fresh Harvest Imports Inc.	Food Importer/Distributor	Toronto, ON
Pacific Produce Wholesalers	Fruit & Vegetable Distributor	Vancouver, BC
Global Grocers Supply	Wholesale Food Supplier	Montreal, QC

To ensure **Explainability**, we use a "Citation-First" framework. Every insight is hyperlinked directly to the source statute. This aligns with the G7's focus on **Transparency**, allowing officers to audit the decision trail instantly.

CTIA is designed with **Accessibility** in mind. The system converts bureaucratic language into Grade 8-level guidance. It is fully multilingual and **WCAG 2.1 compliant**, ensuring that immigrants and persons with disabilities have equal access to government services.



We also adhere to strict **Privacy-by-Design**. We have a **Zero-Retention policy**: data is encrypted, processed in volatile memory, and purged instantly. We never use client data to train our models, protecting commercial trade secrets.

While we started with Canadian data, the architecture is Agency-Agnostic. We can expand to support the **Indo-Pacific strategy** or our G7 partners simply by connecting new regulatory datasets.

By reducing research time from days to seconds, we empower officers to focus on strategy rather than paperwork. We lower the barrier to entry for SMEs and enable a more diverse, resilient supply chain.