II

Chapter 6

Technical Feasibility Of Artificial Intelligence-Based Technology For Implementing International Agreements

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Abstract

This article assesses the feasibility of deploying artificial intelligence (AI) to enhance treaty compliance within the complex U.S.–Mexico bilateral relationship. Faced with escalating administrative burdens, AI offers the potential to process vast data, detect anomalies, and optimize compliance mechanisms. However, significant obstacles exist, including the divergence between U.S. common law and Mexican civil law traditions, conflicting data protection regimes, and ethical challenges such as algorithmic bias. This paper proposes a technically feasible, multilayered reference architecture for a binational AI system designed to mitigate these risks through robust governance and human oversight. It concludes that successful implementation depends not only on technology but on a pragmatic, incremental roadmap, starting with joint regulatory sandboxes, to build institutional trust and ensure that AI-driven compliance remains accountable, transparent, and aligned with the legal values of both nations.

I. Introduction

The bilateral relationship between the United States and Mexico represents one of the most intricate and consequential frameworks in contemporary international law. The two nations share a 1,954-mile border across which almost a trillion dollars in goods move each year, a scale of activity that inevitably imposes extraordinary administrative burdens (United States Trade Representative [USTR], n.d.). Not surprisingly, the story of this relationship spans a transformation from the negotiation of tariff schedules into a dense legal and regulatory web involving non-tariff barriers, rules of origin, labor standards, environmental mandates, and security protocols. However, compliance with these obligations stretches institutional capacity on both sides of the shared border. With physical inspections limited to a small fraction of total cross-border commerce,

vast opportunities remain for fraud, evasion, and non-compliance (Breña, 2025). The challenge is not only legal but logistical, demanding mechanisms that must be capable of processing and verifying massive amounts of data.

At the same time, public administration globally is undergoing a profound transformation in the digital realm. Understandably, governments increasingly seek to replace legacy, analog structures with integrated, data-driven systems designed to improve efficiency, accessibility, and responsiveness (Thomas, 2024). The COVID-19 pandemic accelerated this transition, creating an environment where digital technologies were no longer optional but necessary (Yukhno, 2022). Within this new paradigm, artificial intelligence (AI) and machine learning stand at the center of efforts to modernize. These technologies promise to identify patterns and anomalies and make predictive judgments at a scale beyond human abilities. When these technological capabilities are juxtaposed with the escalating complexity of U.S.–Mexico obligations, especially obligations arising from treaties, the question emerges: can AI be deployed to improve, or even fundamentally restructure, treaty compliance? In this context, compliance is no longer only a matter of interpreting text against precedent or statutory code, but it becomes a large-scale problem of data integration, collection, monitoring, and analysis.

The aim of this article is to assess the feasibility of deploying AI systems to support, enhance, and/or potentially replace existing compliance mechanisms in the U.S.–Mexico bilateral relationship. This assessment is not exclusively speculative, but it is rooted in the particularities of the binational legal order between the U.S. and Mexico. Our study will examine whether the barriers to AI-driven compliance are primarily technical (e.g., arising from the current limits of algorithmic reasoning and data processing), or structural (e.g., reflecting the incompatibilities embedded in the two nations' divergent legal and regulatory frameworks). In particular, we consider the breadth of the legal obligations that define the bilateral relationship, spanning quantifiable trade requirements, qualitative environmental and procedural standards, and emerging digital governance challenges. AI technology is analyzed not simply as a mechanism for automating clerical work, but as a reasoning technology

with potential implications for decision-making authority. This raises fundamental legal and normative questions regarding accountability, transparency, due process, and a host of others. This article integrates legal, technical, and policy perspectives, and offers a comparative legal analysis that anchors the discussion, focusing on the interplay between U.S. common law and Mexican civil law traditions.

II. Overview of U.S.–Mexico International Agreements

The legal framework that governs the relationship between the United States and Mexico is best understood not as a unified body of law but as a patchwork of instruments that differ in formality, legal status, and enforceability. Formal treaties, ratified under Article II of the U.S. Constitution with the advice and consent of two-thirds of the Senate, occupy the highest tier of this legal framework (University of Wyoming, n.d.). These treaties, which often cover areas such as extradition or taxation, have the status of federal law within the United States and represent the most formal and binding level of international commitment. Alongside these stand congressional-executive agreements, such as the United States–Mexico–Canada Agreement (USMCA), which require approval by a simple majority in both houses of Congress. These congressional-executive agreements carry the same domestic legal effect as treaties but follow a different legislative process (U.S. Customs and Border Protection [USCBP], 2025-b). Sole executive agreements, concluded unilaterally by the President, are also central to the bilateral relationship. These agreements do not require congressional approval and are often used to manage foreign policy and inter-agency cooperation on more routine matters (University of Wyoming, n.d.). At the most operational level, memoranda of understanding (MOUs) and similar arrangements facilitate day-to-day cooperation between government agencies. While not always binding under international law, MOUs play an indispensable role in coordinating cross-border collaboration in areas such as law enforcement, environmental monitoring, technical standard-setting, and others (Sanchez, 2025, p. 292). Their flexibility and lesser formality allow for rapid

development but also limit transparency and enforceability. The result of all these mechanisms is a dynamic legal landscape in which highly formal commitments coexist with practical, often informal arrangements.

Within this diverse array of agreement mechanisms lie a wide range of substantive compliance obligations. Trade and customs obligations under the USMCA exemplify the data-intensive nature of many of these commitments. Among the more technical obligations, the USMCA establishes detailed rules of origin to determine eligibility for preferential tariffs, imposes labor value content requirements in sectors such as automotive manufacturing, and mandates specific certification and documentation procedures (USCBP, 2025-b). These obligations are highly technical, requiring continuous verification and extensive record-keeping. Environmental cooperation commitments under the USMCA are equally significant. For example, Chapter 24 contains the most extensive environmental provisions ever included in a U.S. trade agreement, requiring the parties to implement multilateral environmental agreements, combat illegal fishing, prevent wildlife trafficking, and address pressing environmental challenges such as air pollution and marine litter (Office of the United States Trade Representative [OUSTR], n.d.).

Other areas of cooperation are governed by formal treaties with stringent procedural requirements. Extradition treaties, for example, stipulate precise evidentiary standards and legal processes that must be followed when one country seeks the surrender of an individual from the other (U.S.-Mexico Security Cooperation Taskforce [USMEXSCTF], 2018). These provisions demand not only strict adherence to legal text but also coordination between judicial and executive authorities. In addition, the USMCA has introduced groundbreaking commitments on digital trade. Chapter 19 prohibits customs duties on digital products, restricts data localization requirements, and guarantees the cross-border transfer of information, including personal data, for business purposes (United States-Mexico-Canada Agreement [USMCA], 2020). At the same time, the USMCA obligates each country to maintain a domestic framework for data protection, creating a potential site of regulatory friction (Leblond, 2022).

a. Status Quo of Supporting Systems

However, the systems currently supporting compliance with these diverse obligations are fragmented and uneven in their development. Historically, U.S. customs administration relied on paper-based processes before transitioning to the Automated Commercial System (ACS), an electronic platform designed decades ago (United States Department of Homeland Security [USDHS], 2006). ACS, though innovative for its time, was primarily transactional in design and relied heavily on Electronic Data Interchange standards, limiting its analytic capacity. Beginning in 2001, modernization efforts shifted toward the Automated Commercial Environment (ACE), intended to serve as a unified platform for trade data and a "single window" for information shared across federal agencies (USCBP, 2025-a). While ACE represented a major step forward, the broader compliance ecosystem remains siloed, with agencies on both sides of the border maintaining separate databases that communicate only sporadically. Data-sharing often occurs through slow, traditional channels such as diplomatic cables or manually updated dashboards (USDHS, 2006).

Where direct exchange exists, as with the U.S.–Mexico Entry/Exit Data Sharing Initiative, it is usually limited to specific, narrowly defined categories of information, such as traveler data (USDHS, 2017). There is still no comprehensive, real-time platform capable of providing a unified view of compliance across the full spectrum of binational obligations. This fragmentation creates inefficiencies and undermines enforcement capabilities and also leaves significant gaps that could be exploited for non-compliance. These shortcomings illustrate precisely the challenges that any AI-based compliance system would need to address: integrating disparate data streams, overcoming institutional silos, and generating timely, actionable insights to ensure adherence to the complex body of agreements governing the U.S.–Mexico relationship.

III. Evolution from Traditional IT to AIEnabled Infrastructure

Implementation of international agreements has long been supported by information technology (IT) systems, although there is a push to evolve these systems from basic IT toward a more intelligent, AI-driven infrastructure. In the NAFTA era (1994–2020), cooperation between the U.S. and Mexico often involved electronic data interchange and database systems to facilitate compliance. For example, customs agencies developed "single window" platforms to exchange import or export data and detect tariff evasion. Environmental agencies shared pollution databases under the Border XXI program. These systems were largely rule-based and required predefined queries. Under these auspices, these systems could flag straightforward discrepancies (such as missing customs declarations, for example) but had limited ability to analyze complex patterns or anomalies and make predictive assessments. Human experts remained central to interpreting data and enforcing treaty obligations.

Over the past decade, as trade volumes and data generation soared, both countries incrementally upgraded their tools. As Palacios & Norton (2024) note, the USMCA's digital trade chapter explicitly acknowledges the importance of digital technologies and data for modern commerce. Companies operating across U.S.–Mexico supply chains routinely use AI-driven analytics to streamline inventories and forecast demand, and the public sector is now keen to emulate this private sector adoption of AI (Palacios & Norton, 2024). Medium-sized manufacturers in Mexico, for example, have integrated cloud computing and AI into production processes aligned with U.S. partners, improving efficiency and creating new cross-border trade opportunities (Palacios & Norton, 2024). These technological advances pressure governments to ensure that the public governance infrastructure keeps pace with the digital transformation that private industry is embracing.

Today, the capabilities of AI are far beyond those of earlier IT systems. For example, whereas a traditional database might store records of water deliveries required by treaty, an AI system can *learn* from decades of hydrological data to predict shortfalls or detect anomalous usage patterns

that could signal non-compliance. Indeed, Maas (2019, pp. 15-16) notes that AI's strengths in pattern recognition and anomaly detection make it well-suited to strengthen international law compliance mechanisms. One example is in arms control, where AI has been proposed to monitor satellite and cyber data for treaty violations (Maas, 2019, p. 17). Similar concepts could apply to U.S.–Mexico agreements. For example, AI could continuously analyze trade data to spot subtle circumvention of tariffs or quotas, or scour environmental sensor data to ensure pollution levels remain within treaty limits.

Crucially, the evolution to AI-driven infrastructure is not merely a technological upgrade, but an entire paradigm shift which requires a transformational approach. It shifts some compliance functions from alerts requiring human review to real-time or even preventive monitoring by machines. For example, U.S. Customs and Border Protection (CBP) is piloting algorithmic systems to automate vehicle inspections at border crossings (Heilweil, 2025). Already, CBP employs AI models to analyze streaming video from inspection sites and automatically identify suspicious objects or cargo, sending real-time alerts to human officers (USDHS, 2025). This represents a leap from earlier random inspections toward risk-based targeting powered by machine learning, optimizing the limited and valuable time of officers. Likewise, Mexico is exploring AI tools for customs and tax enforcement to minimize human error and corruption. In environmental monitoring, what once relied on weekly water samples can now integrate AI analysis of satellite imagery to detect illegal dumping or deforestation in near-real-time, adding a myriad of valuable metrics.

As these examples indicate, the supporting infrastructure for treaty implementation is becoming much smarter. However, with these advances come risks. For example, adopting AI is not simply about efficiency, it also raises the stakes for accuracy and reliability. Early IT systems were deterministic and transparent, and their limitations were well understood, mostly because their functionality was narrow, and highly specific when compared to AI systems. By contrast, AI-systems learn and evolve in ways that can be a "black box" in that their methods are often opaque. Decisions once implemented with hard-coded rules, are now the result

of the multiplication of large matrices and other advanced mathematical algorithms. Although the latter approach may offer novel insights, it may also incur unexpected errors.

IV. How AI Can Enhance, Optimize, or Replace Existing Frameworks

AI can support treaty compliance in three broad modes: enhancement of human-led processes, optimization of systemic efficiency, and partial replacement of certain compliance functions. Each mode carries different legal and practical implications.

a. Enhancement

In the near term, the most realistic role for AI is as a complement to human decision-makers. An AI system can sift through massive datasets far faster than people, flagging issues for further investigation. For example, under USMCA's labor provisions, a bi-national panel reviews allegations that a factory is violating worker rights. The AI system could enhance this process by mining reports, social media, or sensor data in factories to identify indicators of labor violations. For example, it may infer abnormal production surges which might hint at forced overtime. Subsequently, it could alert inspectors or panel members, which could then take action.

Notably, AI excels at anomaly detection, finding patterns that deviate from the norm. In trade compliance, an AI system might learn typical import-export patterns and then highlight shipments that look unusual, taking into account route, value, content, or more. After thorough examination, the AI system could identify discrepancies for customs officers to further examine. A great way to exemplify the current modality of operation is with the CBP's current use of AI to scan cargo and detect anomalies. The AI doesn't seize goods itself, but it vastly improves an officer's ability to intercept illicit shipments by focusing human attention where it's needed most (USDHS, 2025). Similarly, Mexico's tax administration could deploy AI to cross-verify customs data and tax filings, enhancing enforcement of revenue-sharing aspects of bilateral trade.

b. Optimization

AI can also optimize the overall efficiency and accuracy of compliance regimes. This goes well beyond flagging individual cases, or simple tweaks. It means fundamentally redesigning processes with AI at their core. For example, consider the monitoring of cross-border water allocations under the 1944 Water Treaty. Traditionally, IBWC officials must compile water delivery data and manually ensure treaty quotas are met over a cycle. This involves a tremendous amount of manual labor and is error-prone. In contrast, an AI-driven system could optimize this process by continuously monitoring river flow data, from gauging stations and rainfall forecasts (which could amount to hundreds or even thousands of data points), then recommending optimal reservoir releases to both countries to meet treaty obligations while maximizing conservation. By processing more variables than any human team could, AI might improve compliance and resource management simultaneously. In the trade sphere, AI could optimize tariff quota administration by automatically adjusting quota thresholds in response to market conditions (within bounds allowed by the treaty and subject to joint approval).

Another optimization example is automating routine paperwork. USMCA obligates members to streamline customs procedures, and AI-powered document processing, using natural language processing to read shipping documents for example, can dramatically speed up customs clearance. This would benefit compliant traders while quickly spotting and addressing non-compliance.

These optimizations not only fulfill treaty objectives, but they do so more effectively and at lower cost. Indeed, Lopez (2025) suggests that embracing AI in North American trade logistics, from smart customs clearance to supply chain monitoring, is crucial for the region to remain competitive.

c. Replacement

The most ambitious scenario is using AI to replace certain compliance mechanisms altogether, at least in part. It should be stressed that this does not imply replacing human diplomats or judges with AI, as at present, this remains beyond reach and unfeasible. Indeed, such a task would be fraught with legitimacy concerns. Instead, we envision automating sub-processes that were previously manual. This could leverage all the power of AI and its ability to handle complex tasks at scale, while minimizing its weaknesses such as unforeseen errors and opaqueness.

One could imagine, for example, an automated system under an environmental agreement that continuously certifies whether each party is within its pollution targets. If thresholds are exceeded, the automated system could trigger predefined mechanisms or alert the appropriate authorities. In trade, elements of dispute resolution might be handled by an AI mediator for straightforward technical disputes (say, over statistical data discrepancies), reserving human panels for complex legal questions.

Maas (2025, p. 18) suggests that, in the future, an eventual "legal singularity" could take place where AI could render judgments with perfect objectivity. However, Maas rightly cautions that fully automated international law adjudication remains implausible given the nuances of legal interpretation and political acceptance? (Maas, 2019, pp. 19-21). The most realistic and practical approach is, in our opinion, conditional automation, where AI makes a preliminary compliance determination, then passes its assessment off to a human for approval. For example, an AI system could review periodic compliance reports required by a treaty (such as environmental impact reports) and provide an initial compliance score or highlight sections of concern, effectively taking on the first layer of review. This might be considered a replacement of the initial human screening function, though final judgments would still rest with human officials.

It is noted, unsurprisingly, that any move toward fully replacing human processes with AI demands caution. International law relies not only on outcomes but on participants' acceptance of process. Issues like fairness, transparency, and the chance to be heard are paramount in law. Therefore,

even if an AI tool can technically make a compliance determination faster or more accurately, it must be used in a way that preserves due process and state consent. A joint U.S.–Mexico AI system making an automated finding that one side violated an agreement would likely be unacceptable unless both parties had confidence in the system's impartiality and had agreed to its use formally. Thus, the most likely evolution is that AI will augment and streamline compliance (e.g., enhancement and optimization), while any quasi-automated compliance judgments are introduced gradually and always subject to human review. Indeed, as Maas notes, AI is best seen as strengthening international law by mitigating long-standing problems (like information gaps and delays) rather than displacing human legal processes (Maas, 2019, p. 17). At this point, AI should be considered a tool rather than a replacement.

V. AI as a Reasoning Technology

AI's rapid advances, particularly in machine learning and natural language processing, invite the question of whether these systems can perform legal or quasi-legal reasoning in aid of treaty implementation. Modern AI models can analyze language, classify scenarios, and even predict decisions, but do they *reason* in a way comparable to human lawyers or officials?

At the outset, it is important to distinguish between rule-based expert systems and machine learning systems. Early attempts to use AI in law (dating back to the 1980s) often involved encoding legal rules into an "expert system" that could answer questions by logical deduction. Such systems, while useful for narrow tasks (like determining if a set of facts meets a legal definition), were brittle outside their predefined rules. This fragility stemmed from the specific implementation of well-defined rules and the lack of an ability for inference or generalization. Newer AI systems, especially machine learning algorithms and neural networks, do not follow hard-coded legal rules. Instead, these new AI systems infer patterns from data. For example, a machine learning model could be trained on past trade dispute outcomes to predict how a future dispute might be resolved. Notably, one study trained an algorithm on hundreds

of cases from the European Court of Human Rights and reported about 79% accuracy in predicting the court's judgments (Maas, 2019, pp.18-19). This suggests that AI can capture some essential features of legal reasoning by finding correlations between fact patterns and outcomes. Within the U.S.–Mexico context, an AI might predict the result of an investor–state arbitration under USMCA's legacy NAFTA provisions based on past arbitration data. Such predictive analytics could be a valuable tool for government lawyers evaluating the strength of a case or for compliance officials assessing risk. However, *prediction* is not the same as *justification*. AI can forecast what a court or panel might do, but that doesn't mean the AI itself understands the law or can explain its reasoning in acceptable legal terms. Whether AI can properly understand situations as opposed to simply applying large scale statistical and mathematical algorithms is a longstanding debate.

Another aspect of AI's reasoning capability lies in Natural Language Processing (NLP), which has seen dramatic improvements with large language models (LLMs), which take into account vast amounts of textual data to form patterns at unfathomable scales. These models, like the well-known GPT models used in ChatGPT, can summarize documents, answer questions, and even draft text that reads convincingly legal. These models could, for example, read a lengthy environmental impact report, such as one submitted under a treaty's reporting requirements, and provide a condensed analysis of whether the report indicates compliance with the treaty's standards. In doing so, the AI system is effectively engaging in an interpretive act. The AI system would identify relevant legal provisions and apply them to the facts stated in the report. There have been experiments with GPT-style models to interpret regulatory texts or generate legal arguments, and while results are mixed, it is clear that AI can mimic certain forms of legal reasoning. Researchers have even posited using AI to draft treaty language or suggest negotiated solutions by analyzing vast amounts of diplomatic text (Maas, 2019). Indeed, China's Ministry of Foreign Affairs reportedly tested an AI system to assist diplomats with strategy, showing that governments see potential for AI in reasoning through negotiation scenarios (Maas, 2019, p. 17).

However, AI's reasoning remains fundamentally different from human reasoning in ways that are crucial for law, though similarities exist. After all, the inspiration for many AI-models is the way the brain processes data, at least in approximation. That being said, it is generally accepted that AI lacks true comprehension of underlying principles or moral values. Instead, AI operates on statistical associations in its training data. This means an AI might conclude two situations are analogous because the data patterns are similar, whereas a human jurist analogizes based on principle and relevance.

Furthermore, AI cannot easily handle normative ambiguity, where compliance requires value judgments or balancing competing interests. For example, a treaty might require *reasonable* measures or *equitable* treatment. Determining what is reasonable or equitable is a legal question involving context and experience, not a clear rule. It could easily involve a novel context that could not be easily inferred, even from swaths of data. Thus, AI would struggle here unless such terms are concretely defined or past decisions give it a reliable pattern to emulate. Dulka (2023, p. 352) notes that certain legal questions "require[] more substantive interpretation and contextual understanding" that AI cannot yet provide. It stands to reason that AI's prowess with data-driven reasoning thus complements but does not replace the interpretive judgment of human treaty bodies.

Given these limitations, how might AI serve as a reasoning aid without overstepping? One promising approach is decision support systems. Instead of fully automating decisions, an AI could produce a reasoned recommendation with an explanation, for a human to review. For example, in a cross-border environmental compliance committee, an AI system might ingest data on emissions and treaty obligations, then output a well-reasoned position such as "There is an 85% likelihood Country X exceeded its emission cap in Q4, primarily due to Factory Y's output. See the attached supporting evidence." The AI could also reference the specific treaty clauses and previous similar incidents, saving countless human-hours of pouring through data and contracts. Such an AI-generated report is performing a kind of legal reasoning, applying rules to facts and reaching a compliance conclusion, but it is still purely advisory. The human committee members would consider it along with other evidence.

Under these decision support systems, the quality of the AI's reasoning (and our trust in it) would depend on explainability. Contemporary AI research stresses the need for explainable AI in high-stakes decisions (Molavi & Zhang, 2023). In the context of international treaties, this means AI should be able to show why it flagged a particular issue and provide sources. For example, in a compliance issue, the AI may indicate which data points were out of range or which legal threshold was triggered. Rule-based systems are naturally explainable, since they can cite the rule applied, but machine learning models often are not. Therefore, a hybrid approach might be used. The core treaty rules could be encoded in a transparent logic-based system, augmented with machine learning for pattern recognition, with results cross-checked by the rule engine.

Ultimately, AI as a reasoning technology is best viewed as an assistant *with* reasoning capabilities but *without* the capacity for legal judgment or authority. It can accelerate analyses, spot connections humans might miss, and even draft preliminary findings, and in doing so could save countless hours of human research, but it is still error prone. It cannot, at least for now, exercise the kind of judgment that carries legal legitimacy in the eyes of states or the public. This is why human oversight remains indispensable. A recent study on AI in human rights monitoring emphasized that while AI tools can dramatically aid fact-finding, they risk amplifying biases and must be tempered by "thoughtful legal and regulatory intervention (Dulka, 2023)."In the U.S.–Mexico setting, that means any AI reasoning system should be embedded in a framework of human review and appeal, ensuring accountability and alignment with both countries' legal values. Again, AI should be a tool not a replacement.

VI. Cross-border Regulatory Challenges

a. Structural Differences

One of the most fundamental challenges to implementing a unified, AI-driven compliance system between the United States and Mexico lies in the structural divergence of their legal traditions. The United States follows the common law model, where judicial precedent and the

doctrine of stare decisis play a central role in shaping the law. Courts do not merely apply statutory text; they interpret and develop it through case law, creating a dynamic body of rules that evolves through judicial reasoning. By contrast, Mexico adheres to the civil law tradition (UC Berkley Law, 2017). Its legal system is primarily codified, with statutes and codes serving as the principal source of law. While decisions of the Mexican Supreme Court, particularly those generating *jurisprudencia*, carry significant weight, they do not bind future cases with the same force as precedent in common law (World Bank Group, n.d.). This divergence reflects distinct concepts of judicial authority and the nature of legal interpretation. Common law reasoning is inductive, deriving general principles from specific cases, whereas civil law reasoning is deductive, applying abstract rules to concrete disputes. For an AI system tasked with interpreting and applying treaty obligations, this creates a jurisprudential dilemma. An algorithm designed to reason inductively from precedent in the United States would appear foreign, and perhaps illegitimate, in Mexico, where authority lies in the text of the code. Encoding binational treaty obligations into "rules-as-code" requires not only technical sophistication but also sensitivity to these differing interpretive traditions.

b. Data Protection and Cybersecurity

Divergent approaches to data protection and cybersecurity present a second axis of regulatory conflict. The United States lacks a single, comprehensive federal privacy law. Instead, it relies on a fragmented approach, with statutes tailored to specific domains such as healthcare (HIPAA) or financial services (GLBA). This patchwork is supplemented by state-level legislation and executive frameworks such as the NIST AI Risk Management Framework, which promote principles of trustworthiness but stop short of comprehensive regulation. The underlying philosophy emphasizes commercial flexibility and innovation, allowing different industries to tailor privacy protections to their circumstances. Mexico, in contrast, has enacted a comprehensive and rights-based data protection regime modeled on European frameworks (Stewart, 2020). The Federal Law on the Protection of Personal Data Held by Private Parties imposes broad obligations on any private entity processing personal data,

requires express consent for most forms of data use, and grants individuals strong rights of access, rectification, cancellation, and opposition (Larrea et al., 2025). Enforcement authority lies with a centralized federal body, underscoring the law's view of privacy as a fundamental right. These contrasting models reflect not only different regulatory choices but also deeper philosophical differences about the relationship between the state, the market, and the individual. An AI system that must process binational data would confront fundamentally differing obligations: opt-out standards in one jurisdiction alongside opt-in standards in the other, fragmented enforcement in the United States compared to centralized oversight in Mexico, and different definitions of rights and remedies.

c. Digital- Trade Commitments and Ethical Considerations

The digital trade provisions of the USMCA simultaneously enable and constrain the possibility of a binational AI compliance regime. On the enabling side, Articles 19.11 and 19.12 prohibit restrictions on cross-border data transfers and ban requirements for data localization (USMCA, 2020). These commitments establish the legal foundation for shared systems capable of drawing on data from both jurisdictions. Without them, the technical architecture for a joint AI platform would be untenable. Yet the same chapter imposes constraints by requiring each state to maintain its own framework for personal data protection without mandating harmonization. Article 19.8 acknowledges the importance of interoperability through mechanisms such as the APEC Cross-Border Privacy Rules system but leaves the divergent national regimes firmly in place (USMCA, 2020). As a result, the treaty establishes the technical preconditions for cross-border AI systems while entrenching the legal barriers that complicate their implementation. The most viable architecture under these conditions would be a federated system, in which data remain under the governance of their country of origin and are processed according to domestic rules. Such an approach preserves legal compliance but adds significant technical complexity and limits the efficiency of a truly integrated platform.

Beyond these legal and regulatory divides, ethical considerations raise further questions about the legitimacy and sustainability of an AI-driven

compliance framework. Algorithmic bias poses a persistent risk. AI systems trained on historical data sets inevitably inherit the biases embedded within them, potentially amplifying discriminatory practices (Eben at al., 2025). In the context of customs enforcement, for example, reliance on past inspection data could result in disproportionate scrutiny of certain regions or companies, not because of inherent risk, but because of historical patterns of enforcement. As Ghoshal (2025, p. 187) notes, such outcomes threaten to reproduce inequities under the guise of algorithmic neutrality. Privacy and surveillance present another concern. A comprehensive AI compliance system would require continuous monitoring of cross-border trade, travel, and communications, generating detailed records of individuals and businesses. This creates risks of overreach and function creep, where a system designed for treaty compliance could be repurposed for broader surveillance. Finally, accountability and due process emerge as central issues. When an AI system flags a violation, responsibility for the decision becomes unclear: it could lie with developers, the deploying agency, the data provider, the participating parties. Contesting such determinations is further complicated by the opacity of machine-learning models, which may not yield explanations easily understood by non-specialists (Eben at al., 2025). The divergent administrative traditions of the United States and Mexico compound this difficulty, making the design of a shared appeals mechanism very challenging. For these reasons, human oversight must remain central to any compliance system. Human judgment is essential not only as a technical safeguard but as a guarantor of discretion, accountability, and legitimacy in a binational framework.

VII. Technical Feasibility: Reference Architecture

Despite the legal and regulatory complexities, it is technically feasible to build an AI-powered system to support U.S.–Mexico treaty implementation that mitigates the risks discussed, while delivering the functional benefits of AI. We propose a multilayered structure including data sources, integration and processing, AI analytics, governance and oversight, and user interface/reporting.

a. Data Sources Layer

Good data is the lifeblood of any successful AI implementation. At the foundation, the proposed system would draw on a wide array of vetted data sources relevant to treaty obligations. These include structured databases (e.g., customs declarations, trade statistics, immigration records), sensor and telemetry feeds (e.g., IBWC river flow gauges, air quality monitors at the border, satellite imagery of land use), and unstructured or semi-structured data (e.g., textual compliance reports, news feeds, even social media if relevant to labor or human rights conditions). Each country's agencies would necessarily provide data from their side. For example, the U.S. could contribute CBP's cargo manifest databases and NOAA's satellite data, while Mexico might contribute SAT (Tax Administration Service) customs data and CONAGUA's water monitoring data. Addressing privacy concerns, personal data, like individual traveler or worker information, might be either aggregated, tokenized or otherwise provided anonymously at this layer. Access controls and encryption would be essential. Data might reside in two data pools, one in the U.S. and one in Mexico, behind firewalls, with only necessary elements exposed across a secure connection. Modern techniques like federated data queries could allow the AI system to ask questions of data without the raw data leaving that respective country. This approach would satisfy data localization preferences.

b. Integration & Processing Layer

This layer handles the extraction, transformation, and loading (ETL) of data into formats suitable for analysis. This layer would include a secure data exchange platform governed by a binational agreement or MOU, specifying what data categories are shared and under what conditions, with data security as a paramount objective. Data would be labeled and catalogued (e.g., meta-tagging) according to common standards, which would likely build on existing standards from governing and regulatory bodies like the World Customs Organization or the North American Commission for Environmental Cooperation, for consistency.

Real-time data streams, such as sensor feeds, could be ingested via APIs in real time, whereas other data might be batch-updated in a pipeline run at discrete time intervals. This would make sense for example with monthly trade figures. An important component here is data quality and preprocessing. There is an old saying that "AI is garbage-in, garbage-out," meaning that the quality of the results depends on the quality of ingested data. Training on or supplying dubious data to a model will produce results that are questionable at best. Not only must we vouch for the veracity of the data, but the system must handle discrepancies between U.S. and Mexican data. Differences could include units, formats, or frequencies, in addition to disparate languages. In particular, units of measurement might differ (metric vs. imperial) or time zones might affect time-stamped data. These discrepancies would be normalized at the integration layer. Anonymization is essential to maintain privacy laws. Services which reference personal data might replace names or identifying features with hashes, or aggregate individual records into statistics before passing the data on for further analysis. All data transfers at this layer would be logged for audit purposes (who accessed what, along with timestamps), ensuring traceability and accountability.

c. AI Analytics Layer

This is the intelligence core of the architecture. This layer would host a suite of AI and machine learning models tailored to various compliance tasks. Different models could be deployed for different domains, such as one model could be deployed for trade compliance, another for environmental monitoring, another for labor standards, etc., all within a common platform. At a high level, the AI models could include different types of models. For example, anomaly detection models could establish baseline patterns and flag deviations. In trade, an anomaly model might flag a sudden surge in exports of a regulated chemical. For water, an anomaly model might flag unexplained drops in river flow. Predictive models make predictions based on training off of historical data. These predictions could include future outcomes or compliance risks. For example, a model could predict the likelihood of a water delivery shortfall

by the end of the year, given historical data and current trends. Using this valuable insight, a commission could then proactively manage flows.

NLP models are specialized to handle text inputs like treaty reports, legal documents, or news. An NLP model could perform sentiment analysis on public reports to gauge compliance sentiment, or summarize a 100-page environmental compliance report into key findings and potential red flags. These NLP models could also augment existing documentation by doing large-scale searches for precedents or provide supporting references.

Alongside ML models, a rule-based expert system might be integrated to handle clear rule-checking. For example, a knowledge graph of treaty obligations could be encoded so that if the data shows "emissions = 110 and treaty cap = 100," the system knows this is a violation and generates an alert. This ensures that well-defined legal rules are respected exactly. Knowledge graphs can help to ameliorate the opaqueness of other models.

Combining data-driven ML and rule-based logic, an inference engine can derive conclusions (with confidence levels) such as "Treaty X compliance likely at 95% this quarter" or "Potential violation of labor provision at Factory Z". An inference engine might also run simulations. For example, if Mexico's renewable energy output lags treaty targets, the AI could simulate by how much each country would need to adjust policies to meet a shared climate goal.

A critical aspect of the AI analytics layer is ensuring trustworthiness of AI. This would mandate cooperation from both the U.S, and Mexico. Models would be developed and tested jointly, or at least validated by both parties, to prevent bias that unduly favors one country's perspective. For example, training data would need to include examples from both U.S. and Mexican contexts, in appropriate quantities. The NIST AI Risk Management Framework provides guidance here, recommending that all models should be evaluated for validity, bias, robustness, and security (Soiffer & Xiao, 2023). Any AI components should undergo certification as agreed by both parties. A joint AI ethics board could be formed to review the models.

d. Governance and Oversight Layer

This layer enforces rules and provides human oversight mechanisms. It is essentially a control panel for accountability built into the architecture. Key elements of the governance and oversight layer include access control and audit mechanisms to ensure that only authorized officials and systems can access the data and models, with role-based permissions. For example, a U.S. labor department analyst can view aggregated labor compliance results but not raw personal data from Mexico. Every access or intervention must be logged to provide an audit trail. This is crucial for accountability and later review, especially if an outcome is contested.

Another key element of the governance layer is the decision review workflow. For example, when the AI analytics layer flags a likely violation or significant issue, it does not immediately execute any sanction. Instead, it creates a case or raises a flag in the system. That instance would then be routed to the appropriate treaty oversight body. For example, the Labor Rapid Response Mechanism (RRM) under USMCA for a labor case, or the IBWC for a water issue, or perhaps a new joint AI Oversight Committee if created. The proposed system's interface layer would present explainable summaries, as well as references and underlying data. Officials can then either confirm the AI's finding, request more information, or dismiss it.

The governance layer also manages the machine learning models themselves. This includes how they are updated or retrained. It could enforce that any retraining of models is approved by technical representatives from both countries. It could also mandate a thorough validation phase, which not only evaluates the effectiveness of the model from a technical standpoint, but also that models are tested for fairness. For example, if the anomaly detection model for customs starts flagging disproportionately more Mexican exports than U.S. exports without cause, that would be detected in evaluation metrics. In turn, the technical team could reevaluate the data, and take preventative measures to guard against this bias in subsequent iterations of the model.

The governance layer also encodes legal requirements into the operations of the proposed system. For example, if Mexican law requires

that certain sensitive personal data never be processed by AI, the system would be designed so that such data fields are never ingested to the analytics layer in the first place. The integration layer would strip them in preprocessing. If U.S. law forbids sharing certain export-controlled data, that restriction would also be enforced here. In other words, this is where the system's operation would take into account legal mandates.

Still another key element of the governance layer includes security. Given the sensitivity of the proposed system, strong cybersecurity measures are needed. Proper cybersecurity is not added as an afterthought but integrated by design from the start. The architecture would include encryption in transit and at rest, intrusion detection systems, and possibly redundant systems on each side of the border for resilience. The locations of logical or data storage entities must be specified and agreed upon by both sides beforehand. Security protocols must satisfy both U.S. standards and Mexican standards. Such standards may include details about encryption, authentication, and more. An incident response plan should be in place jointly, providing protocols to follow in response to issues that may arise.

e. User Interface and Reporting Layer

Finally, the outputs of the system must be presented in a user-friendly form to decision-makers and stakeholders. This layer includes dashboards, reports, and alert systems, pertinent to their role. There could be a bilingual web portal accessible to authorized officials in both countries, showing the current status of various compliance indicators (trade volumes vs. quotas, pollution levels vs. treaty limits, etc.), much like a real-time report card of treaty performance. When the AI flags an issue, the relevant officials must receive alerts. Alerts could be in the form email or mobile notifications, at various priority levels. The interface would allow drilling down. For example, clicking an alert would bring up the alert level, relevant data, historical trend, the AI's analysis, recommendations, and any more relevant information. It would also show the AI's confidence level and explanation, such as, for example, "Confidence 90% – based on rainfall deficit and reservoir levels."

VIII. Roadmap for Binational Adoption

As demonstrated, the building blocks for a binational AI compliance system already exist or can be developed with current technology. It is important to highlight that the proposed architecture is modular. The AI system could be implemented starting with one domain (e.g., customs enforcement) and later extending to others (e.g. environment or labor). The proposed architecture is also scalable. As trust and capacity grow, more data and more automated decision-making can be incorporated. For example, initial deployment might use AI only to generate non-binding insights, while later versions might trigger predefined enforcement actions, such as automatic issuance of a warning letter when both sides' officials confirm an AI-detected violation. Of course, technical feasibility and thorough design do not guarantee political will or successful implementation. Building and operating the proposed system would require a high degree of cooperation and resource commitment from both countries

Translating theoretical assessment into practice, however, requires a strategy that is equally pragmatic, gradual, and politically feasible. The deep legal and institutional divergences between the United States and Mexico render any attempt at a top-down, comprehensive deployment of a unified AI compliance system realistically unrealistic. Such an initiative would quickly collapse under the weight of conflicting legal traditions and regulatory philosophies, and uneven institutional capacity. A more viable pathway is an incremental roadmap that builds not only technical capacity but, more importantly, institutional trust and political commitment. The process must begin with controlled pilot projects, expand into structured governance, invest deliberately in human capital, and establish sustainable financial foundations.

The logical entry point lies in the creation of joint regulatory sandboxes focused on narrowly defined treaty compliance challenges. These controlled environments allow regulators to test AI applications in live conditions, producing empirical evidence of their performance and risks without committing to immediate, system-wide adoption (European Crypto Initiative [EUCI], n.d.). The model is already familiar to both countries, particularly in the financial technology sector. Mexico launched

a regulatory sandbox for financial technologies in 2019, demonstrating an institutional appetite for experimentation, while U.S. agencies have used comparable frameworks to promote innovation under close supervision (APEC Economic Committee, 2021). The USMCA itself encourages precisely this kind of cooperation in digital and financial services (APEC Economic Committee, 2021). A pilot program could be jointly overseen by the U.S. Department of Commerce and Mexico's Secretaría de Economía, targeting a discrete but administratively burdensome task such as verifying rules of origin for automotive components under the USMCA, a core compliance obligation already known to be a significant administrative burden (World Bank Group, 2020). Success in such a contained initiative would not only demonstrate technical viability but also build the trust of mid-level bureaucrats, who play a critical role in sustaining long-term institutional projects.

As confidence in the pilot projects grows, the next phase requires institutionalization. Establishing a binational AI technical committee for treaties would provide a permanent forum for governance, the development of standards, and the resolution of disputes. This proposal builds upon a rich history of U.S.–Mexico cooperation through specialized technical bodies such as the High-Level Economic Dialogue, the Border 2025 environmental framework, and the Border Technical Exchange Program for transportation (US Environmental Protection Agency & MX Medio Ambiente, 2021). The High-Level Economic Dialogue, in particular, with its established focus on cybersecurity, information technology supply chains, and semiconductor ecosystems, could serve as a natural partner or umbrella for this new institution. Staffed by legal and technical experts from both governments, the committee would oversee sandbox programs and transform best practices into formalized protocols, as well as adapt regulatory frameworks as AI technology evolves. Crucially, the successes of early pilots would provide the political justification for creating such a body.

No technological initiative can succeed without a corresponding investment in human capital. Sophisticated AI tools will remain inert without skilled professionals to operate them and evaluate their outputs. Both nations already recognize the importance of technological

capacity-building in other areas. The High-Level Economic Dialogue includes action plans for training specialized talent in semiconductors and ICT (OUSTR, 2023), while Mexico's Secretary of Agrarian, Land, and Urban Development has trained thousands of public servants in the use of data for urban planning (González-Hermoso & Morales-Burnett, 2021). Longstanding agreements on scientific and technological cooperation also provide models for personnel exchanges (United States & United Mexican States, 2008). A binational roadmap for AI compliance should build on these precedents by developing a specialized curriculum for customs officers, regulators, and legal professionals. Training should emphasize AI ethics, data science for treaty compliance, model oversight, and the legal implications of automated decision-making. Such investment ensures not only the technical operation of AI systems but also their legitimacy and resilience.

Finally, the financial demands of developing and maintaining a cross-border AI infrastructure require an innovative funding structure, as traditional government appropriations might not suffice. A hybrid public-private partnership, potentially supported by multilateral development banks such as the World Bank or the Inter-American Development Bank, provides the most promising model. These institutions have decades of experience structuring partnerships for large-scale infrastructure projects, and their expertise can be readily adapted to digital infrastructure. A hybrid funding model would combine public investment, private sector innovation, and concessional financing, distributing risk and ensuring sustainability (Schur, 2016). The private sector would be incentivized to develop and maintain the technological core, while development banks would contribute catalytic funding and provide assurance that the project aligns with international standards (World Bank Group, 2024). Formal endorsement from the Binational AI Technical Committee would be indispensable to securing this type of complex, multi-party funding arrangement, demonstrating how each phase of the roadmap builds on the previous one to generate momentum toward a sustainable compliance system.

IX. Conclusions

The study presented here yields a conclusion that is both promising and cautionary: artificial intelligence has the technical capacity to support and strengthen U.S.–Mexico treaty compliance, but its deployment will be constrained by deep legal, structural, and institutional obstacles. AI offers unparalleled potential to manage the complexity of the bilateral relationship by processing data at scales beyond human capacity. Yet this promise is tempered by the divergences between the U.S. and Mexico's legal systems, as well as by fundamentally different philosophies of data protection and regulatory governance. The roadmap and policy framework, as well as the AI-based compliance system developed in this paper outline a path forward that is not simply a technological upgrade but a profound exercise in institutional design. Success will depend on building trust, harmonizing standards, and embedding democratic accountability into the very architecture of these systems.

The implementation of AI-enabled compliance is not an end state but the beginning of a larger transformation in international law and diplomacy. Such systems would not only generate efficiency gains but also create a structured, high-value binational data asset that could fuel new forms of legal-technological innovation. These possibilities highlight an emerging trajectory in which AI evolves from an interpreter of legal text to a participant in the creation, execution, and adaptation of international obligations. That transformation raises profound questions about sovereignty, accountability, and governance. The challenge for policymakers is to engage with these questions now, ensuring that as AI reshapes the mechanics of compliance, it does so under the discipline of law and the guidance of democratic institutions.

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