



**Asia-Pacific
Economic Cooperation**

2025/SOM3/SCCP/015

Agenda Item: 5.7

Transforming Customs Procedures Through Data and Artificial Intelligence (AI): Integrating AI into Korean Customs Operations

Purpose: Information

Submitted by: Korea



**Second Sub-Committee on Customs
Procedures Meeting
Incheon, Korea
30 July–01 August 2025**

Transforming Customs Procedures Through Data and AI

- Integrating AI into Korean Customs Operations-

Contents

- **Pillars for AI Integration**
 - ✓ Big Data, Technology, and Human Resources

- **AI Powered Customs Procedure**
 - ✓ AI Applications in Customs Procedures
 - ✓ Key Contributions of AI models

- **Upcoming AI Capability**

- **Lessons Learnt**

Pillars for AI Integration

- Korean Customs' AI integration was driven by 3 foundational Pillars: **Big Data, Technology, and Human Resources**

✓ Big Data

Diverse data collected from internal and external sources are essential to establish AI services.
Korea Customs provides an environment where high quality and a large amount of big data can be secured.

✓ Technology

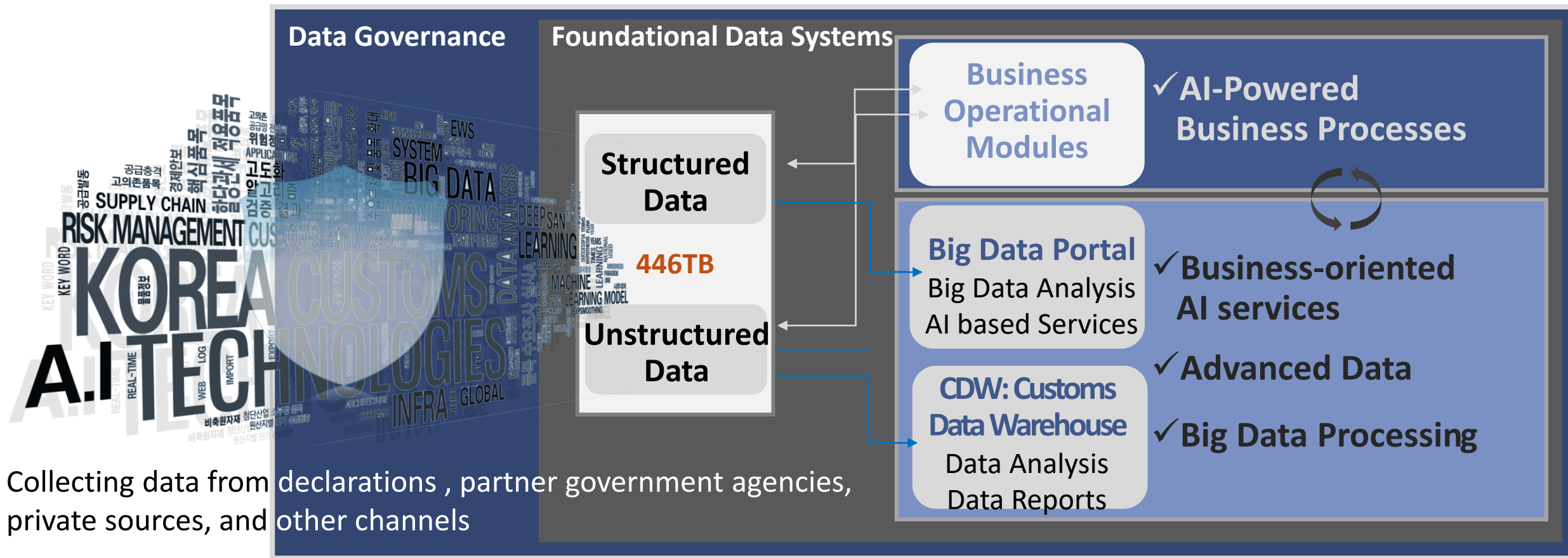
AI-enabled UNI-PASS provides cutting-edge AI technologies which achieve requirements from businesses including those related to machine learning, deep learning, and generative AI.
Advanced technology delivers solutions through AI models.

✓ Capability

Accurate understanding of data drives successful outcomes in building AI services and our domain experts ensure reliability of the required data.
We have been fostering data and AI talent while harnessing growing organizational capabilities in both data and AI.

Pillars for AI Integration: Big Data

- Big data is an essential pillar of AI integration and holds intangible value for businesses. This need has driven transformation from a traditional analytics system to a modern big data platform.



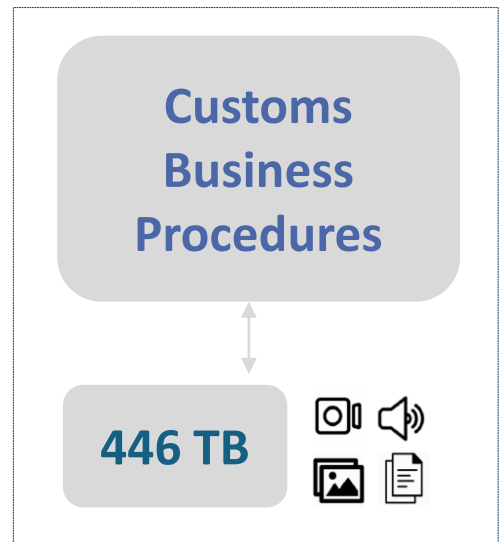
Pillars for AI Integration: Technology

- AI technology is developing at an unprecedented pace. We have closely tracked technological advancements to understand their value and select the right solutions for our business needs.

Big data · AI Platform

Data Analytics Environment + Big Data and AI Services

Customs Procedures



Big Data Processing Environment for Big Data Processing

Data Analytics Life Cycle
Extract → Store → Pre-process → Data Analytics → Visualize

Big Data Processing
ETL, ELT tools
Big Data framework: Hadoop
Cloud Computing: Kubernetes
Analytics Tools: Python, SAS

High Performance computing Power
GPU, vRAM etc.

Advanced Data analytics Business Oriented Services

Traditional + Advanced Data Analytics
Structured Data + Unstructured Data
Rule-based AI + Advanced AI

AI Technologies
Advanced statistical analytics
Machine learning
Deep learning
Natural language processing
Generative AI



Pillars for AI Integration: Capability

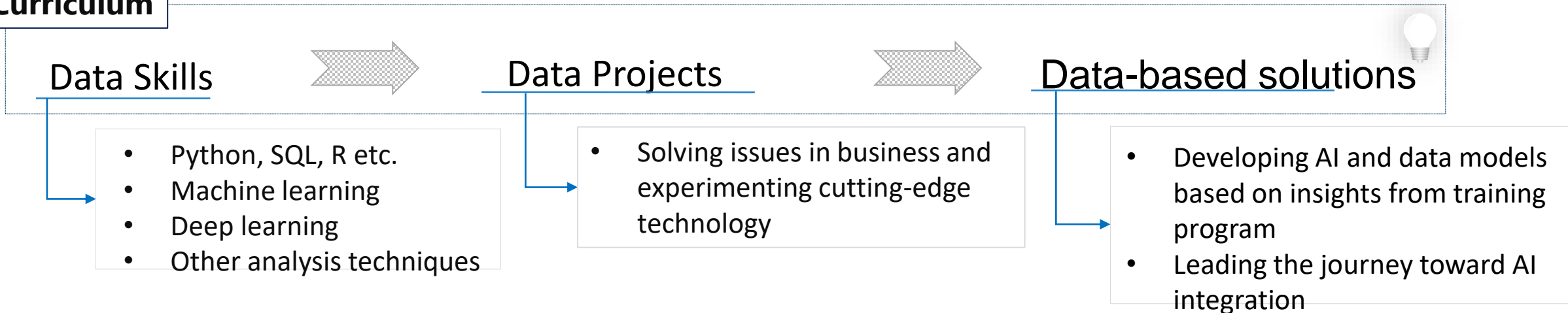
- We elevated our organizational data and technical capabilities and developed technical leaders to drive transformation through the adoption of big data and AI.

Data and AI Expertise Training Program (2017~)

✓ **145** Trainees

✓ **53** Data projects

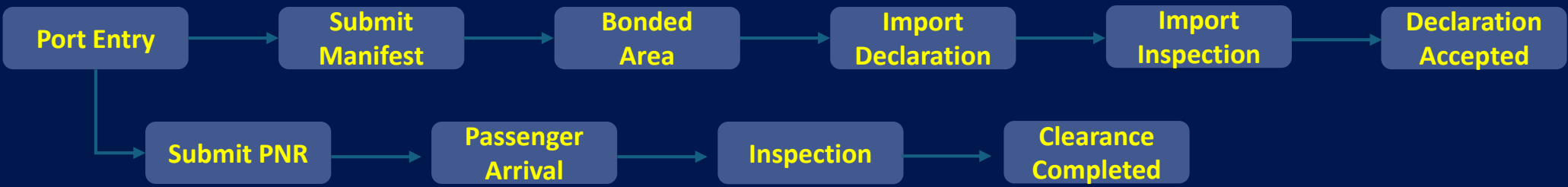
Curriculum



✓ Establishing big data culture

- Demonstrating a strong commitment to data and AI and leading their adoption
- Providing diverse lectures delivering insights on cutting-edge technology

AI Models in Customs Procedures



- Audit · Investigation
- Delinquent Tax Management
- Refund

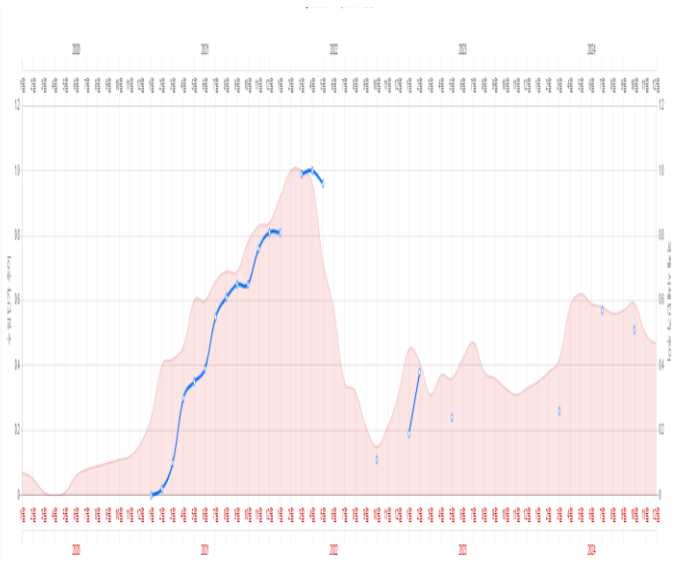
AI Contributions

Understanding Businesses Status

- AI enables understanding of current status of businesses by interpreting data, presenting past and current happenings. Additionally, relevant information provides why the results happens

Analysis of Unusual Trade Patterns by Item and Industry

Conducting a correlation analysis between the unit prices of an imported item and its global prices.



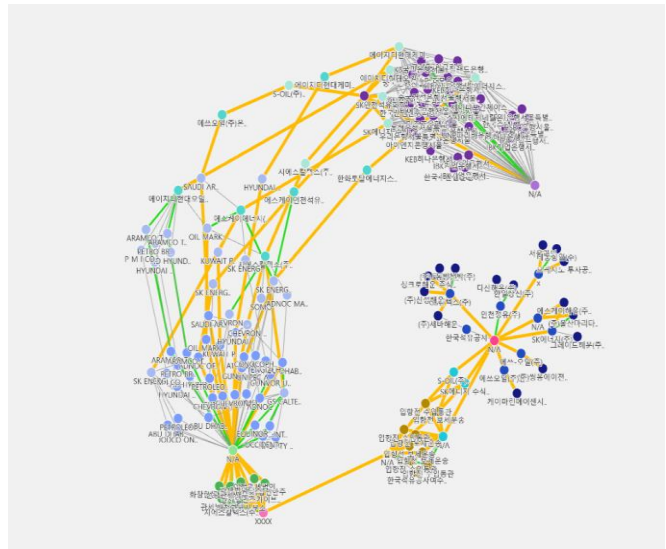
Company Profiling



Providing integrated information gathered from internal and external sources, including key details about companies such as a company overview, financial status, import and export history, stakeholders, comparisons with other companies in the same industry, and more.

Network of Stakeholders

Providing visualized information about key stakeholders involved in the process of importing an item to help identify the relevant parties.



AI Contributions

Enhancing Business Reliability and Processing Speed



- Machine intelligence has its strengths in improving reliability by extracting value from massive data and increasing speed by handling multiple tasks without breaks.

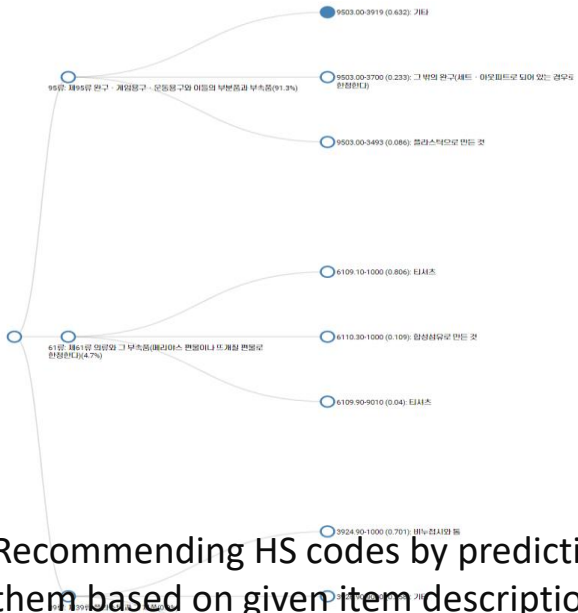
C/O Authentication Analysis

Automating the capture and storage of document stamps and signatures, and verifying the authenticity of certificates of origin by comparing the stamps and signatures of a given document with those on record.

Identifying counterfeit Stamps/Signatures

		Issuing Authority Stamps		Issuer's Signature	
Targets		SY	CS		RC LUM
		NSW BU (S)	IBER		Rol llum
1	Original				
	Results	60.05%	25.99%	49.17%	100%

HS Code Prediction



Recommending HS codes by predicting them based on given item descriptions, enabled by analyzing historical HS codes reported in declarations and decisions made by the item classification committee.

RPA

Replacing repetitive, routine tasks with software robots that can work 24/7 and provide 100% accuracy in results.

- Overtime Hours Computation
- Automated Trade Statistics Processing
- Automated Data Extraction
- Registration of High-Risk Passenger Profile
- Automated Surveillance Vessel Operational Report
- Automated Customs Audit Planning Report

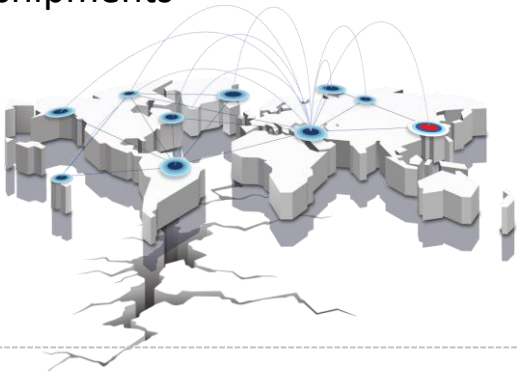


- AI demonstrates high efficiency in risk management by predicting potential risks and recommending actions to address and prevent them.

AI-based Risk Profiling Model

Detecting diverse types of risks at different stages of the clearance process. The models identify high-risk factors with higher performance than traditional risk selectin methods.


AI-selectivity for import items, customs-controlled cargo, high-risk passengers, and personal express shipments



Tax Compliance Risk Assessment · Circumventing Import Analysis

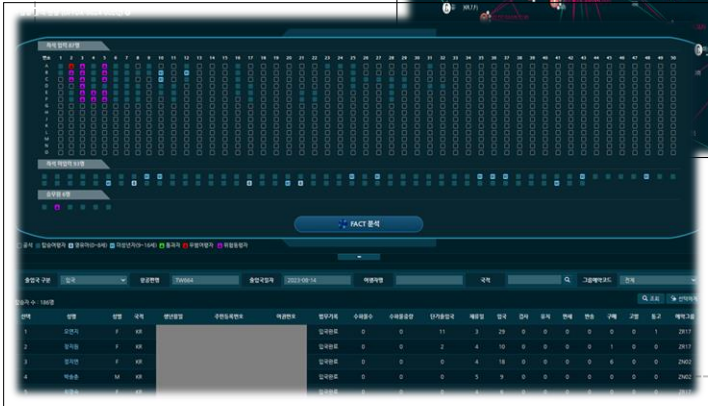
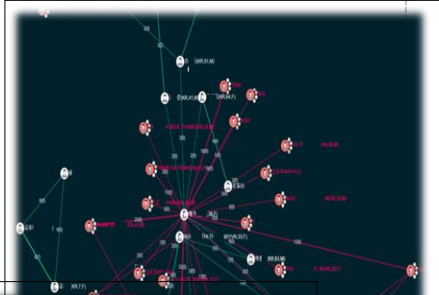
Making delinquent tax payers using diverse methods including a risk-scoring model that calculates the taxpayer's risk level by combining rule-based calculation and a machine learning model. Network analysis also used to identify bypassed importation.

Company	Risk Score	Risk Grade
정인	998	01등급
(주)에이엠	998	01등급
기아모	997	01등급
	997	01등급
	997	01등급
	997	01등급
	997	01등급
	997	01등급
	996	01등급
	996	01등급
	996	01등급



Identify Associates of High-Risk Passengers

Network analysis is used to detect companions of high-risk passengers by analyzing hidden relationships and patterns among passengers



Upcoming AI Capability:

Q: Hi, I have a question about AI technology. What are the key technologies that enable generative AI, especially those related to LLM-based AI applications?

A: Okay, let's break down the key technologies that enable generative AI, with a focus on those powering LLM (Large Language Model) based applications. I'll organize this into categories: **Core Architecture, Training Techniques, and Optimization/Deployment.**

1. Core Architecture & Mechanisms:

- **Transformer Architecture:** This is *the* foundational architecture. It replaced Recurrent Neural Networks (RNNs) due to its ability to handle long-range dependencies and parallelize computations. Key features:
 - **Self-Attention:** Allows the model to weigh the importance of different words in a sequence when understanding context. This is what allows LLMs to "understand" relationships between words that are far apart.
 - **Encoder-Decoder Structure (often simplified):** While the original Transformer had both, many LLMs use only the decoder portion for generative tasks.
- **Attention Mechanisms (Beyond Self-Attention):** Variations like Multi-Head Attention allow the model to attend to different aspects of the input simultaneously.
- **Positional Encoding:** Since Transformers don't inherently understand word order, positional encoding adds information about the position of words in the sequence.

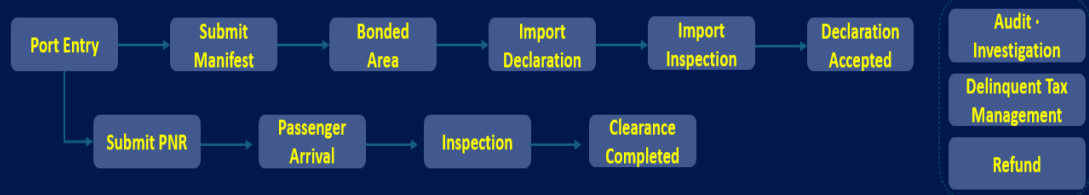
2. Training Techniques:

- **Self-Supervised Learning:** LLMs are primarily trained using self-supervised learning. This means they learn from unlabeled text data. Common techniques include:
 - **Next Token Prediction (Causal Language Modeling):** The model predicts the next word in a sequence. This is the most common training objective for generative LLMs.
 - **Masked Language Modeling (MLM):** (Used in models like BERT, but less common for pure generative models) The model predicts masked words in a sentence.
- **Reinforcement Learning from Human Feedback (RLHF):** This is *critical* for aligning LLMs with human preferences. It involves:
 - **Reward Modeling:** Training a model to predict human preferences for different model outputs.

Agent

AI Models in Customs Procedures

<u>Risk Selectivity Model</u>	<u>Im/Export Supply Chain Transactions</u>	<u>Tax Compliance Risk Assessment</u>	<u>Database Conversion of Customs Documents</u>	<u>Analysis of Importer Customs ID</u>
<u>AI X-Ray</u>	<u>Identify Associates of High-Risk Passengers</u>	<u>Investigation Targeting and Risk Profiling</u>	<u>Unstructured Document Linkage Analysis</u>	<u>Analysis of Import Transshipment Routes</u>
<u>EWS</u>	<u>Linked Analysis using Foreign Company Data</u>	<u>Import Item Price Search</u>	<u>Customs Data Map</u>	<u>Visualization of Vessel Information</u>
<u>Integrated Information on Customs Duty Investigation</u>	<u>HS Code Prediction</u>	<u>Analysis of Unusual Trade Patterns by Item and Industry</u>	<u>Analysis of Fraudulently Supplied Procurement Items</u>	<u>Analysis of Personal Customs ID</u>
<u>Trade and Foreign Exchange Monitoring</u>	<u>Customs Refund Information Analysis</u>	<u>Heads of Customs Office (HCO) Verification Prediction</u>	<u>C/O Authentication Analysis</u>	<u>Monitoring of Dumping-related Imports</u>



lessons learnt

- ✔ **Business-Centered Applications**
- ✔ **In-Depth Understanding of Technology**
- ✔ **Large-Scale and High Quality Data**
- ✔ **Start and grow through experience**

Thank you