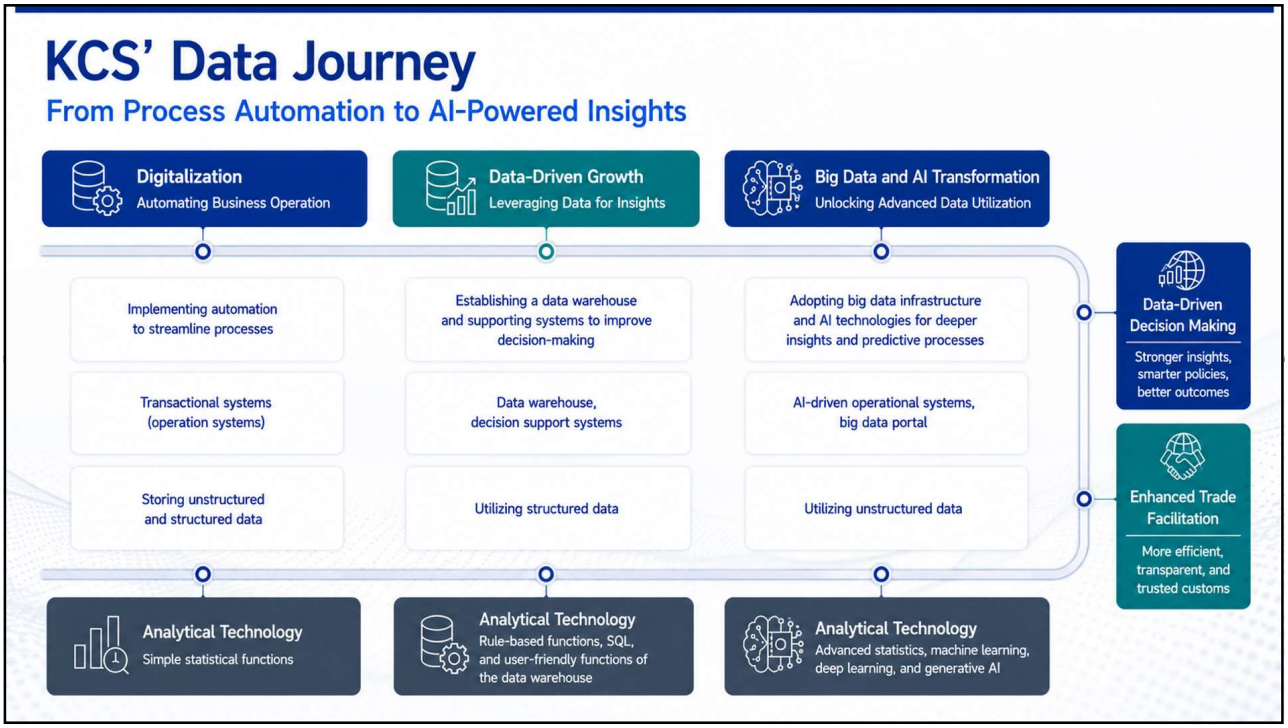
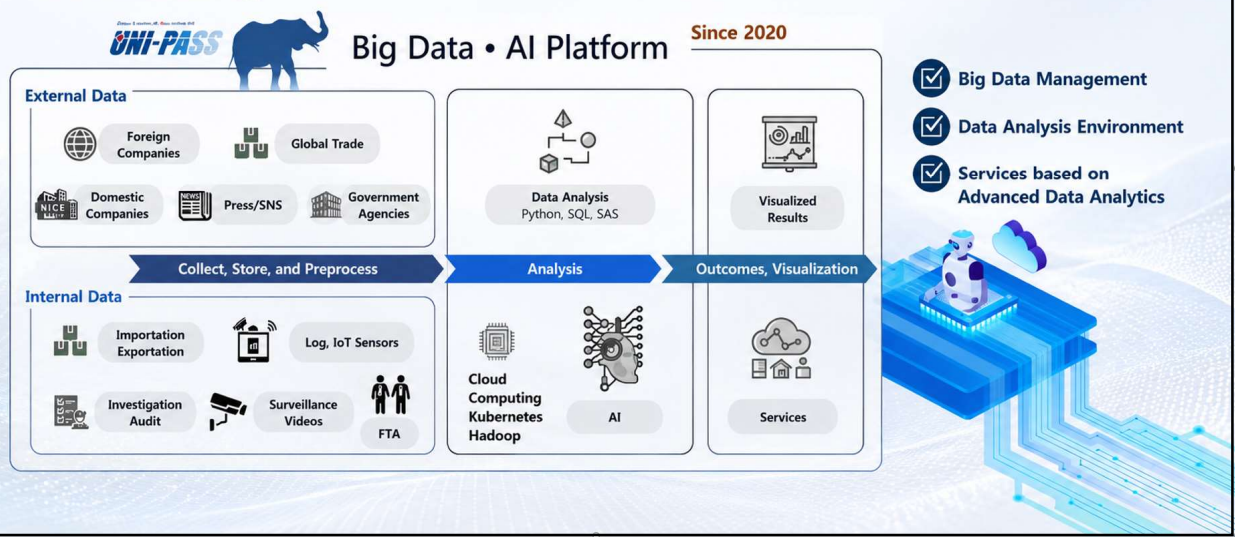

Data-Driven and
AI-Enabled Customs:
enhancing Trade Facilitation
Technology-Driven
Customs Innovation Set In Motion
AI

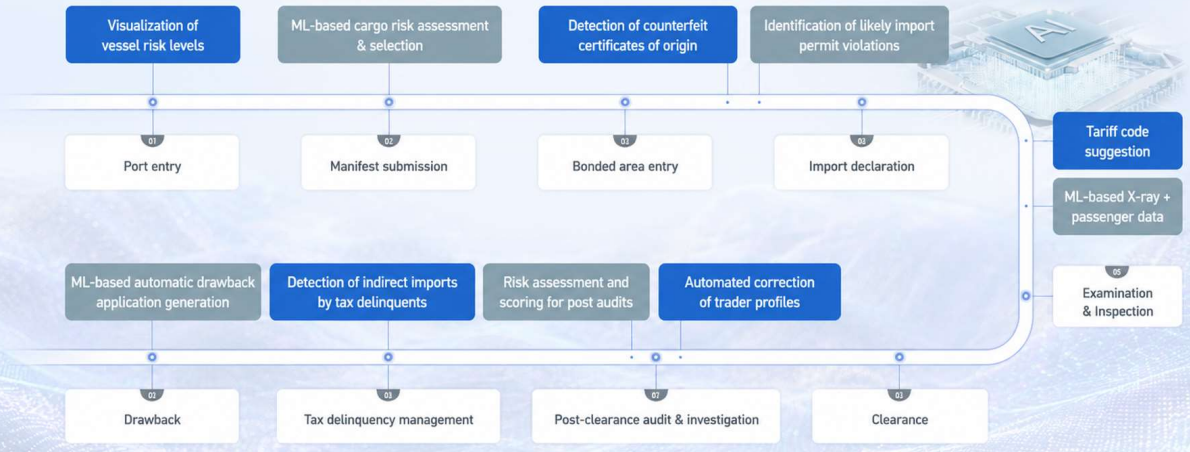

KCS' Data Journey
From Process Automation to AI-Powered Insights
Digitalization
Automating Business Operation
Data-Driven Growth
Leveraging Data for Insights
Big Data and AI Transformation
Unlocking Advanced Data Utilization
Implementing automation to streamline processes
Establishing a data warehouse and supporting systems to improve decision-making
Adopting big data infrastructure and AI technologies for deeper insights and predictive processes
Transactional systems (operation systems)
Data warehouse, decision support systems
AI-driven operational systems, big data portal
Storing unstructured and structured data
Utilizing structured data
Utilizing unstructured data
Analytical Technology
Simple statistical functions
Analytical Technology
Rule-based functions, SQL, and user-friendly functions of the data warehouse
Analytical Technology
Advanced statistics, machine learning, deep learning, and generative AI
Data-Driven Decision Making
Stronger insights, smarter policies, better outcomes
Enhanced Trade Facilitation
More efficient, transparent, and trusted customs

Big Data Portal: The Backbone of Transformation to Advanced Data Analytics

- System environment allows handling big data analytics and providing services based on AI technology



Machine Intelligence in Customs Procedures

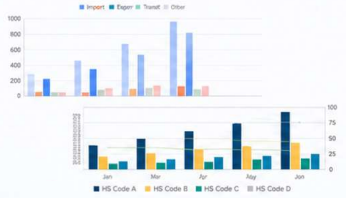


Data and AI Empowered Customs Procedures

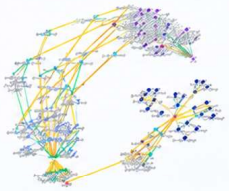
Analysis of Unusual Trade Patterns by Item and Industry



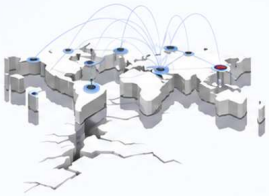
Company Profiling



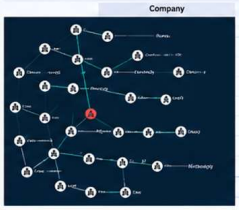
Network of Stakeholders



AI-based Risk Profiling Model



Tax Compliance Risk Assessment



Risk Score	Risk Level
92.3	Critical
87.1	High
76.5	High
65.2	Medium
58.7	Medium
45.3	Low
33.8	Low
22.4	Low

RPA (Robotic Process Automation)



AI Roadmap: Shaping the Future of Customs

Vision

Customs should lead fair and shared growth through AI.

BPR/ISP (Business Process Reengineering and Information Strategy Planning)



Transforming workflows through AI integration





Delivering tangible customs services for the public and businesses



Establishing integrated AI infrastructure for sustainable operations

AI Roadmap: Agentic AI

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?

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 parallelizable 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.

3. Optimization & Deployment

- **Training Optimization:** Techniques like mixed precision training, gradient checkpointing, and distributed training (e.g., tensor/pipeline parallelism)
- **Inference Optimization:** Quantization, model pruning, and efficient attention (e.g., FlashAttention)
- **Retrieval-Augmented Generation (RAG):** Combines LLMs with external knowledge sources for more accurate, up-to-date responses

Agent

AI Models in Customs Procedures

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

01 Constructing a Generative AI Agent

02 Reviewing Existing Models and Creating New Models

03 Securing, Cleaning, and Training AI-Readable Data

04 Securing Infrastructure Including Hardware and Software

05 Fostering Organization-wide Use of Agentic AI

