The background of the slide is a high-angle, night-time aerial photograph of a city. The city lights are visible as a dense network of yellow and white lines, with some blue highlights. The lights are set against a dark, almost black background, creating a high-contrast, textured appearance. The city layout is visible, with roads and building footprints illuminated.

Revolutionising Customs with AI

Dream big, start small

Foreword



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customs authorities are at a critical crossroad. Global trade is becoming more complex and security demands are intensifying. AI offers a transformative opportunity to revolutionise customs operations – yet its adoption remains fragmented.

This thought leadership on *Revolutionising customs with AI: Dream big, start small*, explores how the technology can move beyond siloed applications to drive end-to-end transformation across the customs value chain.

By harnessing AI's capabilities holistically, customs administrations can achieve greater operational efficiency, enhance security and gain deeper insights into trade flows, ultimately building a next-generation customs system that is agile and resilient in the face of modern trade demands.



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AI is on everyone's mind. For customs administrations, the path to fully realising the transformative potential of AI begins with elevating their digital maturity. This journey towards digital transformation is essential for achieving simplification, enhanced security, and improved trade facilitation through AI.

At PwC, we bring unparalleled experience and expertise in guiding and upskilling customs administration through this transformation. We offer access to global best practices, skills, and support you in experimentation and innovation to enable AI.

Join us as we envision a future where AI redefines the next generation of customs excellence.



Introduction

In an interconnected and complex global economy, customs administrations find themselves at a critical juncture. As trade volumes surge due to e-commerce, supply chains diversify, and illicit activities become more sophisticated. Traditional customs operations struggle to keep pace, highlighting the urgent need for transformation. AI is at the forefront of this evolution, poised to revolutionise customs by driving operational efficiency, enhancing security, and simplifying processes.

Currently, many customs administrations explore AI through fragmented, siloed efforts, such as experimenting with machine learning for risk management or using automation for document processing. While these isolated use cases may offer localised benefits, they do not provide a cohesive strategy for unlocking AI's full potential when applied across the entire customs value chain.

This paper highlights that AI adoption starts with experimentation and prototyping, which ultimately lead to a broader strategic vision. It examines the challenges in this journey and demonstrates how AI can streamline and automate customs processes, enhance security, and facilitate legitimate trade.







customs authorities can embrace a new era of human-centric AI to simplify and automate their work, leveraging this momentum to transition to a higher level of digital transformation for greater efficiency and effectiveness. In its final sections, the paper outlines strategies for accelerating AI adoption, offering practical steps to drive full-scale transformation.

In this journey, AI is not just a solution; it is the foundation of a next-generation customs system that is faster, more secure, and capable of adapting to the evolving demands of modern trade.



Evolving challenges in customs

Customs administrations face challenges in adapting to the digital age. Many have outdated IT systems and regulations and struggle to analyse ever increasingly volumes of data. These issues are compounded by the fierce competition for the skills needed to experiment with emerging technologies. Nevertheless, there are now tangible examples of Customs Administrations effectively leveraging the benefits of AI implementation.

Challenge	Description	Case Example
 Safety & security	customs administrations must perform risk assessments based on hundreds of millions of records gathered through the EU's Import Control System before loading in a third country or arrival in the EU.	DG TAXUD built a collaborative AI platform that allows EU Member States to collaborate and enhance their national risk assessment capabilities. 
 Compliance & regulation	In a complex regulatory landscape, customs authorities must manage diverse international trade agreements and compliance requirements. Evolving standards require real-time monitoring and reporting, with non-compliance risking revenue and security.	In Brazil, customs declaration and verification processes were manual and error-prone until automated with an AI-enabled verification tool. 
 Supply chain & logistics	Recent global events like pandemics and geopolitical tensions have exposed the fragility of supply chains. customs authorities need to address disruptions in the flow of goods and adapt to the unique challenges posed by smaller, high-volume e-commerce shipments."	To solve supply chain disruptions, the UAE, in partnership with WEF, launched the TradeTech initiative to harness AI to improve customs procedures 
 Data management	As customs processes become more advanced, a substantial amount of data is generated. customs authorities require solutions to integrate this data from various sources and analyse it for improved operational efficiency.	Indian customs developed an AI-enabled system to store and analyse data effectively, providing valuable insights for decision-making. 

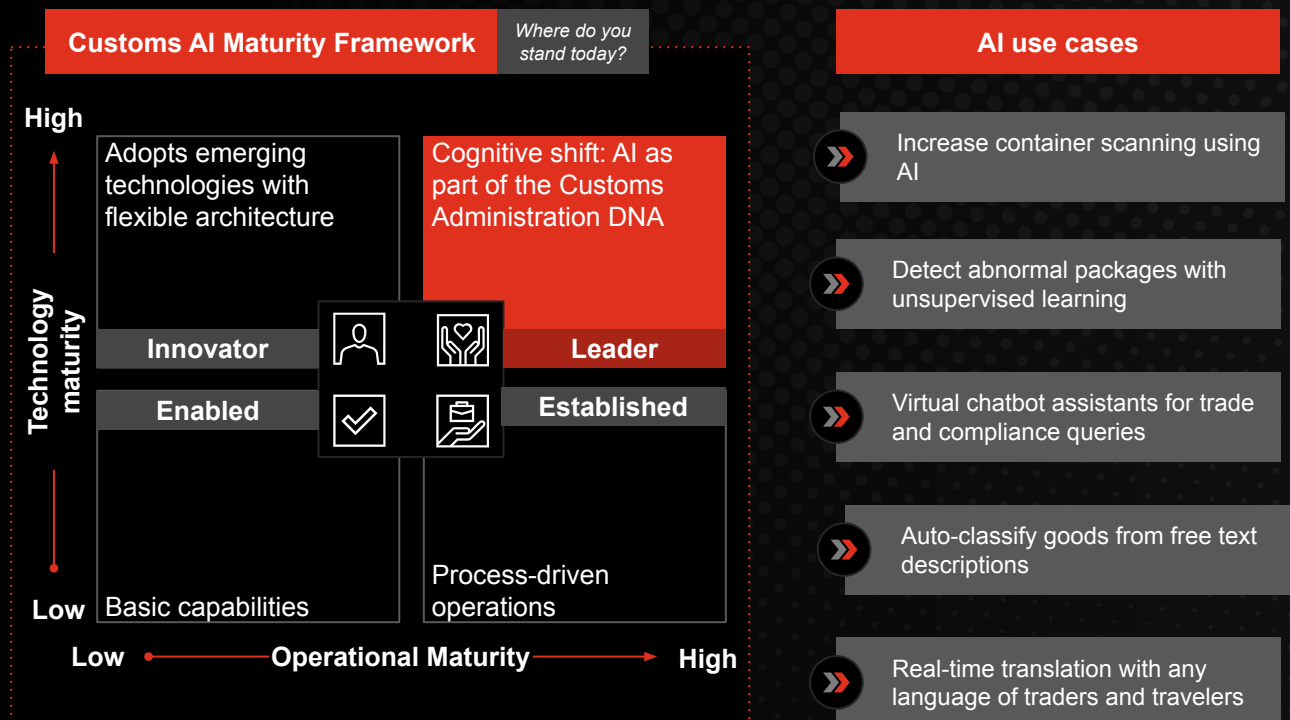
Transitioning to cognitive customs: Enhancing efficiency, security, and trade

To manage the evolving challenges in international trade and customs, authorities should aim to transition towards a cognitive customs state, characterised by advanced technological and operational capabilities. This transformation requires substantial investment, eventually embedding AI in the customs operations DNA.

While many customs authorities are currently at the experimental or opportunistic stages of AI adoption, moving towards a cognitive stage can help custom authorities to achieve many intermediate benefits, such as develop simpler, fully automated systems that leverage predictive analytics, optimise processes autonomously, and learn from historical data to improve decision-making.

This cognitive shift ensures greater efficiency, security, and adaptability in managing the increasingly complex global trade environment. Additionally, it allows customs administrations to be proactive in addressing emerging risks, improve trade facilitation, and create a more transparent and streamlined supply chain, ultimately fostering economic growth and international cooperation.

Non exhaustive

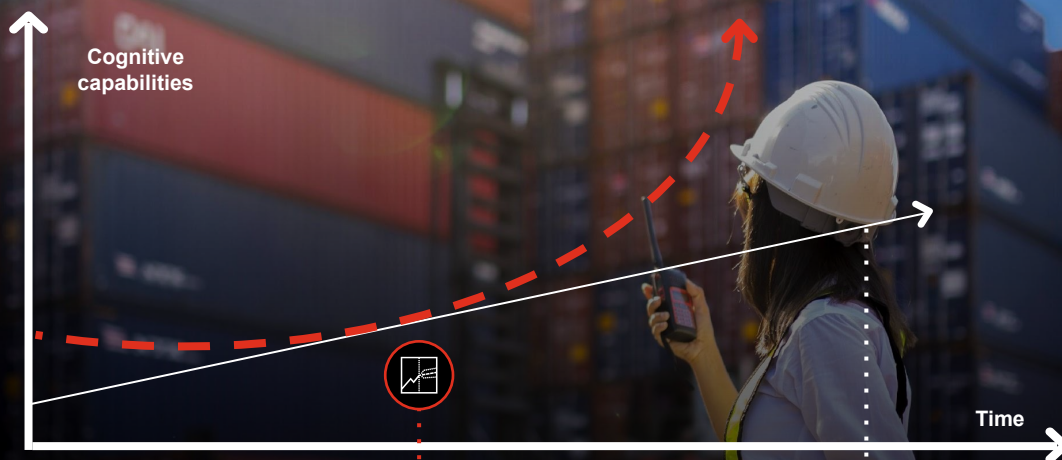


AI will help customs organisations unravel untapped potential

Customs authorities should invest in and experiment with AI-enabled technologies to advance towards a cognitive customs state. This can be done by strategically deploying AI for different customs use cases, helping unlock new levels of operational efficiency, enhance security, and streamline processes. While the benefits may take some time to materialise, AI will eventually drive exponential growth in capabilities, leading to transformative changes in customs operations over the long term.

After overcoming initial setbacks and adapting to AI technologies, customs operations begin to see transformative changes, leading to high transformative and operational maturity

What actually happens



Valley of disappointment

There might be initial challenges in AI adoption that can be attributed to the complexities involved in integrating AI into existing systems. This might result in the delay in realisation of AI benefits, slowing growth in the development of cognitive capabilities











What you think should happen

Indicates initial expectations, where stakeholders might expect a direct and steady improvement in cognitive capabilities as AI technologies are implemented

Integrating AI across the value chain

Customs Administrations should evaluate their entire value chain and pinpoint specific use cases where AI can Revolutionise and transform their operations.





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Value chain	What it entails	Countries	Technology	Outcomes
Pre-arrival	Assessing risk along with aiding customs in proactive planning	    EU, Canada, Hong Kong, South Korea	AI identifies high-risk cargo shipments and forecasts trade trends, enhancing security and efficiency	Improved security by enhancing the detection of dangerous shipments
Arrival	Detecting cargo anomalies in X-ray scans and combating smuggling and tax evasion by spotting fraud patterns	   Canada, Hong Kong, South Korea	AI detects anomalies and fraud patterns, improving contraband identification and combating smuggling and tax evasion	Increased detection accuracy and expedited the clearance process
Custom clearance	Customs duties and taxes are calculated based on the goods' type and value	 World Customs Organisation	AI-enabled Harmonised System (HS) Codes classification tool	Automates the process of determining the HS code of goods and calculates their duty rate in real time
Post clearance	Analysing invoices and certificates automatically to combat smuggling and tax evasion	 UAE	AI ensures trade compliance by analysing invoices and certificates, detecting fraud to combat smuggling and tax evasion	Faster audit processes, reduced human error, and increased compliance
Policy-making	Analysing customs data for insights, aiding data-driven policy decisions	 Brazil	AI-enabled analysis tool is utilised to examine customs data, providing insights for data-driven policy decisions	Improved compliance and simplified customs clearance process

Impact of enablers on AI adoption






A comprehensive business impact analysis, based on various criteria such as business model, ease of adoption, competitive advantage, and technological disruptions, can help to focus on specific needs and requirements.

Non exhaustive

Enablers	Key component	Description	Impact on adoption	Investment
Innovation management	 Agile	Manage innovation in an adaptive manner, ensuring the required agility to cope with changes.	 Low Medium High	 Low Medium High
User centricity	 UX design	Place customs officers and trade at the centre of the AI integration process.	 Low Medium High	 Low Medium High
Data centricity	 Data governance and management	Understand and govern own data, make future reforms more data-driven, and address privacy concerns.	 Low Medium High	 Low Medium High
Skills development	 Training	Invest in capacity building of customs staff to foster a cultural shift. Forming interdisciplinary teams to avoid siloed initiatives.	 Low Medium High	 Low Medium High
Collaboration	 Strategic partnerships	Break silos within customs administrations and between technology providers to share best practice, tools and resources.	 Low Medium High	 Low Medium High
Technology integration	 Interoperability	Leveraging internationally supported standards to simplify integration and reduce costs.	 Low Medium High	 Low Medium High

How can PwC help you?

Next Gen Customs System Outline

Next Gen Customs System Outline	Assessment	Current state and vision 	<ul style="list-style-type: none"> • Capture the vision and ambition for AI. • Gap assessment of the existing customs capabilities in three aspects: people, process, data and technology. • Benchmarking study for alignment and best practice.
	Design and develop	Feasibility and prioritisation 	<ul style="list-style-type: none"> • Identifying and prioritising use cases. • Design user journeys and organisational structure. • Carry out feasibility studies. • Define governance structure, including key performance indicators, decision rights, and Responsible, Accountable, Consulted, and Informed (RACI) matrices. • Rapid prototyping.
		Strategy and action planning 	<ul style="list-style-type: none"> • Develop strategic choices. • Action planning and roadmapping – for example, on how the customs administrations can move into the desired future state, outlining key milestones and objectives.
		Prototyping 	<ul style="list-style-type: none"> • Shape technical descriptions, including requirements, desired functionalities, and visual prototypes. • Leverage key enablers that can support your journey, such as technology, resources, and partnerships. • Design customs ecosystem architecture, including integration requirements.
	Implement	Tender and supplier evaluation 	<ul style="list-style-type: none"> • RFP preparation including pre-qualification, technical evaluation, scope of work, and technical/functional specifications. • Define Service-Level Agreement (SLA) parameters for different components. • Support on pre-bid meeting and clarification response. • Vendor response analysis (technical and commercial).
	Go live	Programme management 	<ul style="list-style-type: none"> • Project management activities, including risk mitigation and daily project coordination. • Supply installation testing (use case testing) and go-live monitoring. • SLA monitoring for edge devices, applications, and IT infrastructure. • Evaluation of change requests across project life cycle.



Conclusion

Customs authorities are increasingly adopting AI to boost efficiency, security, and compliance, yet much of AI's potential remains untapped due to foundational gaps. To unlock AI's power, customs authorities must establish essential enablers to translate technology into tangible gains. Experimental, proof-of-concept pilot projects, focused on real impacts, are essential for determining how AI can best fit customs operations.

Alongside this experimental approach, better innovation management is crucial, with an agile workflow that includes end-user input. While rapid results should remain a priority, AI's broader role in driving digital transformation, including improvements in data governance and technology infrastructure, must not be overlooked.

Establishing mixed AI teams that combine data scientists, risk managers, and other departments will improve engagement and buy-in across the organisation, reducing the risks of siloed initiatives. Additionally, advancing customs legislation to allow data standardisation will make AI a more effective, versatile tool for customs.

To fully harness AI in customs, these initial steps toward a larger vision are essential. Building a foundation for better coordination, stakeholder involvement, and a results-driven mindset, customs administrations can leverage AI to deliver safer, more efficient, and reliable processes for themselves and end-users.





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About PwC

PwC is a global network operating in 151 countries, with over 364,000 professionals dedicated to delivering excellence in Assurance, Advisory, and Tax Services. Beyond our traditional Customs Compliance services for Economic Operators, we are recognized experts in transformation and modernisation of Customs Administrations worldwide.

Our international perspective allows us to serve a diverse clientele, including the EU Commission, GCC public safety, border security, and Customs Authority, as well as numerous national Customs administrations. Our consulting projects span from strategy to implementation, supporting Customs Administrations in their digital transformation journeys. We deliver large-scale digital programmes that make Customs more data-driven, efficient and save. Beyond strategic advice, we design and implement innovative Customs solutions in-house, leveraging cutting-edge technologies such as data analytics, cloud computing, and artificial intelligence. Our comprehensive approach ensures practical, hands-on solutions that drive tangible results for Customs Administrations.