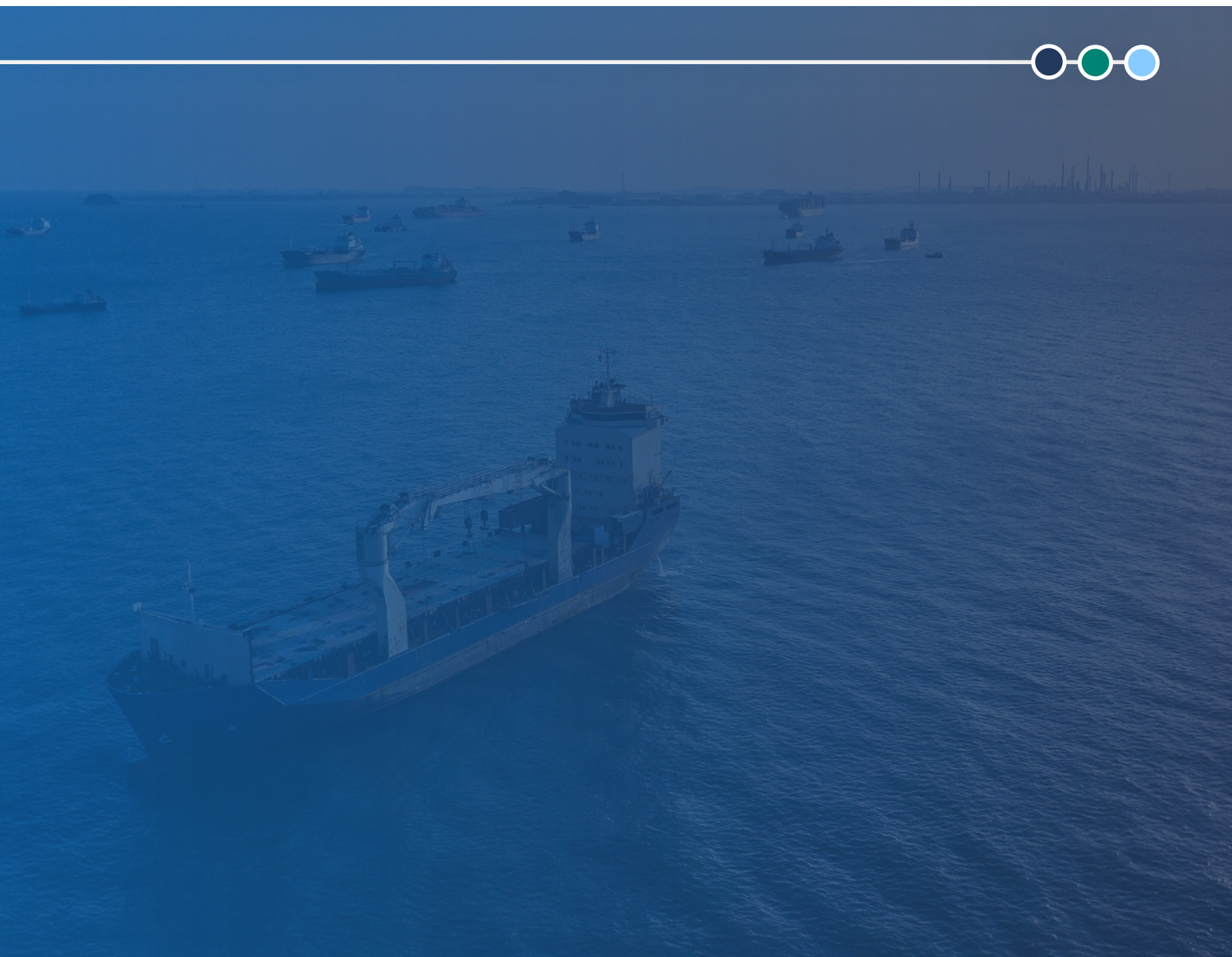


Digital Customs

Immersive data to deliver the
Digital Customs of the Future





Executive summary



Customs is complex. The world of trade has evolved over the years, and the impact of the Covid pandemic only accelerated that shift. Following the pandemic, we are seeing increases in trade, trade agreements and passenger travel.

We also see a change in the **type** of trade from traditional models. For example, we've seen an increase in eCommerce and micro-trading as individuals regularly purchase from online stores across the world for small goods.

We've also witnessed a rise in 'digital trade' which will have significant impact for customs monitoring and control. For instance, when buying virtual property using real physical money, or buying a design pattern for a 3D printer from a merchant in another country. How do customs agencies track that import/export transaction? What about the trade in NFT (Non-Fungal Tokens)?

A plethora of technology now exists to combat the challenges above, such as Artificial Intelligence/ Machine Learning, Internet of Things (IoT), Virtual/Mixed Reality, blockchain, drones and many others. But for many organizations the adoption of this new technology can present a challenge.

When considering new technology, the first question should be, "how does this transform the purpose of customs?" Technology must effectively integrate with and enhance operations, not add complexity, and help make sense of the vast amount of data that is generated throughout the customs lifecycle.

This whitepaper seeks to demonstrate how modern technology can deliver the Digital Customs of the Future. In the following pages we will highlight several common business challenges faced by customs organizations across the globe and discuss how technology solutions can simplify these. The use of technology, such as AI & Machine Learning, can lead to better decision making and business outcomes by giving insight into what is happening across the supply chain and helping organizations better deploy their resources in the future.

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Customs focus areas



Frictionless borders

- Make it easier to trade.
- Share data to join up border controls.
- Onboard Trusted Trader.
- Integrate Trade Facilitation Systems



Tax duty compliance

- Ensure accurate tax collection.
- Ensure correct HS code assignment to goods.
- Identify anomalous behavior.



Cargo logistics

- Integrate movement between ship/plane and transport to market.
- Automate processes.
- Ensure unloading equipment is in the right place at the right time.



Empowering customs officers

- Provide the right information at the right time in the right location.
- Implement paperless office practices and automation.
- Easily capture and share data in the field.



Risk management

- Improve risk analysis.
- Ensure Trusted versus Untrusted trade.
- Implement AI and data intelligence.
- Combat Fraud & Error.



Sustainability

- Lower energy consumption across the port/airport infrastructure.
- Reduce the carbon footprint across the whole customs lifecycle.
- Report on progress to targets.



Enable safe cross-border trade

- Implement data-led interventions at the border.
- Promote effective & timely actions.
- Ensure trusted automated pass-through.
- Track and monitor containers & goods.

Data Hub for Digital Customs of the Future



Data will drive the Digital Customs of the Future, and a data hub is important to help provide real business insights and better decision making.

A data hub is a platform that aggregates customs data into one place, applies AI & ML analytics to that data, and visually displays the information to the right person at the right time in the right place on the right device.

While the aggregated data provides one version of the truth, it serves many purposes:

01 Provides insight into the tax compliance of a trade, linking all the associated documents so that 80% of trusted trade can be processed automatically. This enables customs officials to focus their efforts on the other 20% of 'suspect' trade.

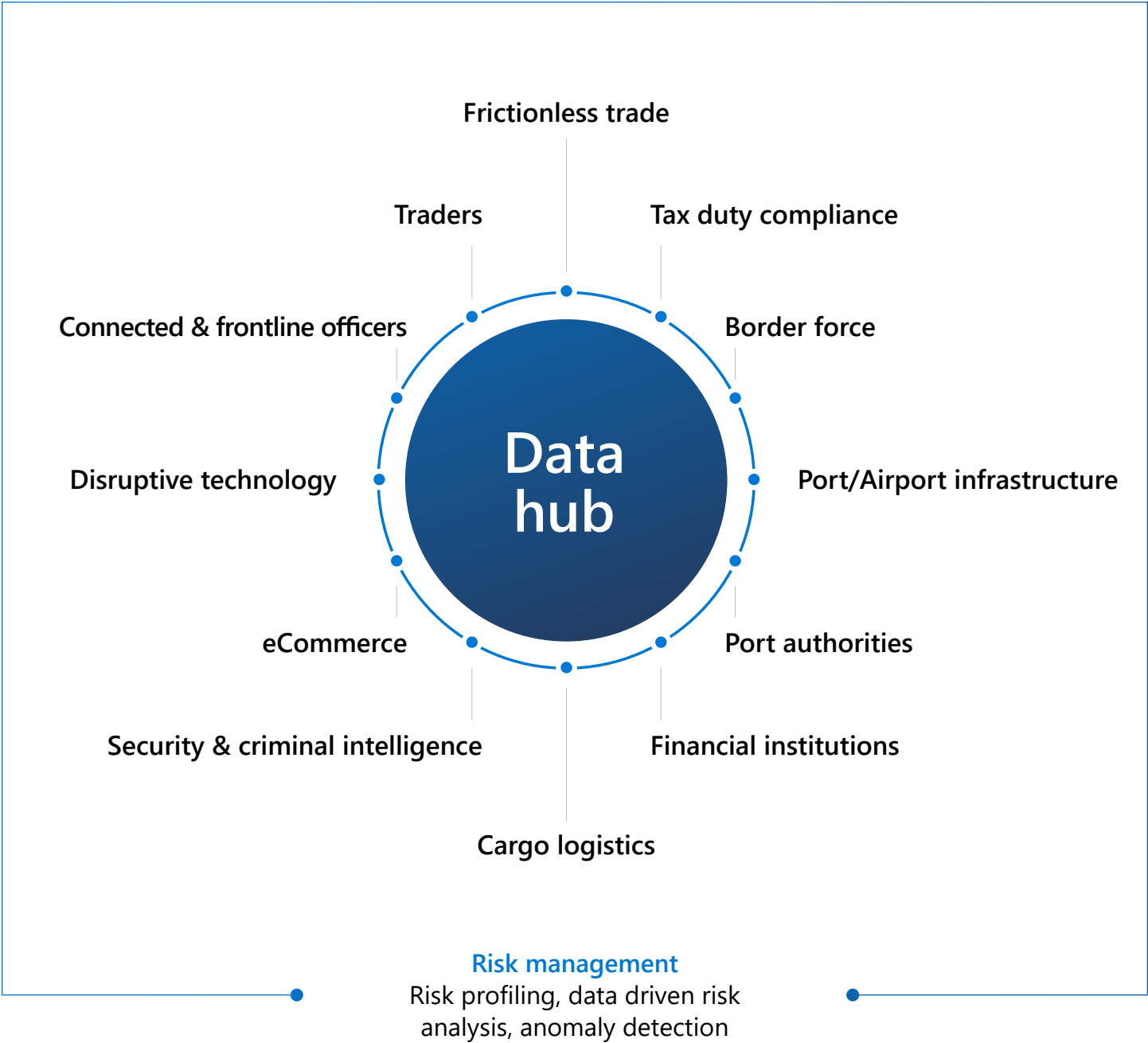
02 Provides insight into cross-border trading, combining the customs documents with other data points to enable officers to better target their intervention resources.

03 Supports the optimization of port side cargo logistics, creating an understanding of where unloading equipment is in relation to a ship docking, or uncovering the most efficient way to get from the ship to market using trains, trucks, etc.

04 Enables insight into risk using advanced AI analytics to identify anomalous behavior, changes in trading trends, suspect activities, etc.

05 Gives insight into the overall sustainability picture from port/airport energy emissions through the entire supply chain.

Only the power of cloud technology, coupled with advanced AI analytics and human decision-making can make this possible.



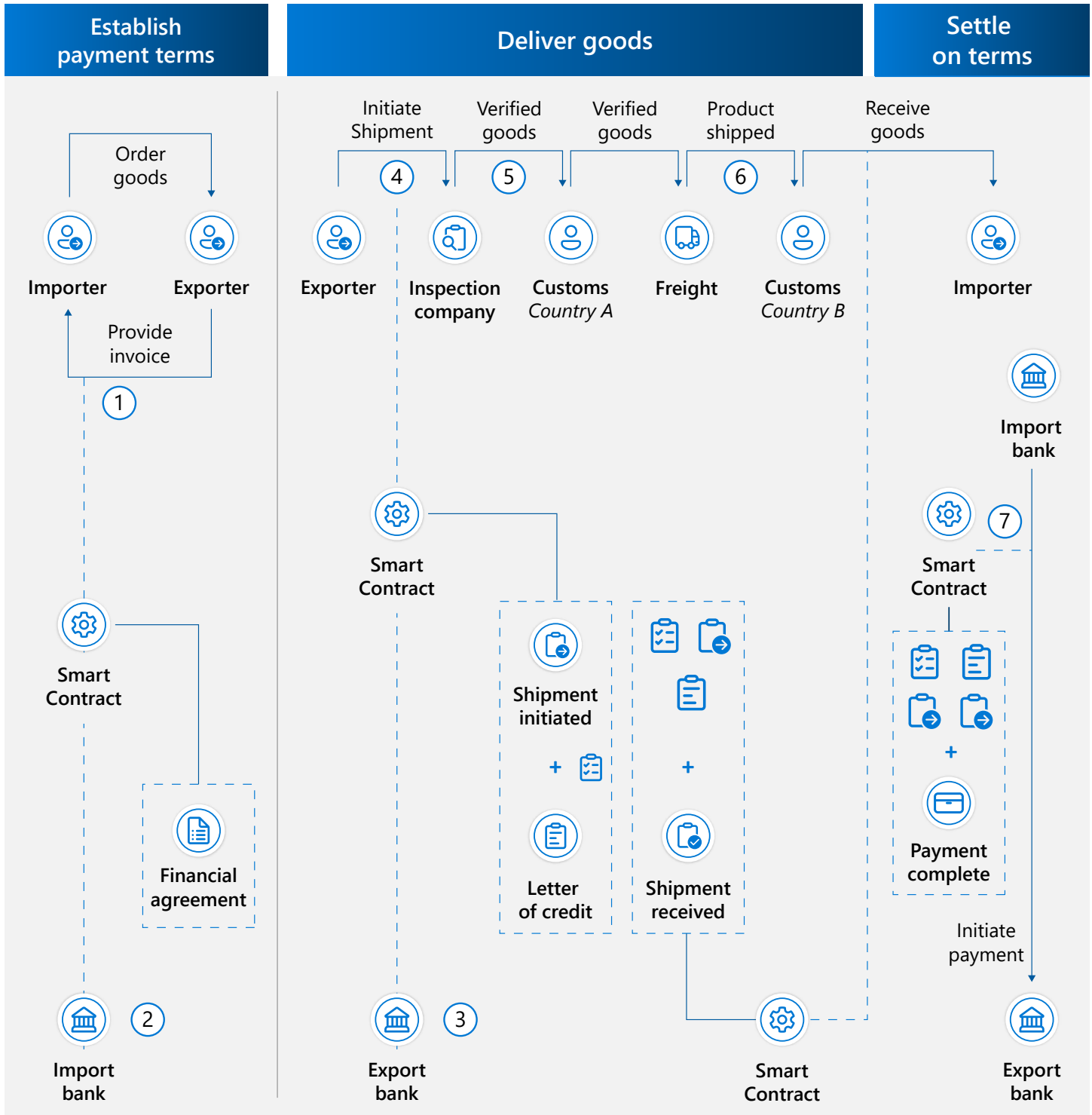
◀
Data models – Security & identity management – Connectors and APIs – Partner ecosystems
▶

●
Microsoft Cloud
●

Digital customs: It's a complex environment

In studying the stakeholders involved in any import/export activity, it's a complex model of many transactions to get goods from one country to another.

In concept, it appears to be a 'linear' process but it's far more complex in nature. Documents must be raised and shared in parallel in order to move things along. Any mistake in these tasks can cause delays or confusion, leading to loss of income for the business or inaccurate tax duties collected by customs. Furthermore, most of the documentation is still created using manual, paper-based forms that are difficult to process, search or link to the overall process.



Customs challenges



Increased fraud & error:

Complexity in customs processes can lead to unintentional human error in the data capture, and criminal organizations are becoming more sophisticated in intentional fraud.

Enabling safer cross-border trading safety:

Fraudulent activity continues to be a challenge as criminals become more innovative and creative.

Rise of eCommerce:

eCommerce will only continue to increase and will require changes in public policy and business practices to improve digital and trading infrastructure.

Automation of supply chains:

Need to automate the preparation, validation and submission of customs documents and replace legacy paper-based procedures that promote inefficiencies and errors.

Web 3.0:

Crypto currencies and NFTs will increase complexity in customs operations as verifying the country origin of goods are challenged by non-standard production and distribution.

Trade regionalization vs. globalization:

Trade will become less globalized and more regional based on supply chain issues highlighted during the Covid pandemic.

Focus on sustainability:

Increasing need to minimize the environmental impact of transporting goods. There could be tax and facilitation benefits for environmentally friendly products.



**Kunio Mikuriya, Secretary General
World Customs Organization, Brussels**
WTO Report on Disruptive Technologies

We are entering a new era, in which a series of innovations that leverage the internet could have a major impact on trade costs and international trade. The Internet of Things (IoT), artificial intelligence (AI), 3D printing and blockchain have the potential to **profoundly transform the way we trade, who trades and what is traded.**

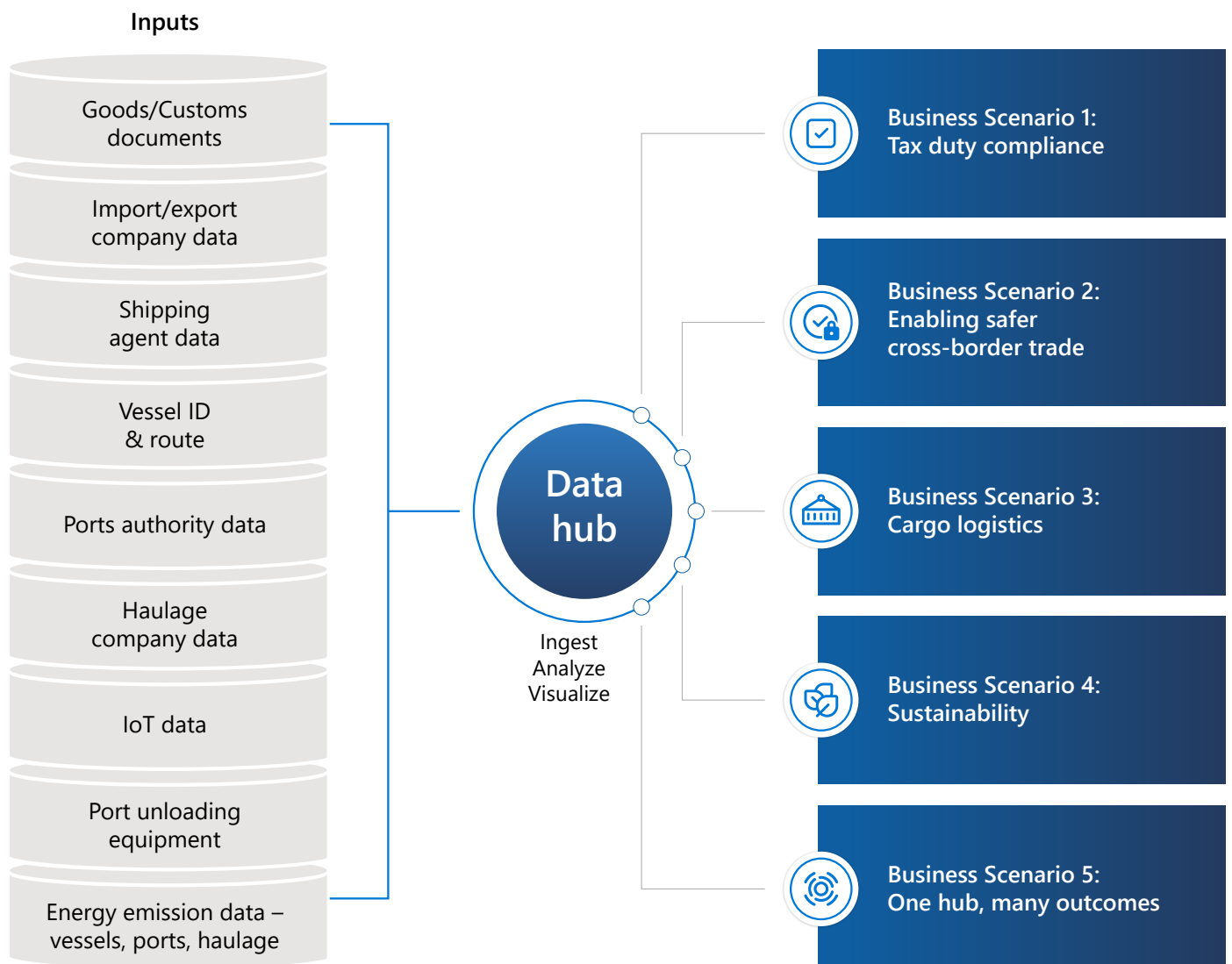
"Technology-driven" means that digital disruption has brought about new opportunities and challenges for Customs and partner government agencies. This triggers the need to explore the use of other information and communication technologies for cargo, containers and conveyances.

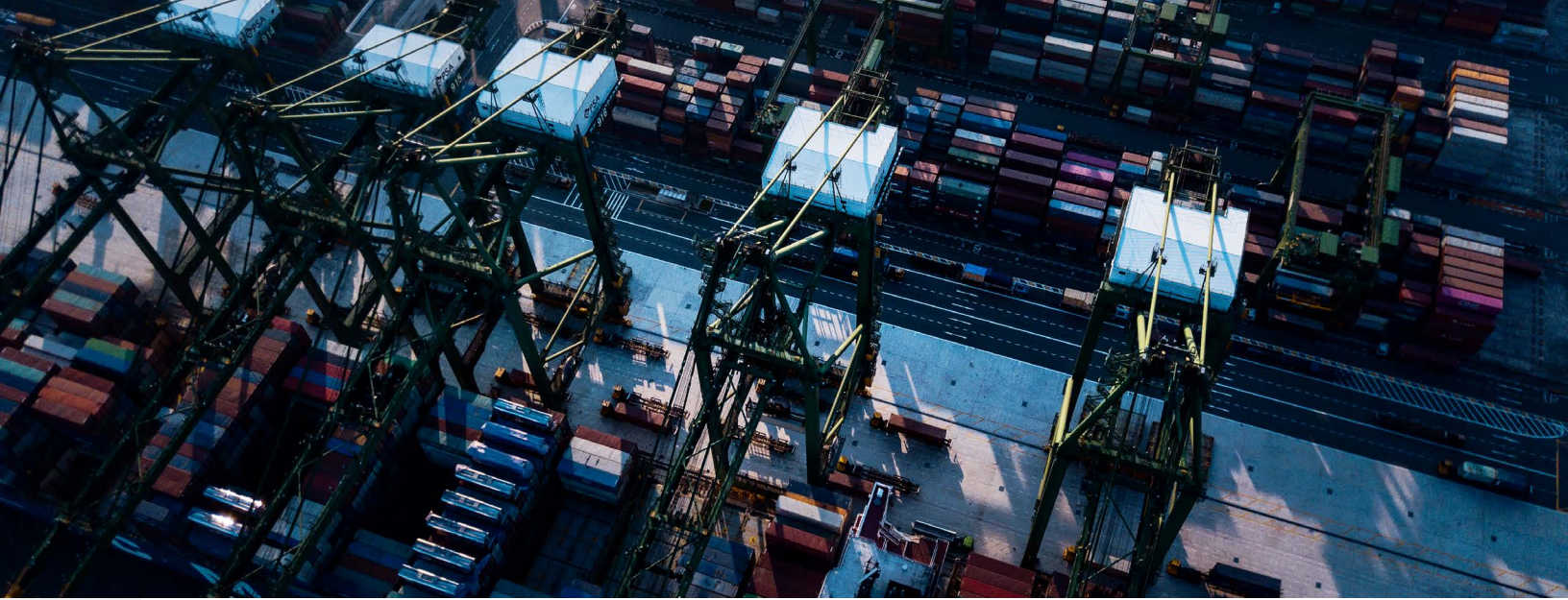
Customs business scenarios



To better understand the complex nature of customs and international trade, consider common benefits and five key business scenarios that apply to all countries, businesses, and Customs organizations. This section describes these scenarios, the data inputs required, and the potential business outcomes when technology is applied to analyze and present business insights.

Being able to link data sources from many different areas will enable the visualization, and more importantly, the understanding of information that has never been possible before. The data created daily across all trading transactions is now too much for a human to make sense of or make informed decisions. This data hub will enable the necessary 'big picture' view to gain insights that enable better decision making for the future but will also empower customs officials to dig deeper into the data when required.





Business Scenario 1: Tax duty compliance

The first scenario is based on a common problem in every country related to the collection of the correct amount of tax duty due on an imported good. Identifying anomalous entries relies on a number of data sources ranging from simple description checking, to Harmonized System (HS) Codes (the identification number of every good being imported or exported) on Customs invoices, and all the way to 'suspect' behavior from different actors e.g. importer/exporter, agents, haulage companies. Enabling AI/ML models to 'learn' from this data will lead to better anomaly detection which will increase revenue collection, improve risk management and reduce delays at the border.



Business Scenario 2: Enabling safer cross-border trade

This scenario is intended to aid in the detection and prevention of intentional fraud and error. Like scenario 1, it is collating data from several data sources and analyzing for anomalous activity. An AI/ML model can identify anomalous behavior, but it cannot determine if it is fraudulent, illegal, or unintentional activity. For that task, it needs a human Customs officer to make that determination and suggest a likely next step.



Business Scenario 3: Cargo logistics

This scenario revolves around the complex operations of a port. This is an environment where port operators need to have a clear understanding of which ships are coming into a port, when they will arrive, the number of containers per ship, the type of port infrastructure (cranes, drivers) needed, and more. This scenario relies on multiple data sources that need to be analyzed in real time so that operators can make informed decisions to improve the efficiencies across the port, minimize time taken to unload a ship and get the goods onto the transport networks to deliver them to market.



Business Scenario 4: Sustainability

Sustainability is another complex area for ports. On the one hand, they need to operate a large environment over many acres including cranes, warehouses, offices, holding areas etc. that consume a lot of energy, while simultaneously providing an unloading service to thousands of ships that need to be processed quickly and efficiently.

The port estates have expanded over many decades and some parts are more energy efficient than others. By combining data from many sources across the port, through Internet of Things (IoT) devices, port authorities can gain great insight into what parts are using the most energy, when are they using it, how are they using it, and which are most inefficient. More importantly is the benefit of using AI/ML models to 'predict' usage patterns based on which ships will come in when, how long they will take to unload based on historical data, what cranes and people will be needed, etc.

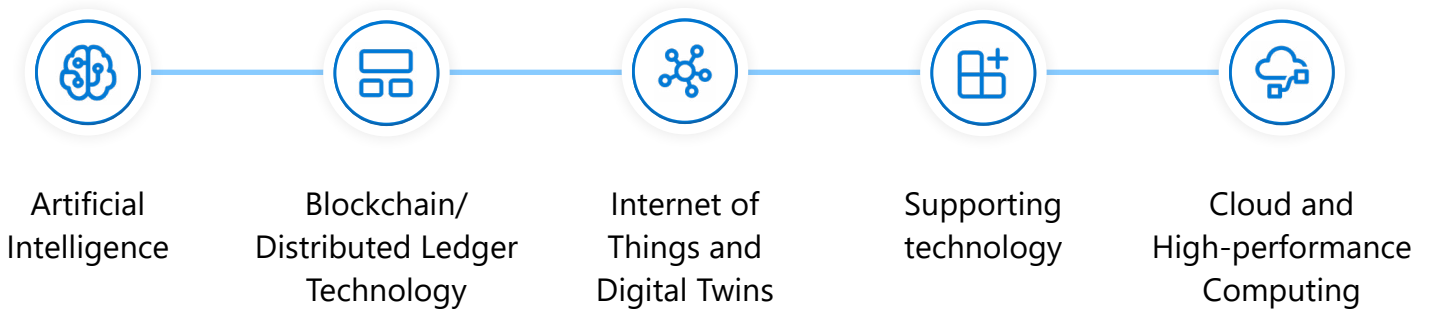
The port authority could also run 'what if' scenarios. For example, if a warehouse is closed for 3 days because it's not needed for during that period, what impact will that have on energy usage?



Business Scenario 5: One hub, many outcomes

The 5th scenario is about bringing everything together into one data platform (hub) that enables all business needs going forward. The more data that is collated into the data hub, the more insight that can be gained from it.

Disruptive technology enabling Digital Customs of the Future



Artificial Intelligence

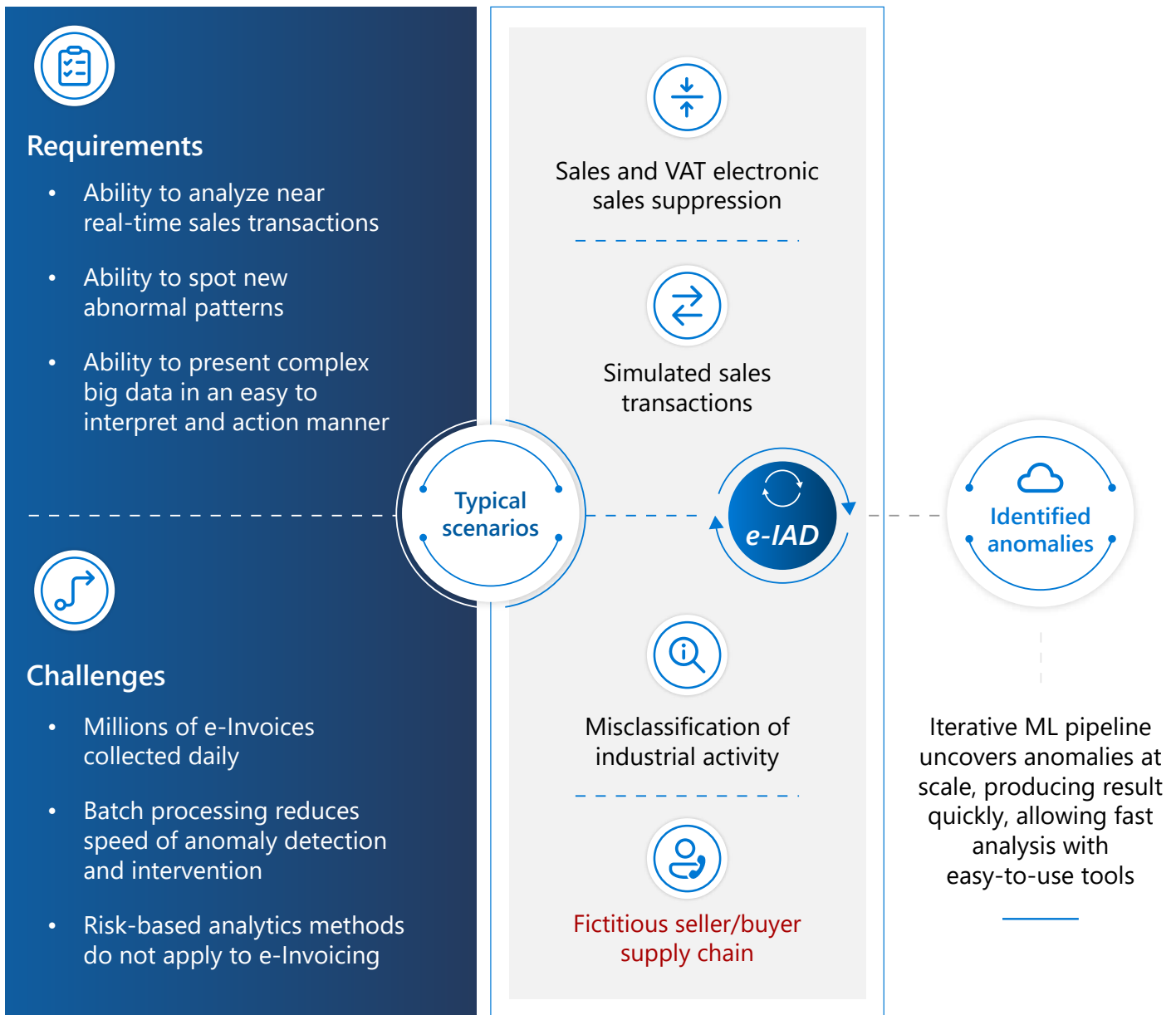
Humans can no longer process the quantity of business data produced daily data in a timely manner. Artificial intelligence can help transform trade data into customs insights.

- Data Analytics can ingest, analyze, and visualize data to get insights for decision making.
- AI/ML can be an extension of Data Analytics that businesses can use to train and build predictive models. AI/ML can be used to predict future demand, price, operation costs, or optimize operation resources.

Important: It's still critical to combine AI plus humans in any decision-making process based on data analytics.

Example: Electronic Invoice Anomaly Detection (e-IAD) solution accelerator from Microsoft

- Designed and built to leverage the latest AI/ML to provide Automated Detection of Anomalies in e-invoicing data.
- The e-IAD capabilities can be applied to any e-invoicing or equivalent sales document.
- Builds on the expert knowledge of business representatives from tax agencies represented by the Interamerican Center of Tax Administrations CIAT.
- e-IAD is provided as a Microsoft Industry Accelerator at no charge to accelerate your “time to value” on Azure.

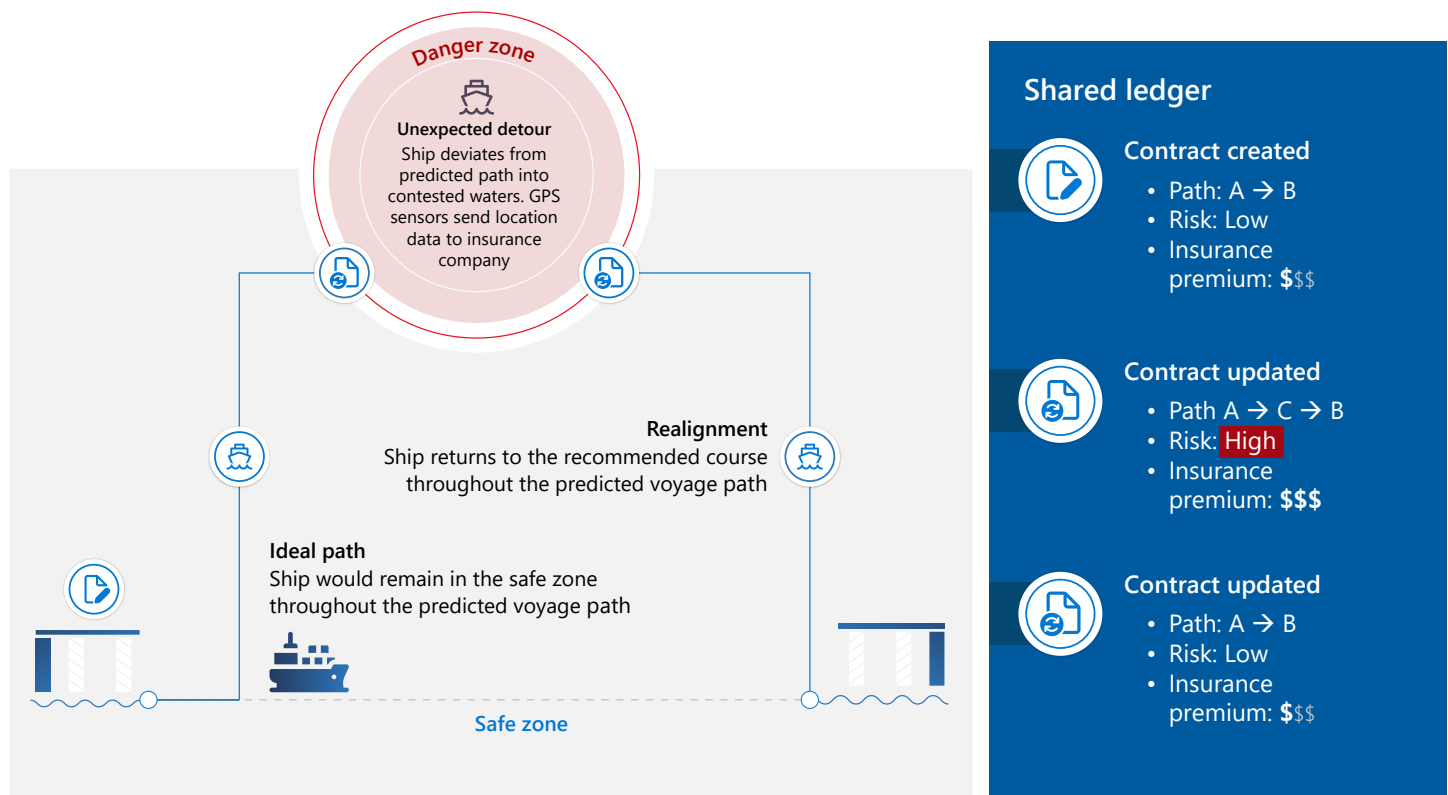


AI for improved risk management

One of the biggest challenges for customs is understanding risk. The better risk profiling in place, the better targeting of resources. This can apply to the processing of customs documentation in tax compliance, improving trusted trader status, automatic processing of documents, and identifying trends for fraud and error.

Understanding risk in Border Force protection is even more critical. Data Analytics and AI/ML capabilities within a data hub for customs add value to assimilate and take action on this information in an effective and timely manner. It can ingest data points on the movement of thousands of ships across the globe, activities within ports and airports, track vehicles using ANPR systems, identify known or suspect individuals, identify anomalous behavior and add this information to all the customs documentation to provide improved risk profiling.

Blockchain in action | Real-time maritime risk assessment



Examples include:

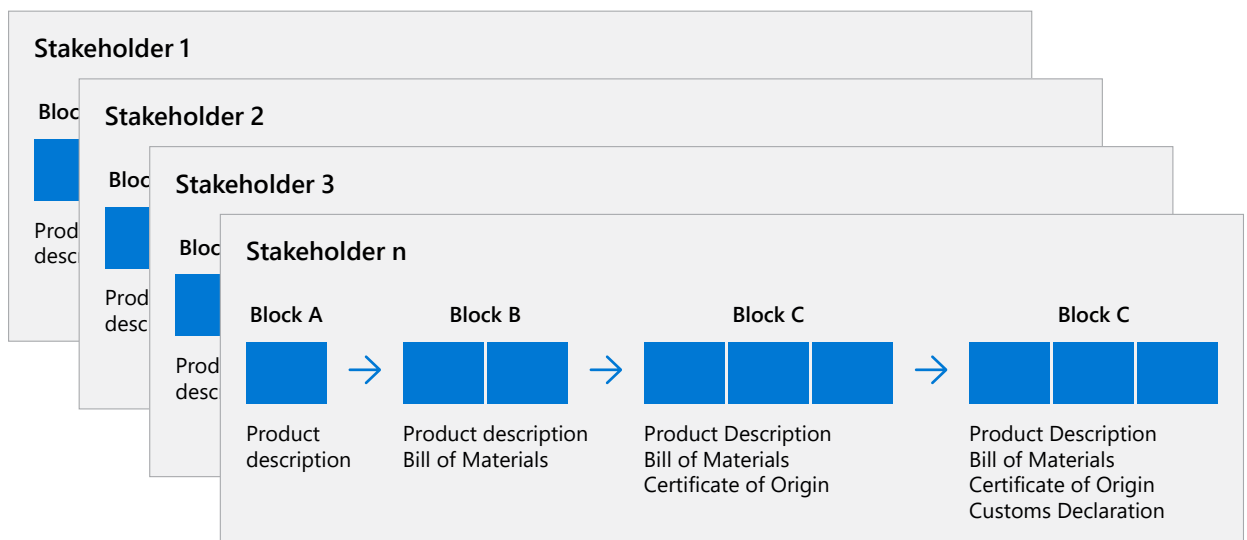
- A cargo ship consistently navigates a certain route, but on one trip, deviates before entering a port. This could be brought to the attention of a customs official waiting at the dock side.
- Vehicles routinely traveling across a border suddenly change behavior or the journey traversed some suspect areas. Again, this could be surfaced to relevant officials.
- Enable port authorities with insights into shipping patterns, predicting when incidents will incur, etc. using Geospatial Imagery produced between [Microsoft and Airbus](#).

The above examples enable automatic processing of the trusted transactions, freeing customs officials to investigate the 10-20% of 'suspect' trade rather than checking 100% of trade transactions, which leads to a higher success rate.



Blockchain / Distributed Ledger Technology

Blockchain, by its 'proper' industry name, is referred to as Distributed Ledger Technology (DLT). A blockchain is a distributed database or ledger that is shared among the nodes of a computer network. As a database, a blockchain stores information electronically in digital format, guaranteeing the fidelity and security of a record. A blockchain collects information together in groups, known as blocks, that hold sets of information. Blocks have certain storage capacities and, when filled, are closed and linked to the previously filled block, forming a chain of data known as the blockchain. All new information that follows that freshly added block is compiled into a newly formed block that will then also be added to the chain once filled.



In this scenario, a blockchain solution would have the blocks (documents) shown right, all held on the blockchain network. As a copy is held by many stakeholders, any 'fraudulent' changes to one copy are ignored by the others which ensure the security of the data.

For that reason, blockchain is regarded as a 'trusted' technology for supply chain business scenarios. There has been much 'hype' about blockchain in recent years. But there have been limited deployments because while the concept is simple, the implementation can be complex due to the lack of underlying technology knowledge and the number of stakeholders involved.

It's also challenging to find the right business scenario to target. The customs supply chain is ideally suited to a blockchain network due to lifecycle activities (blocks) involved in importing or exporting goods from one country to another.

Blockchain privacy and confidentiality

The challenge for organizations with blockchain, apart from initial implementation, is managing data privacy. As indicated above, blockchain data is secure from a tamper-proof perspective, in that an entry cannot be changed without it being noticed by all the nodes on the network.

However, security in the context of the privacy is a challenge because of the level of visibility of the information stored on the network. Since everyone has a copy of the ledger, everyone has access to the data. And this is understandably undesirable to most organizations because the information could be commercially sensitive, or it could be security sensitive.

Microsoft resolves this privacy challenge using Azure Confidential Ledger. This is a tamper-proof unstructured data store hosted in trusted execution environments and backed by cryptographically verifiable evidence.

[Azure Confidential Ledger](#) provides a managed and decentralized ledger for data entries backed by blockchain. Data integrity is maintained by preventing unauthorized or accidental modification with tamperproof storage. Organizations can protect their data at rest, in transit, and in use with hardware-backed secure enclaves used in Azure Confidential Computing



Protect data with blockchain

Ensure that your sensitive data records remain intact over time. The decentralized blockchain structure uses consensus-based replicas and cryptographically signed blocks to make information committed to Confidential Ledger tamperproof in perpetuity.



Access tamper evidence at any point of time

Trust that your stored data is immutable by verifying it yourself. Tamper evidence can be demonstrated for server nodes, the blocks stored on the ledger, and all user transactions.



Get the benefits of Azure Confidential Computing

Protect your data at rest and in transit as well as data in use. Confidential Ledger runs exclusively on the trusted execution environments (TEEs) of Azure Confidential Computing. Transport layer security (TLS) terminates inside the enclave, which keeps cloud providers and administrators outside the trusted computing base (TCB).



Keep cloud providers out of the trusted computing base (TCB)

Confidential Ledger runs on a minimalistic TCB that lets you keep cloud providers out of your computing plans with options like certificate-based authentication.



Internet of Things and Digital Twins

IoT description: The network of physical objects that contain embedded technology to communicate and interact with their internal states or the external environment.

Internet of Things (IoT) technology has huge potential to transform customs operations, from tracking containers to providing sensor data across a port or airport used for monitoring energy emissions.

Deploying IoT sensors across a port would give unprecedented insight into what is happening in near real time. Sensors could be deployed on cranes, vehicles, buildings, energy generators, air quality, containers, ships, tugs, people, and more. Each sensor transmits data on a frequent basis (minutes, hours) into a central hub which can then be analyzed to give insights across the port. This data could inform where cranes are in relation to where they need to be; are the people in the right place for when a ship docks; what energy is being consumed in the warehouses. The information could also be used to identify if there is there an anomalous repeating pattern that needs investigating.

IoT sensors can be easily installed on containers to enable the tracking, monitoring and insights.



Customer case study: Maersk

Maersk use IoT devices on their containers, with Remote Container Management System on Azure, to track and monitor refrigerated shipping containers as they move across the globe. They use insights from this IoT data to optimize internal operations and create new projects.

Learn more about how [Maersk](#) is transforming operations with IoT.

IoT and Digital Twins

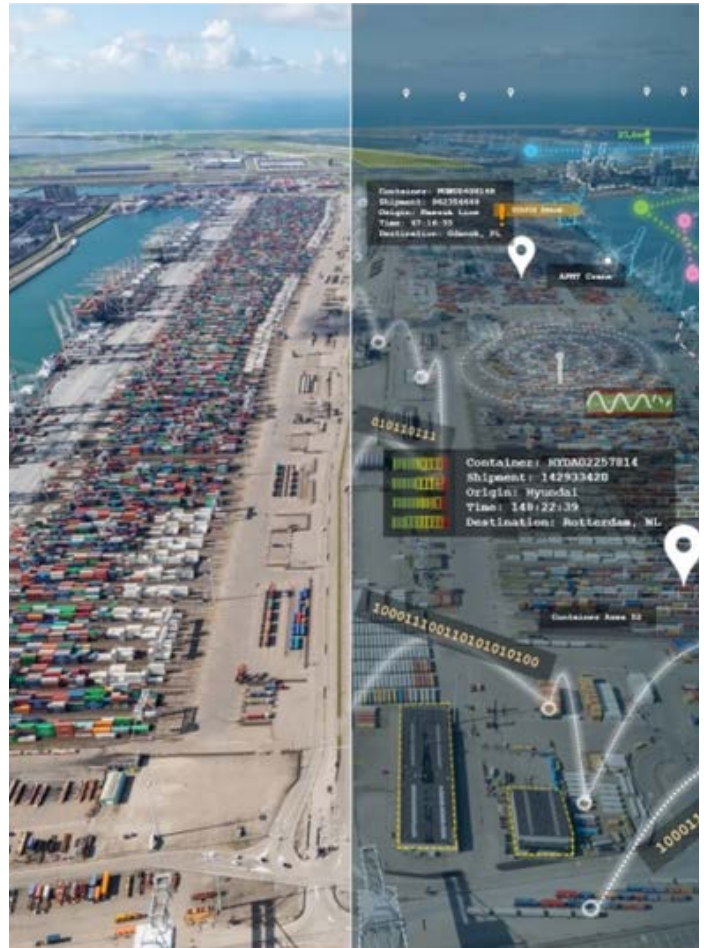
Digital Twins is an Internet of Things (IoT) platform that enables the creation of a digital representation of real-world objects, places, business processes, and people. It enables customs organizations to gain insights that help drive better products, optimize operations and costs, and create breakthrough customer experiences.

With a digital twin of a port or airport, one can model the physical environment by connecting inputs from IOT devices located across that environment to establish a single live integration layer that delivers business insights.

Seaport scenario

Organizations can build a digital twin of a port enabling a 3D-map of the entire environment with IoT sensors placed in various locations and on many pieces of equipment. This visualization can then be used to track and monitor:

- Equipment – Ensure they're in the right place at the right time when needed, optimizing operations.
- People – Officials, Border Force personnel, dock workers, etc. can be used to identify anomalous behavior. For example, if there are people moving about that don't have an IoT 'tag,' appropriate personnel can be alerted to uncover who they are and what they're doing there. Similarly, it could enable the detection of authorized personnel in unusual locations, signally potential suspicious activity.
- Energy consumption – Optimizing energy consumption.



Sustainability

Combining IoT sensor data with a customs warehouse Building Energy Management system (BEMS) could provide invaluable insight on how the buildings are being used.

Customs agencies could have insight into energy consumption patterns for each building, and run 'what if' scenarios to identify opportunities for energy reduction to reduce their overall carbon footprint.



Supporting technology

Drones

Drones have become mainstream technology and their use in ports or airports is being tested in many countries. They can cover a much wider area in a shorter time period than people on foot. They're able to provide a better aerial view of a port or airport, giving better insight into what is going on across the environment. A drone could spot drifting debris, oil spills, and ship congestion that impact operations.

X-ray scanning technology

X-ray scanning technology has been used in ports and airports for many years but has relied on humans to inspect goods. This is very time consuming and slows down movement across borders and is especially problematic given that 80% of trade is trusted. With increased international trade, micro-products, etc., manually reviewing these images will be untenable. Ingesting these high-resolution images into a customs data hub enables AI-enhanced technologies to automate the process, identifying suspect packages for human review and passing through trusted ones.

X-ray scanning of containers

Criminals continue to try to smuggle goods across borders and use ever more sophisticated channels to do so. But at the same time, companies are improving their scanning technologies to identify suspect goods and activities.

Scanning technology, like that provided by Smith Detection, enable quick capture of high-resolution images of whole containers that can be imported into a customs data hub. These images could then be compared with the Customs Declaration document within the data hub and analyses to ensure they match. Any anomalous items could then be highlighted to customs officials, cutting down human visual inspection and speeding up the processing time. This is especially important in "roll on roll off" (RoRo) facilities where time is critical.

The big advantage to scanning machinery is that goods don't need to be unloaded from their containers to 'see' what is inside. If customs officials had to unload every container, it would be very time consuming and totally unrealistic given the volume of containers that traverse a given port every day. In busy ports, it's millions per year. For that reason, customs authorities need to use Non-Intrusive Inspection (NII) technology to identify anomalies.

X-ray scanning for Anti-Smuggling

[Project SEEKER](#), a pioneering multi-species artificial intelligence (AI) model built using Microsoft Azure Machine Learning Services, can automatically detect illegally trafficked wildlife concealed within luggage and cargo.



Illegal wildlife trafficking represents \$23 billion per year. This makes it the fourth-largest illegal trade in the world, following only drugs, guns, and human trafficking. One of the biggest challenges in protecting endangered wildlife species is that it's a massively unregulated industry. This trade often goes hand in hand with other organized crimes, including corruption and money laundering.

While Microsoft is engaged in many significant biodiversity projects, Project SEEKER is a first of its kind initiative aimed at using bespoke Microsoft AI to curb the trade. Currently, there are no integrated, multi-species illegal wildlife algorithms on the market.



Cloud and High Performance Computing (HPC)

Unifying and making sense of the petabytes of customs data produced daily across stakeholders and systems requires powerful computing. Ingesting, analyzing and visualizing that data in a timely manner can be provided by the Microsoft Cloud Services, and in particular [Azure High Performance Computing](#) (HPC).

Azure high-performance computing (HPC)

A complete set of computing, networking, and storage resources integrated with workload orchestration services for HPC applications.

Optimized performance with cost control

Maximize the full range of CPU, GPU, FPGA, and fast interconnect capabilities to reduce job completion times from days to minutes

Production-class platform

With robust HPC reliability, data security, and global regulatory compliance, Azure is the cloud that just works

End-to-end workflow agility

Build and manage HPC clusters for exclusive use, enabling end-to-end application lifecycle management in the cloud

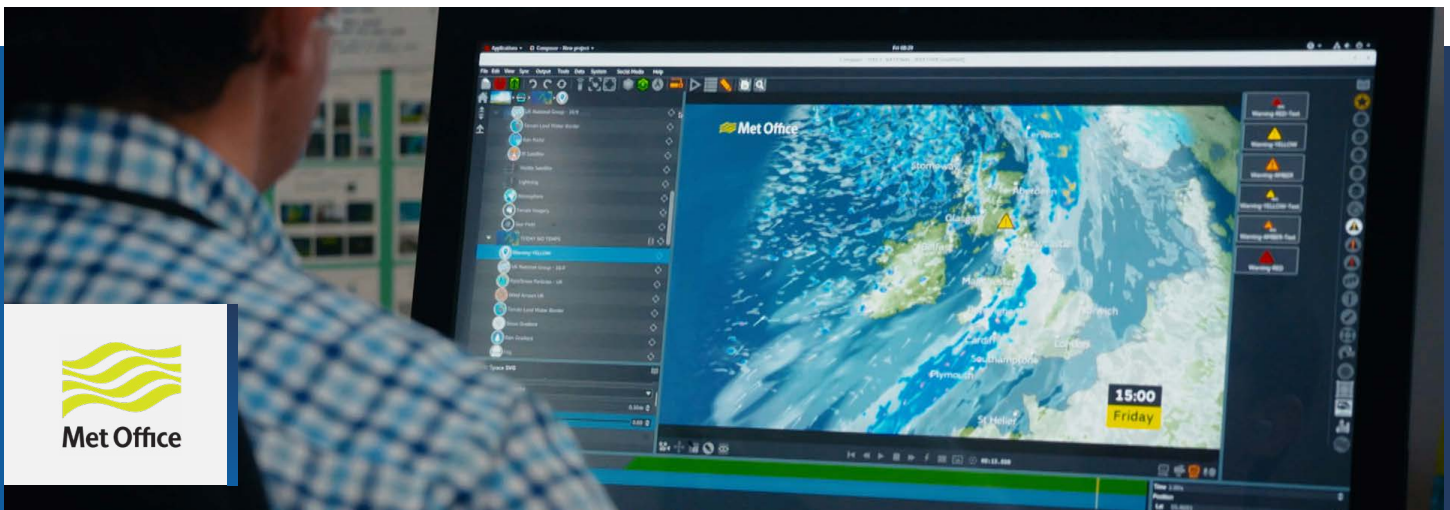
Incorporating intelligence

Build and train new AI models faster with automated machine learning, autoscaling cloud compute, and built-in DevOps

Why Cloud, HPC and AI?

Only the power of cloud High-Performance Computing and AI can analyse the vast amount of data produced daily during the trade process.

- Using a customs data hub will give customs officials the right information in the right place at the right time, whether they're in the tax compliance or Border Force areas.
- Bringing all this data together in a customer's data hub empowers customs officials with tools and real business insights, and visualizes the relevant information in a simpler, easier-to-consume manner.
- Enabling access to the information when they need it, on a device that suits the situation and in a location that they are working.
- Viewing the data from different angles, giving different insight to enable better decision making and targeting of resources.
- Focusing on the areas that need investigating. For example, AI can identify the anomalous behaviors that need further human analysis.



Customer Case Study: The UK Met Office

The [Met Office](#) is the UK's national weather service. It supports businesses, agencies, and governments in making short and long-term decisions that help make the world a safer and more resilient place tomorrow, and for the years to come.

It plays a keystone role in predicting and dealing with the effects of climate change, as well as charting the path to a net zero future. Simon Vosper, Director of Science at the Met Office, explains, "Weather and climate science relies on big computing, big and complex simulations and big data. There are the simulation codes themselves – big and complex codes that need to run on a supercomputer... and then there's the data... Another critical aspect is the platform – the analysis and data platform – where our big data can sit and be ready to be analyzed."

Given these huge technological demands, The Met Office selected Microsoft as its partner to help it deliver the innovation and the compute resources needed to achieve its ambitious goals.

[Learn more about how the Met Office partners with Microsoft chart the UK's path through climate change to a Net Zero future.](#)

Opportunities for a Digital Customs of the Future



Technology solutions that can enable and empower the Digital Customs of the Future.



Single trade window



Microsoft Supply Chain Platform



Microsoft Cloud for Sustainability



Intelligent port orchestration



Geospatial imagery



Protecting data whilst sharing insights

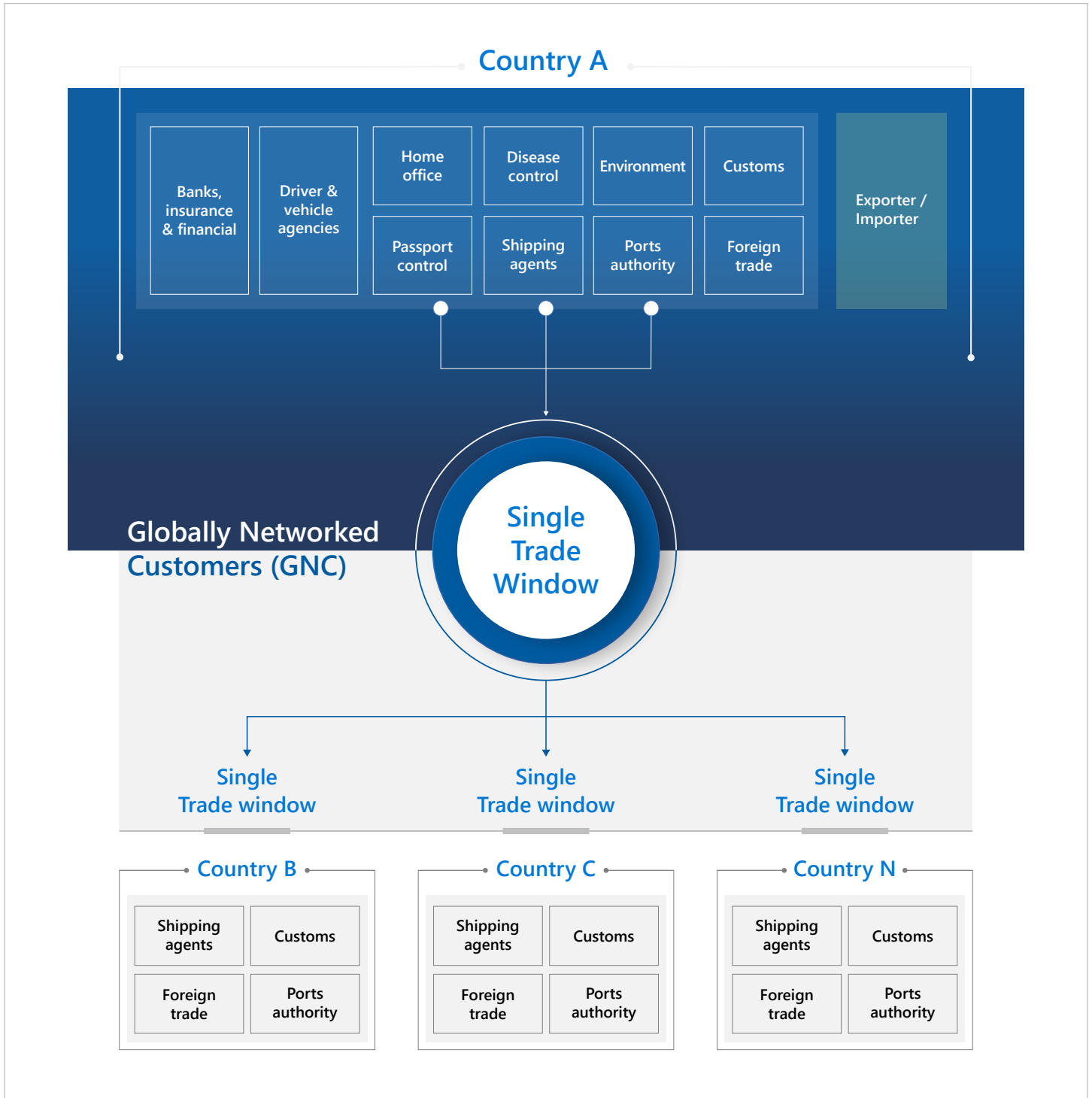


Automated workflow using Content AI



Single trade window

A Single Trade Window provides a gateway between businesses and a country's border services, allowing users to meet all their import, export and transit obligations by submitting information one time in one place. It makes it easier and simpler for customers to complete customs documentation, improve accuracy and reduce errors. And a Single Trade Window also empowers customs officials and enables detection of customs and tax fraud and other financial crimes in disparate data sources in real time.



Making it easier to submit Customs declarations



Challenge

- Many current Customs forms are paper-based or old-fashioned web forms that are difficult to navigate for users.
- Users and agents find it difficult to select the correct HS code for the goods or services which leads to errors and incorrect tax duty collected.



Solution

- Simple online web, mobile application to complete import/export invoicing.
- Virtual assistant to help complete the form.
- Checks and validation at point of entry, reducing errors.
- Auto-complete known fields to reduce time to complete, making it easier and simpler.
- Multi-platform enables completion on device and in location of choice.
- Increased customer satisfaction.



Benefits

- Consistent, standardized data entry, validated at point of entry.
- Faster processing of invoices, reducing workload on Customs officials.
- Less re-work or investigation by Customs officials.
- Enables 'Trusted Traded Status from consistent entry of information.
- Auto-identification of anomalous activity from data presented compared to known data points.
- Reduced unintentional errors z increased tax revenue.

Important note: [The International Maritime Organization \(IMO\)](#) Mandate will make the single window for data exchange mandatory in ports around the world, marking a significant step in the acceleration of digitalization in shipping. The amendments are expected to enter into force on 1 January 2024.



Microsoft Supply Chain Platform

The data generated by customs organizations is typically spread across legacy systems, enterprise resource planning programs (ERPs), and custom solutions, resulting in a fragmented view of their supply chain.

But an organization’s supply chain agility and resilience depends on their ability to connect their data and orchestrate actions across all relevant systems to quickly respond to changing market conditions. To be truly agile, supply chain software needs to increase visibility across data sources, predict and mitigate disruption, streamline collaboration, and fulfill orders sustainably and securely.

Customs organizations can accelerate and efficiency with the [Microsoft Supply Chain Platform](#), with the Supply Chain Center at its core. The Supply Chain Center provides a “command center” experience for practitioners to harmonize data from across existing supply chain systems, like Dynamics 365 and other ERP providers, including SAP and Oracle, along with stand-alone supply chain systems. Data Manager in Supply Chain Center enables data ingestion and orchestration to provide visibility across the supply chain and drive action back into systems of execution.



The Microsoft Supply Chain Platform

Connect your ecosystem.

Get more value from your data across new and existing solutions with a platform that connects your entire supply chain.

Better navigate disruption.

Predict supply chain disruptions before they happen and proactively address risks through intelligent orchestration.

Be ready for anything.

Keep goods flowing with the agility to rapidly adjust to changing markets and meet evolving customer demands.

Accelerate sustainability.

Meet your sustainability goals, improve brand perceptions, and minimize the carbon impact of your organization.



Microsoft Cloud for Sustainability

Sustainable supply chains are a bit opportunity for organizations to reduce their carbon footprint. However, it is challenging to address because decision makers lack the data and insights to optimize supplier, route, fulfillment, and product selection. Using capabilities from Dynamics 365 Supply Chain Management and Order Management in the Supply Chain Center, customers can make sustainable decisions on product sourcing, package-free returns, transportation logistics, manufacturing, and warehouse automation and more.

Microsoft Cloud for Sustainability

Drive operational and cost efficiencies to help meet sustainability goals with [Microsoft Cloud for Sustainability](#)

Unify data intelligence

Gain the visibility needed to improve sustainability reporting and help transform business operations.

Build a sustainable IT infrastructure

Identify opportunities to replace tools, systems, and activities with more efficient options.

Reduce the environmental impact of operations

Track and minimize the environmental footprint of operational systems and processes.

Create sustainable value chains

Enhance accountability across the value chain, from sourcing materials through product distribution.



"We are optimizing transportation costs by leveraging AI-powered capabilities within the Microsoft Supply Chain Platform and Supply Chain Center to recommend inventory allocation. The actionable insights from the Supply Chain Platform trigger freight planning and execution to support order fulfilment for our customers."

– Robert Critchley,
VP Transportation and Warehousing, [iFit](#)



"Our collaboration with Microsoft is a critical piece of our supply chain transformation. The platform gives our team the ability to be more agile – assessing risk and opportunities faster than ever before. Simply put, it provides the end-to-end visibility we need to keep our products on people's tables across North America, and there's nothing more important."

– Mitch Arends, Senior Vice President,
Head of Operations, [Kraft Heinz North America](#)

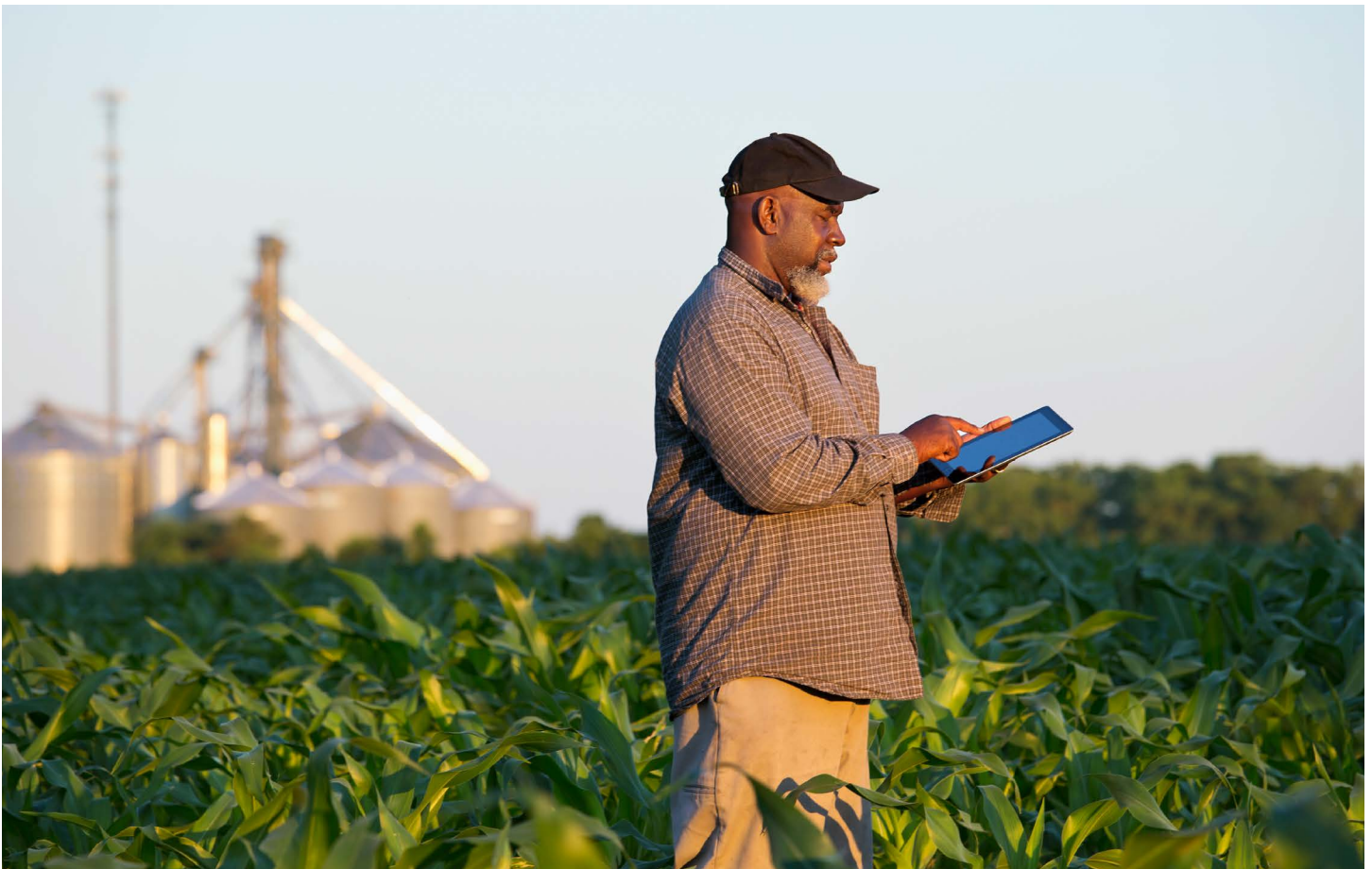
Carbon Border Adjustment Mechanism

The introduction of Carbon Border Adjustment Mechanism (CBAM), as defined by the [European Commission](#), is another factor that will impact trade and customs over the next several years.

Carbon 'leakage' occurs when companies based in the European Union (EU) move carbon-intensive production outside of the EU to countries with less stringent climate policies, or when EU products get replaced by more carbon-intensive imports. This will be a key component of the trade lifecycle. Companies will be required to hold/present CBAM certificates that prove that a carbon price has already been paid during the production of the goods.

This is another data element that can be captured in a customs data hub, and if it is stored in a Microsoft blockchain-backed confidential computing framework, Microsoft can attest to its authenticity.

The CBAM will initially apply to imports of certain goods and selected precursors whose production is carbon intensive and at most significant risk of carbon leakage. These include cement, iron and steel, aluminum, fertilizers, electricity and hydrogen. With this enlarged scope, CBAM will eventually capture more than 50% of the emissions in Emission Trading System (ETS) covered sectors. Under the political agreement, the CBAM will enter into force in its transitional phase as of 1 October 2023.





Intelligent Port Orchestration

A port is a very complex environment involving arriving/departing ships, cargo, Customs, infrastructure such as tugs and cranes, terminal services and of course many people.

We see Intelligent Port Orchestration as the means to manage that environment as efficiently and effectively as possible. Using modern technology such as Internet of Things (IoT), artificial intelligence and digital twins can help bring the data together and provide business insights to help improve the myriad of tasks that go into port operations.

Intelligent Port Orchestration



Customs



Port authorities



Storage/warehousing



Carriers



Hinterland/3PL



Terminals

Benefits of IoT, AI and Digital Twin for port operations



Improve vessel turnaround time by optimizing berth and quay crane allocation using foreknowledge of clustered vessel patterns. These clusters could be proactively broken up through coordination with ocean liners, pilots, tugs, and vessel traffic services.



Improve vessel flow by leveraging insights into navigational bottlenecks in estuaries, anchorages, and berthing areas. On a longer timescale, this insight may also inform hydraulic infrastructure programs.



Reduce container dwell time by providing visibility to hinterland transporters, beneficial cargo owners, and third-party logistics partners on the state of containers and predicted milestones throughout the logistics chain.



Geospatial Imagery empowers a more predictable supply chain.

Global supply chains and businesses all around the world have been faced with unprecedented disruptions due to major spikes in consumer demand, product shortages, and traffic congestion. [Airbus imagery combined with Azure Machine Learning and AI](#) can help organizations predict a disruption before it happens by analyzing shipping routes, traffic patterns, and global consumer buying trends.

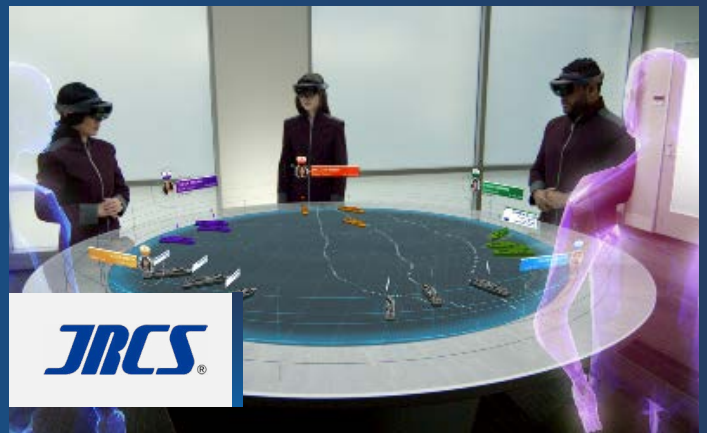


The insights derived from satellite imagery can then go into a customs data hub. Azure Cognitive Services, like [Custom Vision](#), allow organizations to develop and deploy machine learning models on satellite imagery. This helps them better understand global shipping patterns by identifying the location and quantity of cargo ships waiting to be unloaded at ports.

Case study: Microsoft and JRCS plan autonomous ships

Imagine a future with self-navigating ships. As they ply the ocean autonomously their “digital captains” are far away on dry land, keeping watch remotely with mixed reality (MR) and artificial intelligence (AI) technologies.

[JRCS](#) – a major Japanese maritime services company – believes it can make this a reality within the next 12 years. With the help of Microsoft, it has launched an ambitious plan to digitally transform the global shipping industry.



In a series of initial steps, JRCS is deploying MR, the Internet of Things (IoT), and AI to change how shipping crews are trained, how ships are maintained, and how navigational safety and standards are promoted and enforced.

It sees digital transformation as the key to a safer and more efficient maritime industry, which is facing economic and demographic challenges on the horizon.



Protecting data whilst sharing insights

Customs organizations need to increase data privacy and security surrounding business and consumer data. [Azure Confidential Computing](#) enables them to do so by protecting data in use. By enabling multiparty data analytics and machine learning that combine datasets, Microsoft helps organizations keep data private among participants.

Top use cases include:

1. A consortium of banks wanting to share reference data about securities to understand if they are within market consensus. To form an accurate market view, the individual data points must come from authenticated participants without revealing the contents of the submissions and on aggregating correctly.
2. A payment provider can run payment data through regulator-provided fraud-detection algorithms, which can flag a transaction but not reveal personal data. Then, an independent authority can audit and confirm the accuracy of the fraud detection algorithm for flagged payments while protecting user privacy.

Azure Confidential Computing

Protect data in use.

Secure sensitive and regulated data while it's being processed in the cloud.

Share AI insights confidentially.

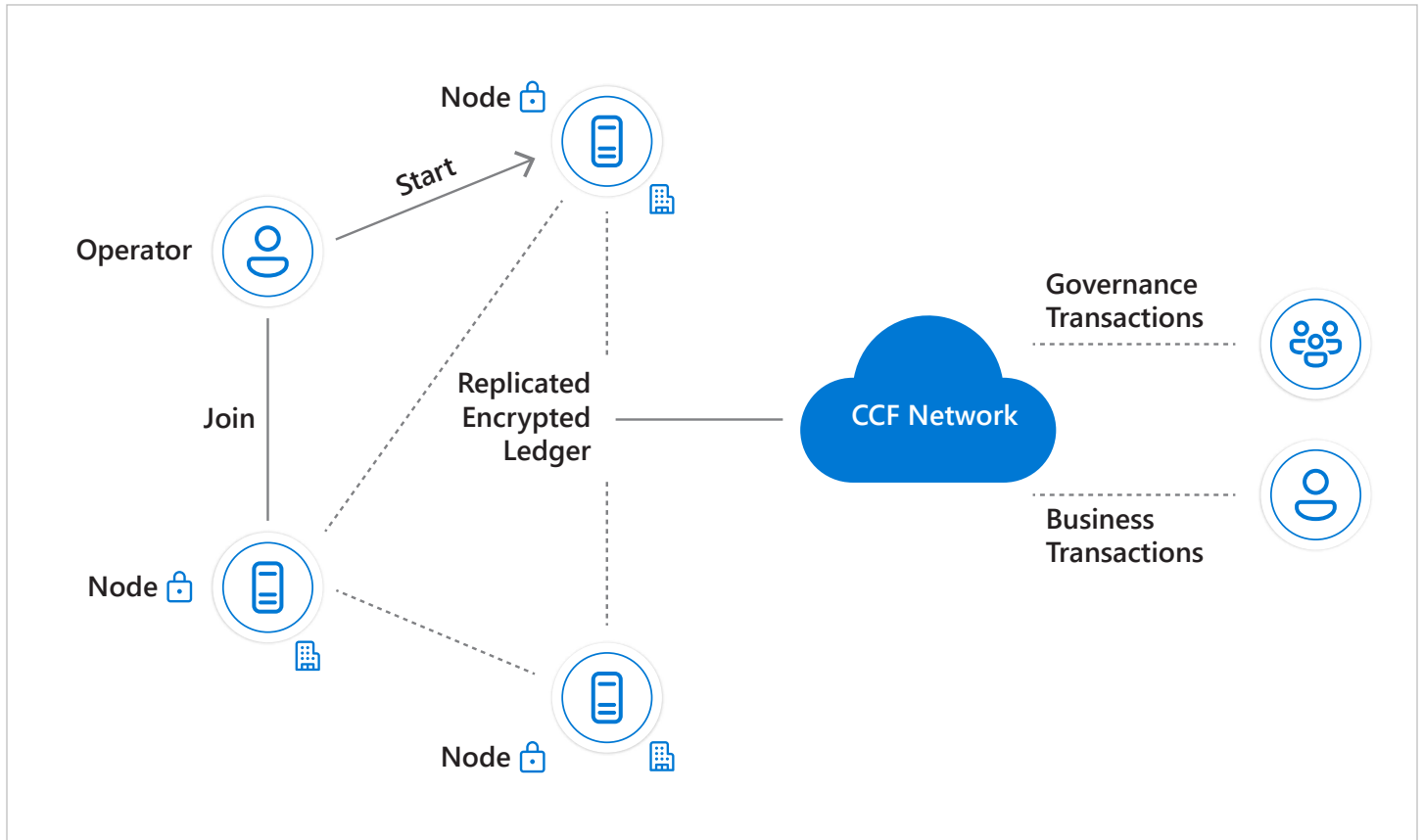
Combine datasets confidentially, without exposing data to other contributing organizations.

Own data.

Migrate to the cloud and keep full control of the data in a trusted execution environment.

Confidential Consortium Framework

The [Confidential Consortium Framework \(CCF\)](#) is an open-source framework for building a new category of secure, highly-available, and performant applications that focus on multi-party compute and data. Leveraging the power of trusted execution environments, decentralized systems concepts, and cryptography, CCF enables enterprise-ready multiparty systems.



Get an in-depth idea of how the [Confidential Consortium Framework](#) can help customs organizations build enterprise grade applications between multiple parties with a common source of truth.



Automated Workflow using Content AI

[According to IDC](#), by 2025 there will be more than 130 billion terabytes of content and this content is often unstructured, locked up in siloed repositories or sitting as paper in a warehouse. A new category of technology solutions called Content AI uses advancements in cloud and AI to transform how content is created, processed and discovered, empowering people and automating workflows at scale.

Every workday, on average, our customers add over 1.6 billion documents to Microsoft 365.

In customs, there are a multitude of documents created in any trade transaction that are all in unstructured silos, including invoices, certificates of origins, declarations, and contracts.

[Microsoft Syntex](#) automatically can read, tag and index high volumes of content and connect it where's it needed – in search, applications and as reusable knowledge. It manages content throughout its lifecycle with robust analytics, security and automated retention.

Using Content AI with Syntex can automate the processing of this content and transform the business of customs.

[Enhance, manage, and connect content at scale.](#)



Digital Customs of the Future – Summary



As shown in this whitepaper, customs organizations need to incorporate modern technology to help them meet their obligations, like facilitating frictionless trade, ensuring the right tax duties are paid, enabling safer cross-border trade, optimizing the cargo transport operations, and meeting the ever-challenging sustainability goals.

Digital Customs of the Future will be achieved by bringing together people and technology in an integrated manner to deliver real business outcomes.

Now is the time for customs organizations to embrace AI and machine learning technology to transform their business, starting first and foremost with a focus on business outcomes.

Learn more about how Microsoft can help achieve desired customs outcomes at aka.ms/publicfinance

The Customs Data Hub will empower:

- 01 Tax Duty Compliance**
Ensuring the right tax duty is collected, helping traders' complete documentation correctly, reducing fraud & error, reducing rework, feeding into risk profiles.
- 02 Protecting the borders**
Providing border force officers with the right information at the right time in the right place to aid their investigations, searches, security intelligence.
- 03 Risk profiling**
Bringing the data together and the AI analysis will provide better risk profiling, highlighting suspect items, anomalous behavior in a timely manner.
- 04 Facilitate frictionless trade**
Having access to Customs digital data (documentation) in one platform enables trusted trader status which will automate 80% of the trusted trade, making it easier for all stakeholders.
- 05 Cargo Logistics**
Making use of the customs metaverse will enable optimization of the logistics process — unloading containers, connecting to road and rail transport, extracting contents and delivering to the end marketplace.
- 06 Sustainability**
The customs intelligent data platform will provide unprecedented insight into your energy emissions and carbon footprint in the ports & airports infrastructure, and the whole supply chain.



Valentina Ion

As Director of Public Finance, Valentina is in charge of Microsoft sales and industry solutions strategy, enabling a strong organization that supports Governments embark on the Digital Transformation journey based on deep understanding of their industry, drivers and the critical line of business processes. She is also in charge of building and developing strategic partnerships with ICT, Advisory, academia and international organizations such as OECD, IOTA, WCO, etc.

She has a diverse background in industry sales strategy and execution, partnerships management, marketing and product management as well as business operations and she holds a Masters in Finance and Accounting. With more than 20 years experience in ICT and business transformation, Valentina is passionate about business re-engineering and digital transformation for better economy and society.



Steve Barr

As an Industry Digital Strategist within Microsoft Worldwide Public Sector, Steve has 30+ years business/IT experience with very strong relationship skills at all levels up to and including C-suite and ministerial level. He is a member of two All Party Parliamentary Groups for AI (APPG-AI) and Blockchain (APPG-Blockchain). He is a recognized global speaker, most recently at Dubai Ports Global Freight Summit presenting thoughts on “Net Zero in the Supply Chain” in November 2022.

He works with government customers across the globe on subjects such as tax, customs, sustainability, security, innovation and user experience and is recognized by his peers as a Public Sector subject matter expert. He has extensive industry knowledge of government, defense and PS sustainability gained in real world engagements across the globe. Prior to joining Microsoft 15 years ago Steve held senior positions in Capgemini, EDS and HM Revenue & Customs.