Microsoft

Data collaboration enabling Fair, Safe Trade

The evolution toward Intelligent Connected Trade Windows

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Executive summary

This white paper aims to outline the urgent need for data collaboration, and positive ways to enhance digital collaboration, in customs and trade, leading to strong benefits, such as ensuring simpler procedures for the importers and exporters, and improving trade facilitation to foster economic growth.

Thriving economies are characterized by focus and investment into fair and safe trade. Even more today, in the pandemic context, Microsoft understands how important it is to facilitate trade, to keep the flow of raw materials, goods and services running across the globe in order to enable economic recovery and growth, to maintain and improve opportunities for individuals and companies, and ultimately to fuel value generation.

The pandemic has shown that data insights are vital for decision makers. However, we are also seeing several deficiencies in data collaboration at a global level and therefore, we provide below a number of essential ways for data collaboration that will enable better transparency, collaboration and insights-based decision-making in customs and trade. This paper goes a step further and looks not only at the benefits of technology in the digitalization of processes, but also provides an overview of the transformation interconnected trade windows can provide, which are in fact interconnected trade ecosystems. Such ecosystems can help generate more value, create more jobs, accelerate economic growth, attract investments, enable cooperation and complementary trade, and ultimately contribute to a fairer distribution of resources, while providing easier access to the global consumption market, including for the smaller players, such as startups or farmers for example.

Trade, by definition, requires multiple stakeholders to come together and exchange goods & services for mutual benefit, with the government playing a key role in ensuring the safe and fair attributes of the exchange. Technology has proven to be an enabler and accelerator for international trade through the digitalization of previously paper-based processes and enablement of almost real-time data exchange to prevent delays at the border and to enable seamless customs and ports operations. New technologies, such as IoT and Blockchain, are enabling automation, supporting remote monitoring, and building command and control centers at the borders. This can lead to improved health and safety of the people and sustainability of the economy. In a post-pandemic world, technology can help improve and empower collaboration when social distancing is required.

WORLD
ECONOMIC
FORUM

International trade is the lifeblood of the world economy, providing the goods and services that are traded across borders to bring wealth and prosperity to nations. Emerging markets more broadly have also been steadily growing. With unfinished goods, components and services now accounting for 70% of all trade, emerging markets such as the BRIICS countries – comprising Brazil, Russia, India, Indonesia, China and South Africa – are the largest beneficiaries of this development, their share of total global trade rocketing in recent years.

World Economic Forum Oct 2021

U.S. Chamber of Commerce

America cannot have a growing economy or lift the wages and incomes of our citizens unless we continue to reach beyond our borders and sell products, produce, and services to the 95% of the world's population that lives outside the United States.

January 15, 2021 U.S. Chamber of Commerce

Federal Ministry for Economic Affairs and Climate Action

Trade is important, not least for Germany – a country that accounts for 7.2% of global trade. Many sectors of the German economy are heavily dependent on exports. The same applies to employment. More than one in four jobs in Germany depends directly or indirectly on exports.

Federal Ministry for Economic Affairs and Energy.

These technologies are not reserved for a select few rich countries. In 2018, a World Bank symposium on the role of Big Data in achieving the Millennium Development Goals illustrated the diversity of data usage by governments. More generally, data technologies usually leapfrog in less rich countries: they adopt the latest technologies, according to their needs, without following the linear pace of technology adoption in rich countries.

World Customs Journal 2020 – If algorithms dream of Customs, do customs officials dream of algorithms?
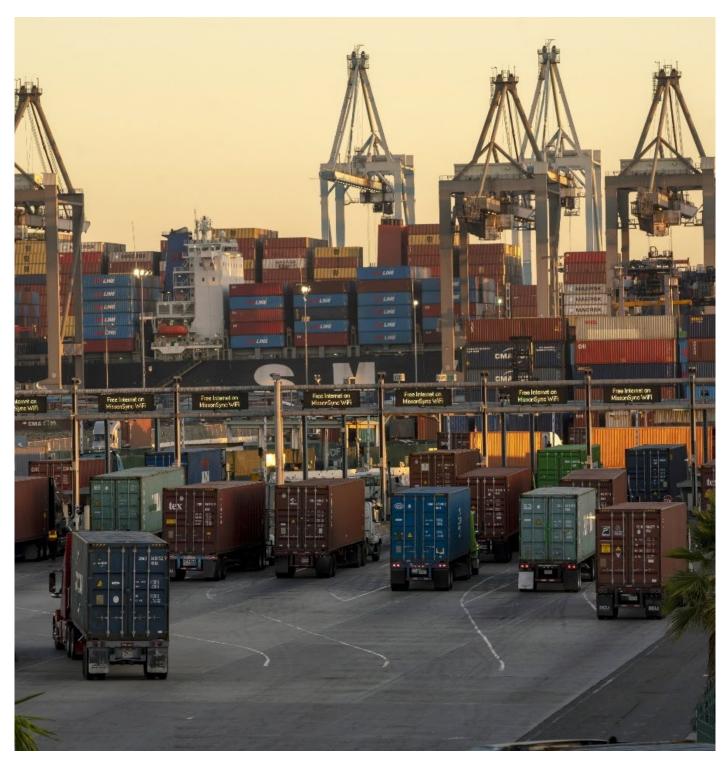
Our vision on the evolution of trade in a digital world is represented by the **Intelligent connected trade windows**, where with real time data collaboration achieved, new services are unlocked enabling better capacity utilization, new value creation, cost optimization, trusted transactions through Distributed Ledger Technology (DLT) and API data integration that provide supply chain visibility and dynamic routing and pricing.

To support the evolution of trade agreements and arrangements in a digital environment, Microsoft is putting a special focus on **innovation, integration, and interoperability**. These investments help ensure long-term vitality and build the necessary trust among members by focusing on data sharing, data privacy, data veracity and transparency. **Microsoft Cloud interoperability** and **Open Standards** enable seamless interoperations among the Single Trade Windows environments that customers are using. Portability of workloads between platforms is vital if customs and ports authorities are to realize the benefits of agile, elastic infrastructure, and Microsoft is focused on the technology innovation required to make this a reality in this complex environment. Microsoft provides state-of-the-art data privacy and security solutions such as the **Azure Data Share** and **Azure Purview** which support data sharing to and from Azure as well as other platforms, Blockchain technology to address multiple specific business needs that deal with trust. AI is another important area that impacts distributed collaboration with focus on preserving data privacy while enabling AI-based collaboration of data, as well as enabling **Safe Haven** which helps bring users one step closer to a true ''utility computing'' model for the Cloud.

Let's explore what changes economies are currently facing in international trade, understand the future trade vision, discover how technology can transpose this vision into reality, and uncover the key innovators along with their current learnings.

Pandemic disruptions

Pandemic is burdening ports and borders with long waiting queues

Source: [Supply chain chaos is hitting global growth and could get worse (cnbc.com)](cnbc.com)

The COVID-19 pandemic has revealed the fragility of the global supply chain. Global international trade value dipped by 14.5% in 2020 (UNESCAP). The WTO estimates that transport and travel costs could potentially have the most significant impact on international trade during the pandemic. Given the scale of the impact and the severity of the containment measures, closures of ports of entry (air, sea and land) along with strengthened border crossing and quarantine procedures, could increase trade costs by 25%.

This crisis presents the world with unintended impacts on the world economy and trade, and on the global supply chains that produce and distribute essential goods such as medical supplies, food, and energy. **Maintaining trade connectivity through digitalization of borders** not only for the immediate pandemic response, but also for the subsequent recovery efforts is crucial to build resilience to future disruptions. The United Nations 2030 Agenda for Sustainable Development recognizes international trade as an engine for inclusive economic growth and poverty reduction, and an important means to achieve the 17 Sustainable Development Goals (SDGs). Being the main enforcer of cross-border trade-related regulations, customs can ensure that international trade contributes to accelerating progress in achieving these goals.

The COVID-19 pandemic has revealed the urgent need for customs and all supply chain stakeholders to digitize procedures and apply technology to achieve more efficient connectivity and collaboration.

Kunio Mikuriya, Secretary-General, World Customs Organization, Brussels

To mitigate the effects of the pandemic, the global, regional, and local entities have to work closely together to minimize disruption **by digitizing cross-border trade** in goods, particularly those essential to combat COVID-19, while safeguarding public health. Increasing transparency by **sharing information** on new trade measures introduced in response to COVID-19 and **making relevant information publicly available** are important steps in establishing a coordinated approach to ensure that essential goods can quickly reach those most in need, including in least developed and land-locked countries.

WCO and WTO members have already been invited to increase transparency by sharing information on new trade and trade-related measures introduced in response to the COVID-19 pandemic. "As COVID-19 continues to spread globally and governments consider new measures to protect the health and well-being of their citizens, we urge Members to ensure that any new border action is targeted, proportionate, transparent and non-discriminatory," they declared.

Fragmented digital infrastructures, a lack of relevant legal frameworks and a lack of streamlined trade facilitation practices have constrained trade resilience and post-pandemic recovery. Countries achieving higher implementation rates of trade facilitation measures have mobilized their existing trade facilitation mechanisms better and have leveraged a wide range of national and regional instruments in response to the pandemic.

To overcome bottlenecks in trade facilitation and to build a regional mechanism for resilient trade recovery, various actions can be taken, such as:

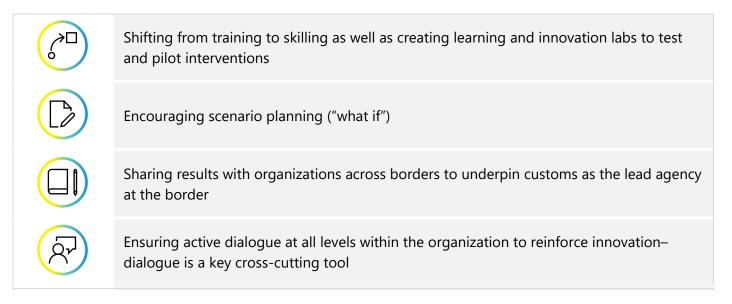|	
	Create **national trade facilitation committees (NTFCs)** supporting the development of comprehensive national TF strategies, encompassing all supply chain activities, and including adequate responses in times of crisis and pandemic. **Digitalization plans** should be at the core of these committees. Examples are listed here
	Accelerate the implementation of **paperless trade** to achieve **resilient trade connectivity**
	Drive **risk management** to minimize trade disruptions and reduce trade cost
	Establish permanent mechanisms for cross-border **exchange of trade-related data and documents**, by ensuring streamlined procedures
	Collaborate at all levels including with the private sector to facilitate trade effectively, enhance **digital skilling** and drive resilience at individual local level
	Establish a whole-of-government approach to drive institutional cooperation and **integration at all levels**, either national, regional, or international

Finally, the pandemic is dramatically increasing the demand for an **agile transformation** in which new workforce strategies are needed, such as **dynamic rerouting capabilities**, and **visibility in the management capacity** within customs administrations and border agencies globally. The concept of a "learning organization" provides guiding principles and tools to integrate innovation and drive digital skilling. This requires critical reforms to enhance the **efficiency of cross-border trade**:

	Shifting from training to skilling as well as creating learning and innovation labs to test and pilot interventions
	Encouraging scenario planning ("what if")
	Sharing results with organizations across borders to underpin customs as the lead agency at the border
	Ensuring active dialogue at all levels within the organization to reinforce innovation–dialogue is a key cross-cutting tool

Integrating and evolving procedures to dynamically respond to society realities, such as limiting entry points during the pandemic (i.e., EU green lanes), increasing capacity for customs to process increased volumes, automating processes and the digitalization of borders (i.e., moving inspections and preclearance process) will ensure **sustainability**.
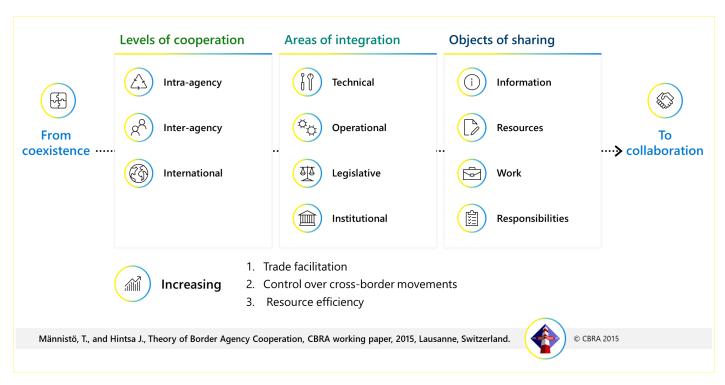
> " We've seen two years' worth of digital transformation in two months. From remote teamwork and learning to sales and customer service, to critical cloud infrastructure and security— we are working alongside customers every day to help them adapt and stay open for business in a world of remote everything.

Satya Nadella, CEO Microsoft, 2020 (Source: [Microsoft](#))

Various levels of cooperation and integration can help move from isolated coexistence to a more active **collaboration across borders**.

Figure 1

Levels of cooperation	Areas of integration	Objects of sharing
Intra-agency	Technical	Information
Inter-agency	Operational	Resources
International	Legislative	Work
	Institutional	Responsibilities

From coexistence ..... **To collaboration**

Increasing
1. Trade facilitation
2. Control over cross-border movements
3. Resource efficiency

Männistö, T., and Hintsa J., Theory of Border Agency Cooperation, CBRA working paper, 2015, Lausanne, Switzerland. © CBRA 2015

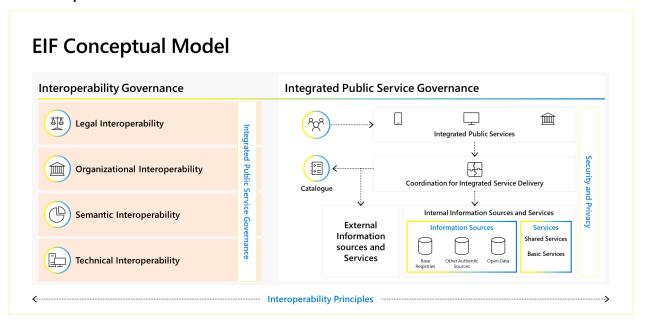*Source: [Cross-border research agency](#)*

> " More often than not, what works in normal times won't work in a crisis. We need to think and act differently... One of the positive effects of the crisis is that it has forced policy makers to "think anew". It has forced us to understand that we need to adopt more robust responses to managing complexity in times of crisis.

Stephen Quest, Director General, European Commission – Joint Research Centre, Snowden, D. and Rancati, A., [Managing complexity (and chaos) in times of crisis 2021](#).

The [EU Customs Action Plan](#) from 2021 is calling for "a stronger framework that will allow us to better protect our citizens and our single market" and "an integrated European approach to reinforce customs risk management and support effective controls by the Member States." 30 actions scheduled for 2020-20253 seek to address the challenges faced by the EU Member States customs authorities. This includes more efficient management of their ever-increasing roles, to ensure, for example, that import duties, excise duties, and VAT are paid correctly and that goods are checked at import/export at the EU border and unsafe/fake goods, or controlled items are identified and handled appropriately, taking account of the major increase in e-commerce and risks related to that. In addition, the expected Brexit-related increase of customs declarations and the COVID-19 crisis highlight the clear need for improved management of the EU customs union. The European interoperability framework defines basic interoperability guidelines in the form of common principles, models and recommendations:
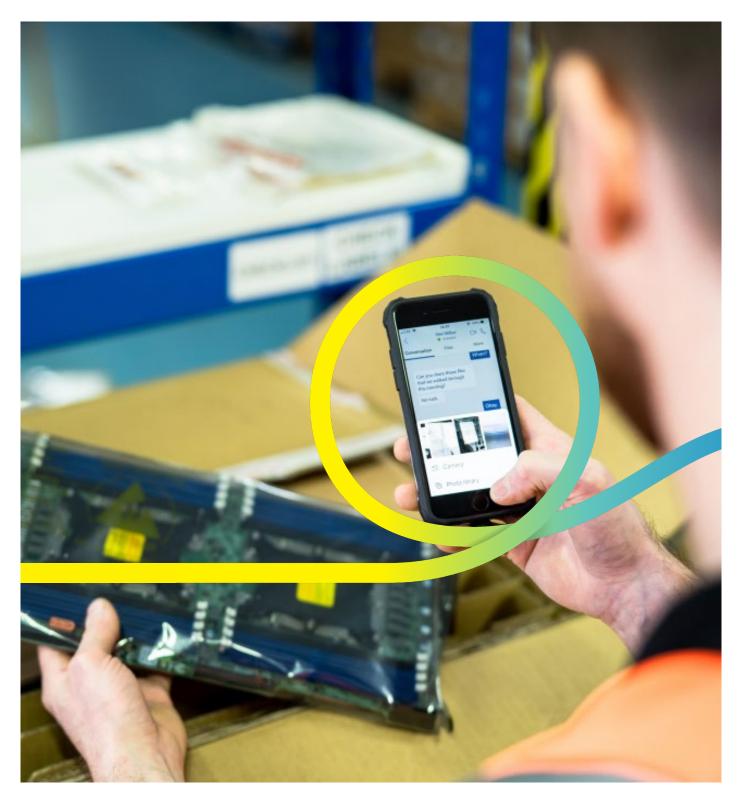
Figure 2

EIF Conceptual Model

Source: [EU Commission – New European Interoperability Framework](#), 2017

Key lessons from the pandemic have been applied to **establish procedures** and capacities for the management of customs personnel that guarantee their health protection at the ports of entry, and to promote **flexible telework systems**, which are essential to **build resilience** during crises and to keep in step with trends in digitalization of economic activities.

Taking advantage of this turning point to adopt new technologies such as **artificial intelligence, IoT, blockchain, and big data** will transform and streamline customs procedures and contribute to reviving the countries' economies through trade.

The importance of establishing communication protocols within the customs agencies and with other border authorities, users, border communities, and the customs authorities of neighboring countries will ensure that clear, appropriate information is shared in a timely fashion.

Customs authorities have a major role in managing the pandemic. Modernizing and transforming agencies by improving their processes, systems, and facilities through new technologies and by strengthening their human resources will drive the resilience needed to come back to economic growth and development, globally.

Future of trade vision

In building their vision for customs in 2040, the EU identified two factors that will have the most influence in shaping the future of trade and customs:

Economics

International trade will always be an important component of economic growth and development. The nature of that international trade will be shaped by the needs of the local economy and the global economy. When the economy is dynamic and growing, customs authorities are able to focus on their broader mission around welfare, the environment and maintenance of standards. Low growth and poor global competitiveness will shift the focus to reducing the barriers to trade. The growth in digital trade will accelerate these shifts.

Conflicts

Geopolitical tensions form the context for global trade. As tensions reduce, the number and diversity of trade agreements is expected to increase. Increased tensions will lead to a reduction in the number of trading partners and a greater emphasis on the security role within customs. Where local economies remain dynamic, dumping is expected to be a growing problem and customs organizations will be at the forefront of the government response. Increased tensions also will require customs agencies to partner with other government agencies in protecting remaining trade agreements.

Neither of these two factors can be predicted in the long term. The customs agency of the future needs to be able to respond to the evolving economic and geopolitical context for trade. But more than that, global trade has a role to play in reducing global tensions and poverty, and in tackling the global challenges that we face. The customs organization of the future will be instrumental in enabling countries to work together to overcome them.

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The events of the last year have demonstrated that no country, no people and no continent can stand alone in the face of the challenges that confront humanity. From pandemics to climate change, from war to poverty, we need to overcome shared problems through collective action.

Cyril Ramaphosa, South Africa's President
6 February 2021 Opening Statement African Union Assembly

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Digital trade is an opportunity to expand availability, choice and lower the price.

Jesus Seade, Undersecretary for North America,
Secretariat of Foreign Affairs of Mexico
World Economic Forum Trade Multistakeholder Conversation 2020

The Customs organization of the future has 4 features

1. An expanded remit through single trade window

The government has brought together all relevant departments to fully implement a single trade window for the country (or the customs union). The single trade window enables the customs authority to fulfil their expanded mission to facilitate legal trade, protect citizens and the environment, and to assist with compliance with legislation. Data flowing through the single trade window, and across government, is used to proactively identify growth opportunities and security risks that may harm citizens. Customs authorities use the single window to provide evidence for policy makers drafting new legislation.

The smooth operation of the Single Trade Window enables small- and medium-sized enterprises to trade globally and take part in global supply chains. As a result, Small Medium Enterprises (SMEs) have significantly grown their expertise and intellectual property and are more competitive in the global market.
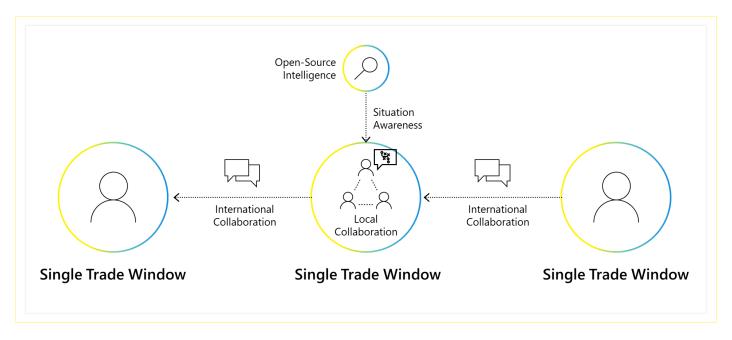
Figure 3

Single Trade Window: The UN Economic Commission for Europe defines a Single Trade Window as '...a facility that allows parties involved in trade and transport to lodge standardized information and documents with a single-entry point to fulfil all import, export, and transit related regulatory requirements. If information is electronic, then individual data elements should only be submitted once.' (Source: rec33_trd352e.pdf (unece.org))

2. Priorities shifting as the operating context changes

The customs authority has shifted to be truly focused on the needs of their customers – importers, exporters and the other government departments that have a role in trade, tax, finance, and borders. The organization has developed capabilities to monitor global trends and pressures, and they develop actionable insights from that data. Strategic and operational leaders can refocus resources (people, funding, physical assets, etc.) as the mission of the agency adapts to external drivers – rapidly enabling a greater focus on security, for example.

Frontline staff have the digital skills and tools they need to be able to respond to changing demand for services. They also have the tools that enable them to collaborate with colleagues (across the globe) as they respond to increasingly complex challenges.

Figure 4

3. Facilitating an evolving landscape of trade agreements and arrangements

Customs authorities enable Single Trade Windows to be connected together as governments enter into new trade agreements and as existing agreements evolve. Their expertise and technical capabilities enable new trade arrangements to be implemented faster and with less risk. As a result, the country is able to exploit new trade opportunities around the globe.

Trade windows joined together using open standards have enabled trading partners to protect global supply and value chains from increasing threats from state and non-state actors. The interconnectedness has enabled customs agencies to identify serious organized crime crossing borders (trafficking of people and illegal goods) and to target modern slavery that is happening within the country. As a trader, you can trade globally by interacting with Single Trade Window services in your local country.

4. Balance digital trade opportunities and digital threats

Government policy and taxation of digitally enabled trade in goods and services (either physically or digitally fulfilled) have evolved so that digital and physical trade are no longer siloed processes. As a trader, it is now easy to see which rules apply to different types of trade. The services provided by the customs organization enable supply chains to adapt and blend digital and physical delivery of goods and services. Digitalization of customs means that traders can deliver "on demand" and consumers have instant access to goods and services.

The customs authority has become a digitally native organization, one that not only provides digital services to traders and citizens but that also uses in-house expertise to rapidly respond to changing demand. Cyber security professionals within customs use open source and customs data to protect the country and trading partners. They are also able to use the data to build a picture of emerging risks that enables the country to remain secure and competitive.

Figure 5

Example: Artur, the farming trader of the future
(for illustrative purposes only)

As customs agencies of the future transform, they will enable small and medium-sized enterprises to compete as part of global supply and value chains. For informational purposes, let's imagine for Joe, a farmer, the Single Window on government services allows him to provide production and provenance data in one place for all the supply networks that he is a part of. This increases the value he is being able to provide to the manufacturers he is supplying.

The creation of a Single Window has made it easier for Joe to transform his own business. Data that flows through the Single Window helps him balance supply and demand. Real-time data means that he is able take decisions at the right time to maximize yields, manage logistics and keep importers informed.

Because Joe is now able to manage all his import and export information in one place, customs clearances are obtained quickly and consistently. His customers are being able to depend on his shipments and can better plan based on the shipping information he provides.

What are the steps, in terms of technology modernization and innovation, to make this vision reality?

As with any digital transformation reaching the level of connected Single Windows into regional and global trade ecosystems, there are several steps to be taken that have been mapped across **3 horizons** as follows:

Figure 6

HORIZON 1	HORIZON 2	HORIZON 3
Modern decentralized identity	Data as a Service Data marketplace	Real-time collection of sensor shipment data
Chatbots, intelligent processes, and customs clearance automation	Integrated Data systems	DLT-based global trade automation
API-centric data integration in trade ecosystem	Automated non-intrusive inspections	Supply chains real time visibility through integration
Customs officer recruitment and training	Customs intelligence and risk profiling	Connected Trade Single Trade Windows
Smart border surveillance	ESG compliance reporting	
Open banking integration	Cross-government, cross-country data exchange	
Unified payment and collection platforms	Modern integrated cyber platform	
Trade services catalogue and eCommerce		

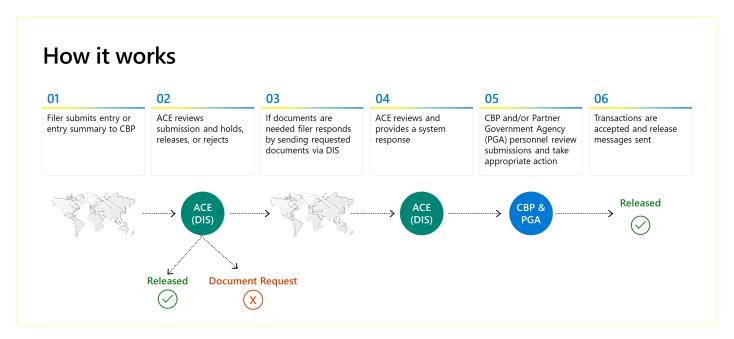## Horizon 1: Digitalization and low code automation

There are four steps for Horizon 1. The first step is ensuring a trusted digital identity of the stakeholders. The next step is providing a digital representation of the customs and ports assets (warehouse, fleet etc.). The third step is digitalizing the exchange of information and modernizing the payment processes connected to the trade and customs clearance processes. Finally, the last step is establishing the catalogue of trade services each stakeholder will offer such as:

🔲	Modern decentralized identity
🔲	Mobile data collection for inspection and intelligence
🔲	Customs officer recruitment and training
🔲	Chatbots, intelligent processes, and customs clearance automation
🔲	Smart border surveillance
🔲	Unified payment and collection platforms
🔲	Open banking integration
🔲	Trade services catalogue and eCommerce platform

Example Horizon 1: USA – ACE Single Trade Window

The Automated Commercial Environment (ACE) is the system through which the United States government has implemented the Single Window, the primary system for processing trade-related import and export data required by government agencies. This transition away from paper-based procedures results in faster, more streamlined processes for both government and industry. The U.S. Customs and Border Protection (CBP) maintains a notional development and deployment schedule (Dev/Dep schedule) of planned ACE enhancements.

Figure 7: The ACE Document Image System and how it works

How it works

01	02	03	04	05	06
Filer submits entry or entry summary to CBP	ACE reviews submission and holds, releases, or rejects	If documents are needed filer responds by sending requested documents via DIS	ACE reviews and provides a system response	CBP and/or Partner Government Agency (PGA) personnel review submissions and take appropriate action	Transactions are accepted and release messages sent

Source: https://www.cbp.gov/trade/automated, Nov 2021

Horizon 2:
Data collaboration

Once stakeholders, assets and processes have been digitalized it becomes critical to enable data collaboration between all these entities to generate insights on trends, challenges, gaps as well as capacity usage and profitability. Insights can then enable automation and optimization of processes. An important building block is the ability to perform risk profiling. With a risk scoring for each economic agent, the processes related to customs clearance and trade facilitation could be automated. Ultimately this could lead to secure trade digital marketplace that will embed compliance by design with the requirements of ESG reporting and the requirements of a safe and fair trade:

	Integrated Data systems
	Data as a Service
	Data marketplace
	Customs intelligence and Risk profiling
	Cross-government, cross-country data exchange
	ESG compliance reporting
	Modern integrated cyber platform

Example Horizon 2: EU Single Window Environment for Customs

Each year, the EU Custom Union facilitates the trade of more than **€3.5 trillion worth of goods**. On 28 October 2020, the European Commission proposed a new initiative that will make it easier for different authorities involved in goods clearance to exchange electronic information submitted by traders.

The **EU Single Window Environment for Customs** will enhance cooperation and coordination between different authorities and will support the automated verification of non-customs formalities for goods entering or leaving the EU, and has 2 pillars of digital administrative cooperation:

- A government-to-government (G2G) digital cooperation between customs and partner authorities to support the automated verification by customs of the non-customs formalities required for goods clearance
- A business-to-government (B2G) digital cooperation, focused on various ways of streamlining clearance processes for traders when dealing with certain EU non-customs regulatory requirements

The Single Window will enable businesses and traders to provide data in one single portal in an individual member state, thereby reducing duplication, time, and costs. 24/7 availability of the automated supporting documents verification service will allow the clearance of standard cases to happen even outside the working hours. Once fully rolled out, customs and other authorities will then be able to automatically verify that the goods in question comply with EU requirements and that the necessary formalities have been completed.

Figure 8: G2G and B2G cooperation in the EU Single Window Environment for Customs

Source: https://ec.europa.eu/taxation_customs/eu-single-window-environment-customs_en

Horizon 3:
Intelligent connected trade windows

With real time data collaboration achieved, new services are unlocked, enabling better capacity utilization, new value creation, cost optimization, trusted transactions through DLT and API data integration that provide supply chain visibility and dynamic routing and pricing. Another benefit of reaching this stage is that organizations can reduce and prevent illicit trade and take down trafficking networks as illustrated by the Project Seeker. The first-of-its-kind, multispecies artificial intelligence model, to combat the $23 billion illegal wildlife trafficking industry, has been developed by Microsoft. Microsoft has trialed the Azure-based technology at Heathrow Airport, where it scanned up to 250,000 bags a day. It recorded a more than 70% successful detection rate and is particularly effective at identifying ivory items such as tusks and horns.

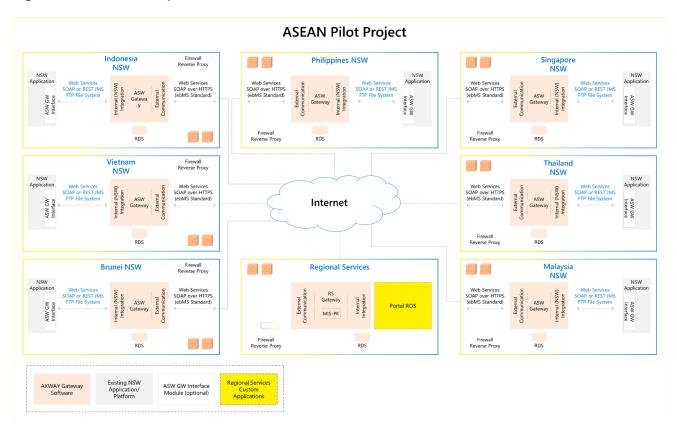|	
	Real-time collection of sensor shipment data
	API-centric data integration in trade ecosystem
	Supply chain visibility and dynamic routing and pricing
	Multi – modal automated logistics
	DLT-based global trade automation

Example Horizon 3: APEC Interoperability Concepts & ASEAN Single Window Systems

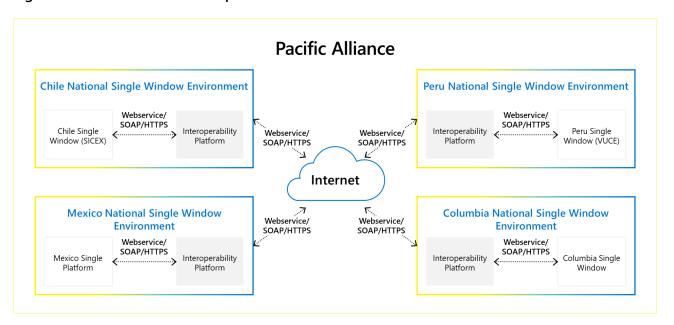Trade between the United States and ASEAN is estimated at $200 billion. The **ASEAN Connectivity through Trade and Investment** project was created by the United States Agency for International Development and the Department of State to adopt free, transparent, sustainable and inclusive trade practices and to move toward economic integration. It will create an **ASEAN Single Window** that can connect and integrate national windows of the 10 ASEAN member states. This will enable streamlined electronic data submission for cargo clearance and lower the cost of doing business across the region. It will also increase transparency in customs systems and improve customs compliance. The ASEAN Single Window is lending technical assistance, capacity building and support to expand to other member economies. A "distributed model" will ensure that the central server is purely responsible for managing the communication hub of each economy does not retain, propagate, or archive any trade or regulatory information. Below is an architecture diagram of the ASW.

Figure 9: ASEAN Conceptual Architecture

Source: APEC.org (Page 29)

Figure 10: Pacific Alliance Conceptual Architecture

Source: APEC.org (Page 32)

By implementing all of these activities, the project encourages the less developed ASEAN member states to implement trade and investment measures as part of the ASEAN Economic Community and help narrow the development gap.

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Example Horizon 3: Nxtport Antwerpen

[NxtPort BV](#) was founded in 2016 in the Port of Antwerp with the mission to bring transparency to the supply chain through a neutral data-sharing platform. It is an open data platform in which local application developers can develop their logistic solutions to provide users with increased efficiency in their supply chains. By sharing data transparently and setting up open global communities, international supply chains can be significantly optimized, contributing to the digital interconnection of maritime clusters across the whole world.
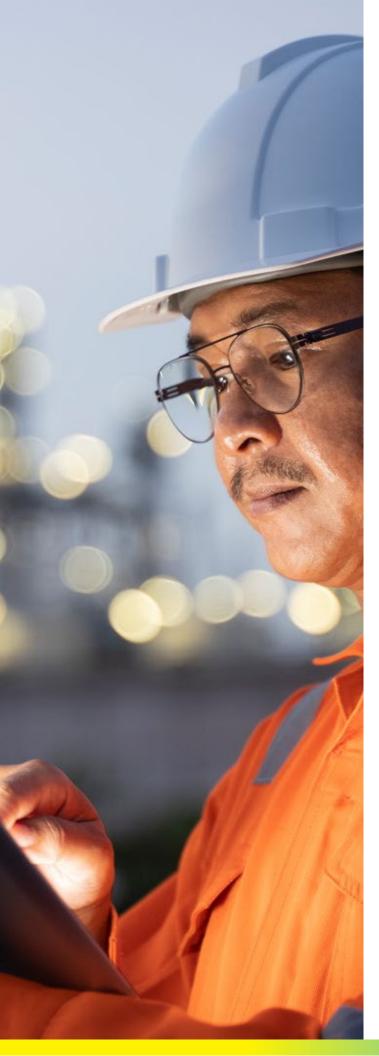
The NxtPort Data Utility Platform allows faster cost-effective, and more efficient transfers of data between the different players. The platform creates more transparency in the whole shipping process and aims to increase operational efficiency, safety, and revenue.

Figure 11: NxtPort BV Single Trade Window

								Offered STW Services
Arrival at Exit Send the Charge Report (IE507) to Customs for export containers known in the e-balie application	**Bulkchain** Bulkchain digitises the non-commercial communication between all supply chain members in the Breakbulk & project cargo sector	**Certified Pick Up** An innovation solution for releasing containers in the Port of Antwerp	**E-Balie+ Notifications** Receive status updates for cargo reported through e-Balie/e-Desk	**PortStays** Get an overview of all active sea-going vessels in Antwerp	**Push Barges Location** Push Barges Location	**Qronoport** Get visual insights into what other stakeholders have planned on liquid bulk vessels you have to work on, improving planning and reduce lost time	**Terminal Events** Enrich your view on your container voyage by obtaining the terminal gate in and out moves	• Export • Import • Terminal • Mobility • Vessels traffic mgmt. • Cargo mgmt. (incl. Barges booking and mgmt.) • Cargo tracking • Bulk cargo mgmt. (unload/load) • Geolocation tracking and maps • Verification (weight) • Track and trace for water, land, Air • Next mode of transport (multi model transport mgmt.) • Data sharing • Customs clearance • Cargo release and pickup • STW services catalog, e-commerce
Export Manifest Send an automated manifest when vessels with export cargo leave the port	**Import Consignment** Re-use the cargo information digitally	**Port Directory** Up to date contact information by integrating your systems with the yellow pages of the port community	**Portcall+** Precise and real-time information on the movement of vessels	**Tresco Location** Lat 51.287273/ Lon 4.268129 may not ring a bell, 'Deurganckdok' probably does	**UN/Locode** Use the UN/LOCODE dataset with ease in your application	**VGM: Method 1** Request the weight of an export container (SOLAS method I)	**VGM: Tare Weight** Request the tare weight of any container to meet the SOLAS VGM (method 2) requirements	
		VisiGIP Follow your container through the customs process	**VisuRIS** Visualise the transport and traffic-aspects on inland waterways	**Green Lights** Check the different release steps of your containers in the import process	**Next More of Transport** Announce the NMoT of your container to the terminal			

Sources: Adapted by the consultant from various sourced (i.e., Nxtport Marketplace, WTO | Maintaining open trade)

Customs Administrations are rethinking their business to take a stronger role in terms of value creation next to trade facilitation and economy and society protection. As Administrations are now connected 24/7 and information is at a button press away, they need to leverage their network, share information, cooperate, and improve efficiency between peers. In all this transformation, **digital skills** are a critical success factor for Customs Administrations and economic operators. In the EU for example, support in the professional development of the entire workforce is being intensified and is regarded as an essential element to achieve the desired goals. Building an **innovation culture** means also that Administrations need continuous service improvement, keeping an ear to the ground, analyzing new business and IT trends – and basically be one step ahead of the curve.

Intelligent Connected Trade Windows make it easier to do business cross-borders for any type of company including an SME. In the Horizon 3 scenario the typical challenges for customs clearance are resolved:
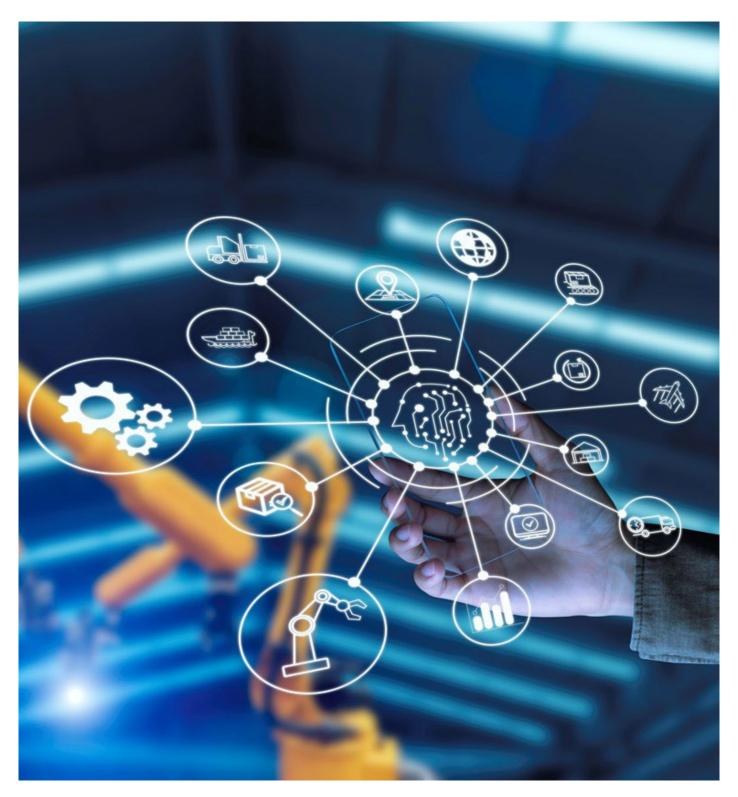
1. **Misclassification of freight:** When describing your product within customs documents, you classified it in a way that the destination country's customs office views as inaccurate. Companies shipping produce, foods, medical supplies and technology items might be at particular risk for this customs clearance mistake.

2. **Duties higher than anticipated:** When your freight arrived at its destination, it was discovered that the actual applicable duties exceeded the amount you paid when you originally booked your freight. Customs clearance will be delayed until the difference is paid.

3. **Problems with buyers:** Your business filled out the forms correctly and paid all applicable taxes and duties, but you can't gain customs clearance from the local office to release your ocean freight or air freight to your buyer or importer. They may need to clear up licensing issues or pay fees before customs clearance issues are resolved.

4. **Health, sanitary or safety issues:** Customs clearance is rejected because the local office views your ocean freight or air freight as a potential health or safety threat. In this case, a business likely will not gain customs clearance, and must look for alternative options for redirecting or returning the freight.

5. **Basic documentation issues:** According to Export.gov, fundamental problems with labeling involving certificates of origin, weight, ingredients and identification marks hold up customs clearance for many shipments. Also, customs clearance is commonly rejected simply because the exporter failed to submit all the necessary forms.

6. **Packing regulations of the receiving country:** Some destination ports mandate particular packing methods for imported goods before customs clearance is granted. If your material isn't packed properly, your freight might be rejected for customs clearance.

Intelligent Connected Trade Windows are possible because of the following **5 technology trends** which are driving innovation in the cloud:

1. **Ubiquitous and decentralized computing:** Radical changes in computing architecture will result in continued exponential growth in compute capacity in the cloud and at the edge. This more ubiquitous and decentralized compute power will come with, and will require, more decentralized control.

2. **Sovereign data and ambient intelligence:** The volume, variety, and velocity of data will go through explosive growth in the cloud, and at the edge. The decentralization of computing will result in data that is more private and more sovereign. Data governance and providence takes on new importance in a world where data is more distributed and interconnected. The growth in data leads to large-scale data models that enable ambient intelligence all around us.

3. **Empowered creators and communities everywhere:** Connections and collaboration across communities, along with expanding access to skills, tools and platforms, enable everyone to create – whether it's manufacturing physical or virtual goods as part of a global supply chain or knowledge workers contributing to a value chain.

4. **Expanded economic opportunity for every member of the global workforce:** Feedback loops inform the work, skills, learning, and credentials required both for the jobs of today and tomorrow. They help to define productivity much more broadly, inclusive of collaboration, learning, and wellbeing to drive economic opportunities for all.

5. **Trust by design:** Technology is secure by design and is built with the design intent to protect the fundamental rights of all people, including privacy, and to strengthen trust in the institutions that we all rely on for our livelihood and wellbeing. Ethical principles govern the design, development, and deployment of AI.

The Technologies that underpin Intelligent Connected Trade Windows

Intelligent Connected Trade Windows rely on some critical technologies:

Cross-agency collaboration

Productivity, security and mobility cloud software integrates workflows across agencies and creates connected experiences for employees. Collaboration tools enable employees across agencies to securely share and protect sensitive information, even when shared outside of government.

AI

Intelligent algorithms can be used to improve service to citizens and strengthen engagement. AI can be used to improve process innovation within connected trade windows and to transform the experience of services for the people that interact with them.

Blockchain

Blockchain solutions that provide the ability to digitize trust in multiple-party business processes. Shared ledgers give each partner in a distributed blockchain network real-time visibility into every transaction that occurs, along with the ability to reject transactions before they are applied to the ledger.

Secure Data Sharing, Analytics and Governance

Secure data sharing enables big data sets to be shared and updated while ensuring that data governance rules are adhered to. Sharing technologies allow data access to be given to new partners without requiring them to set up new infrastructure. Data duplication is reduced or eliminated.
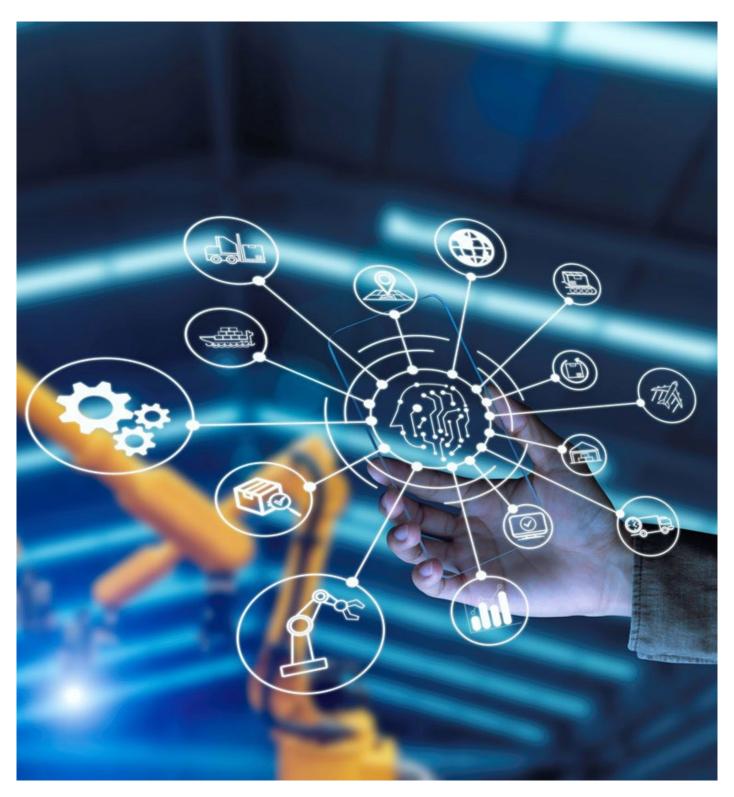
Internet of Things

IoT has been widely adopted, particularly in manufacturing, and is transforming a huge range of physical objects through digital intelligence. Business and government agencies are now using IoT to revolutionize the way that they do business, using it to manage risk, increase efficiency and capacity, and improve traceability. IoT solutions are being enhanced with AI, edge compute and digital twin capabilities.
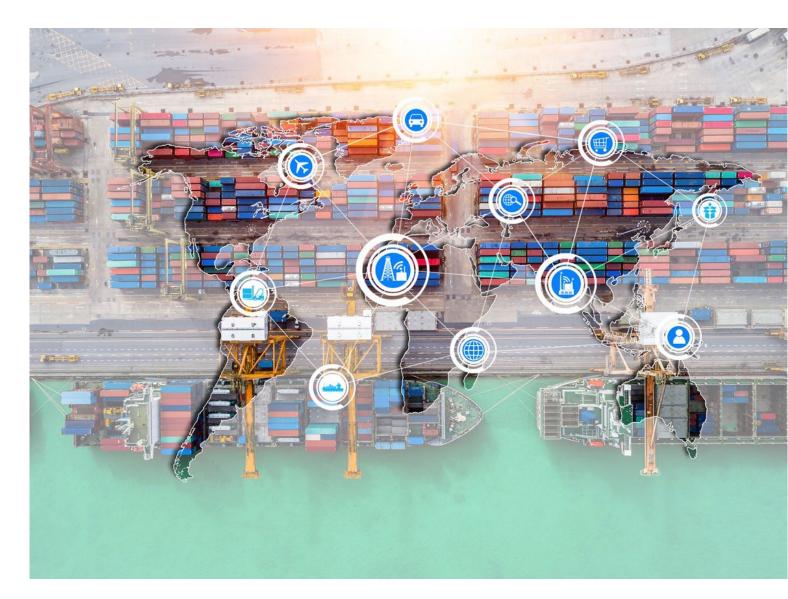
But these trends and technologies are not sufficient on their own. Customs agencies, and the other government departments that support their mission, need to be able to **harness tech intensity** – the rate at which you can adopt new technologies along with your ability to build your own digital capabilities. Increasing tech intensity is about increasing your ability to apply these technologies to transform your services. Successful implementation of **Intelligent Connected Trade Windows** will require customs agencies to become digital organizations with the ability to rapidly create new customer experiences and services in response to changing demand.

Intelligent collaboration with Microsoft innovative cloud platform

Governments and customs administrations realize that the increasing demand for free and secure trade, in particular in an e-commerce environment, requires **data standardization** in order for governments to accomplish their missions. The information-sharing and the information requirements need to be viewed and analyzed not only from a national and international perspective but also specifically between **Data Providers** and **Data Consumers**. As trade transactions extend over multiple countries, the agent or trader completing the customs declaration might have only partial information about the underlying transaction, logistics and earlier or subsequent transactions.
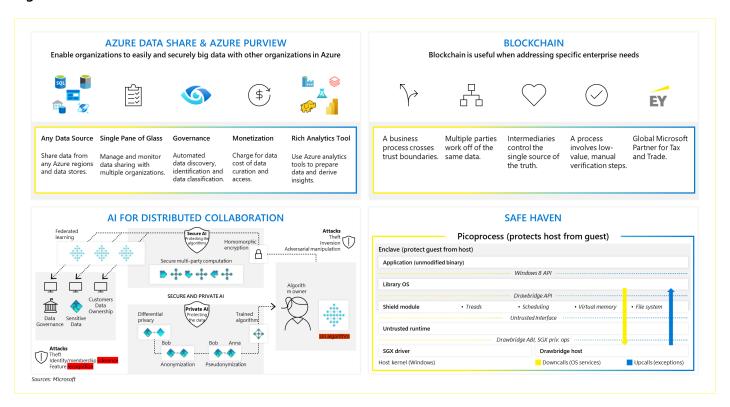
To support the evolution of trade agreements and arrangements in a digital environment, we are putting a special focus on innovation, integration, and interoperability. These investments help ensure long-term vitality and build the necessary trust among members by focusing on **data sharing, data privacy, data veracity and transparency**. Cloud interoperability and Open Standards allow us to provide a seamless interoperation among the Single Trade Windows environments that our customers are using. Portability of workloads between platforms is vital if customs and ports authorities are to realize the benefits of agile, elastic infrastructure. An adaptive operating model, backed up by an **ethically driven legal framework**, as well as a **collaborative coordination** among stakeholders leads to a strong ability to help our customers constantly improve and evolve their Single Trade Windows.

As such, Microsoft provides state-of-the-art data privacy and security solutions such as the **Azure Data Share and Azure Purview** which support data sharing to and from Azure, **Blockchain** technology to address multiple specific business needs that deal with trust, **AI for distributed collaboration**, which combines different new technologies with focus on preserving data privacy while enabling AI-based collaboration of data, or Safe Haven which helps bring users one step closer to a true ''utility computing'' model for the Cloud where the utility provides resources (processor cores, storage and networking) but has no access to user data. When using Azure services, customers are entrusting Microsoft with one of their most valuable assets— their data.

They trust that the privacy and confidentiality of the data they store and process in Azure services will be protected and that it will be used only in a way that is consistent with their expectations. Through a large and ever-expanding network of datacenters around the globe, Microsoft offers data residency – Azure allows customers to choose from more than 60 regions linked by one of the largest interconnected networks on the planet, including more than 150 datacenters and growing.
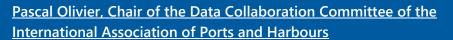
Figure 12

Sources: Microsoft

Conclusion

Automation and Optimization, End-to-End Supply Chain, Security and Cyber-Security, Smart Technologies and Digitalization, Container Handling and Terminal Operations are just some of the areas impacted by data sharing in Customs and Ports. Greater progress could be unlocked by a more collaborative approach between state actors and industry on data standards.

A shared Single Window of information between port operators, customs agencies, and shipping providers helps bridge that digital divide. Several best practices are demonstrating that collaboration in data sharing as part of developing a standardized approach is key to achieve a "connect once, collaborate infinitely" objective. Peru and Chile for example, have released their first live single maritime window in 2020, agreeing to create an interoperable window with Just-in-Time arrival between vessels using their ports. This is an excellent business case today.

> "
> The role of states is paramount in making digital highway a reality at ports and customs around the world, while the industry hesitancy towards obligatory information exchange can contribute to a 'digital divide' between more economically-developed ports/customs and those in emerging economies.
>
> **Pascal Olivier, Chair of the Data Collaboration Committee of the International Association of Ports and Harbours**

The World Economic Forum has highlighted the need for an integrated view on both the movements of goods between different transport hubs using different means of transport, the paperless trade which has a strong relationship to Single Window initiatives, and collaborative decision making to derive situational awareness at the transport hubs to enable integrated end-to-end performance. Further, the European Commission, through the efforts of the Digital Transport Logistic Forum has put a lot of emphasis on integrated corridor information systems and has recently launched two projects to demonstrate a concept for a federated network of platforms called FEDeRATED and FENIX. The integration between different modes of transport across borders is an important concern for tomorrow's transport of people and goods.

Interoperability is a key enabler, and it requires common definitions of data sets used for the exchange of static and dynamic information, leading to a common understanding of what is happening and what is expected to happen. Many customs and ports aim to become "smart" to drive sustainability by enabling just-in-time operations, by becoming insightful information hubs and by providing enhanced predictability. Through digitalization and enhanced data sharing procedures it is possible to promote the necessary cultural development of collaboration needed to achieve environmental and efficiency gains in their operations. The challenge is now on current stakeholders to implement digitalization and to adopt common, interoperable data standards or to risk losing control in the logistic chain.

Performance Measurement of Intelligent Connected Trade Windows across the globe

Intelligent Connected Trade Windows are an important trade facilitation tools and, if implemented effectively, a Single Window project can help achieve the following benefits:

🏛	For the **government** as a whole: Increase in government revenue, enhanced compliance with rules, improved efficiency in resource allocation, better trade statistics.
👤	For economic **operators**, such as traders: faster clearance times, a more transparent and predictable process and less paper/manual-based processes.
🖥	For an **administration** such as Customs: improved staff productivity through the upgraded infrastructure, increase in customs revenue, a more structured and controlled working environment, and enhanced customer satisfaction.
👥	For the **national economy** as a whole: improved transparency and governance and reduced corruption due to fewer opportunities for physical interaction.

Microsoft can help achieve Connected Trade Window benefits in the following ways (but not limited to):

Trade and business improvements

- With its global reach, support organizations of all sizes (from SME to startups to global entities) to drive accelerated trade, as well as resilience and recovery
- Support safe and fair trade (including compliance) as well as a decrease of illicit trade
- Drives GDP growth which attracts investment, new business and up-lift of own nation
- Strong upskilling ecosystem

Productivity improvements

- Data sharing & data marketplaces provide value creation through data predictability, consistently high-quality data, more real-time data and avoiding duplication of data
- Supports premium services and efficiency of processes

Trusted ecosystem

- Trusted trade leads to less inspections and more information sharing
- Visibility/transparency

For **nations**, some of the quantifiable benefits of globally interoperable Single Windows are:

Peru VUCE was leading to 30% reduction in time spent on administrative processes per year and savings of $50 million through reduced travel, time and paper. Peru expects to further decrease the number of days to carry out international trade procedures from 8.4 in 2014 to 6.4 in 2021, as well as forecasts a significant reduction in logistic costs during the same period.
(as noted by OECD and WTO).

With a view to expediting customs clearance, ASEAN adopted an action plan to establish the ASEAN Single Window (ASW). The system enables a single submission of data, a single synchronous processing of information and a single decision-making for customs release and clearance among ASEAN Member States (AMS). Since January 2018, the ATIGA e-Form D has been the first e-documents exchanged through the ASW among five (5) AMS namely, Indonesia, Malaysia, Singapore, Thailand and Vietnam. Australia showed improved services predictability, and lower costs in providing information and processing goods. There will also be a lower cost for new traders in identifying domestic or international regulatory requirements.

In general, Single Trade Window systems among the economies lower costs, drive greater efficiency and coordination in the trade of goods and services. However, there is also widespread recognition of the challenges that are being faced, such as, the lack of harmonization of standards, data and procedures and inadequate technological architecture. Economies have future plans to address these challenges and improve international interoperability.

The path forward

As data has the greatest potential for impact when it is **shared for the purpose of collaboration** – with a focus on its usability, we encourage the public and private sectors to **lead by example in how they share data**. They will have more impact through data sharing initiatives when there is **collaboration** among all actors. Experience shows that once shared, there can be various uses for that data beyond its initial intended purpose. For example, the use of open satellite imagery data for estimating poverty at the household level in developing countries can open-up opportunities to draft more effective poverty reduction programs and allocate funding more efficiently.

One of the key lessons from the COVID-19 pandemic has been the value in **sharing data across borders**. International best practices to track COVID-19 cases and collaborate on research to prevent and treat the disease have been a critical element in the global community's response. The key learning here is that these opportunities for **data to be used for impact** are greatest when the data is shared with a focus on it being useable, and that impact can be maximized through active collaboration between organizations to **use shared data to achieve their goals**.

Trust is a key ingredient in data sharing initiatives and **Azure Confidential Computing** for example, allows data to be combined for uses like AI while retaining confidentiality. Microsoft also shares various **cyber threat intelligence data**, like the opensource data available on COVID-19 related cyber threats, to further bolster the cybersecurity environment. And while the data divide is not inevitable, the economic, societal and governance advantages that **safer data sharing** can bring will be unlocked through collaboration across stakeholders and regions.

Drawing on these learnings, we look forward to working with organizations across the globe to unlock the potential of data sharing for a stronger future for all.

The path forward – key take aways

🤝	Cooperate toward open Standards that enable seamless operations among connected trade windows.
🎯	Focus on a culture of innovation that supports data collaboration and transparency.
🔀	Invest into agile, elastic infrastructure and bolster the cybersecurity efforts
🔄	Cater for interoperability, integration, and portability of workloads between platforms.
📱🔒	Build Trust as a key ingredient in data sharing initiatives by leveraging AI for distributed collaboration and Safe Havens approach for data privacy.

About the authors

Valentina Ion

As Director of Public Finance Industry, Valentina is in charge of Microsoft sales and industry solutions strategy for this industry, 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 or 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 a business operation and she holds a master's in Finance and Accounting. With more than 21 years' experience in ICT and Business transformation Valentina is passionate about business re-engineering and digital transformation for better economy and society.

Matt Bishop

As an Industry Digital Strategist within Microsoft Worldwide Public Sector, Matt Bishop works with government across the globe to transform front-line services. Specific themes of interest to Matt at present include the transformation of justice and customs to support recovery from the pandemic, the development of place-based services for local communities and implementation of public health approaches to crime and harm reduction. Prior to joining Microsoft, Matt held a range of senior roles at the Home Office including Policing CTO and, most recently, the Head of Strategy. He also spent several years working at the National Policing Improvement Agency and the Association of Chief Police Officers. Matt graduated with a Bachelor of Engineering from the University of Warwick, with a specialization in Control and Communications.

Dieter Schule

Dieter is the Program Manager of Government Industry Solutions at Microsoft focusing on the digital transformation for Trade, Customs and Ports. As an M.Sc. alumnus of the RWTH Aachen University in Germany, his expertise is on digitalization, data security & privacy and on transformational change management. Before joining Microsoft, he has been the co-founder and COO of a German start-up for confidential computing and data privacy. His responsibilities included the design and implementation of a blockchain-based patented solution that enables secure data sharing and insights execution without compromising data privacy. He was also responsible for their partner ecosystem as well as the acquisition of large health, financial, retail and insurance customers. Dieter is passionate about the impact of innovative data ecosystems on current and future business models and their impact on society and human wellbeing.

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