

UK-TAIWAN

**TRADE
DIGITALISATION
PILOT**

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Executive Summary

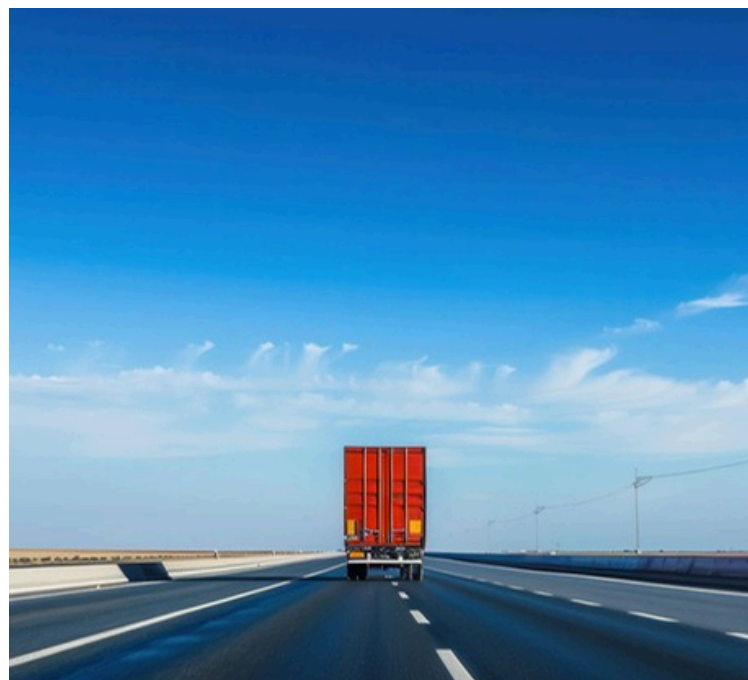
The UK-Taiwan Trade Digitalisation Pilot (TDP) represents the next phase of the UK's efforts to implement digital trade corridors with key strategic partners. Co-funded by LogChain and supported by the British Office Taipei, the UK-Taiwan TDP has extended the successes and lessons from the UK-SEA Trade Digitalisation Pilots by targeting high-value, strategically significant sectors, notably semiconductors, and applying a robust methodology to explore the real-world feasibility of full trade digitalisation.

Trade digitalisation is the shift from manual, paper-based processes to interoperable, legally recognised, and secure electronic trade flows. It is enabled by technologies such as Electronic Transferable Records (ETRs), e-signatures, digital identities, and encrypted supply chain platforms. For governments and companies, it promises faster clearance times, lower costs, improved security, and enhanced resilience. For regulators, it supports better compliance, data visibility, and emissions tracking.

This pilot builds upon previous work in the ASEAN region and is aligned with the UK-Taiwan Enhanced Trade Partnership (ETP). It reflects a shared ambition to reduce friction in trade processes, eliminate redundant documentation, and enable data-driven supply chains that are more secure, transparent, and efficient.

The UK-Taiwan TDP focused on:

- Testing the UK-Taiwan digital trade corridor using real-world shipments (semiconductors, whisky).
- Assessing the digital maturity and readiness of SMEs and mid-sized exporters in both markets.
- Applying trade digitalisation across various modalities: air, road, and sea.
- Identifying public and private sector barriers using a 'traffic light' system.
- Quantifying the impact of digitalisation on business operations via KPIs.

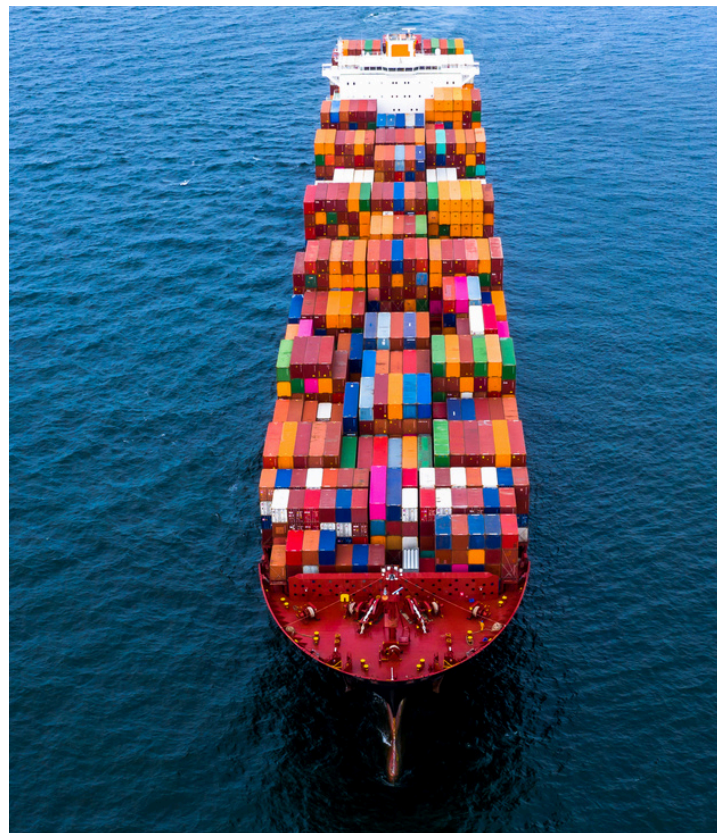


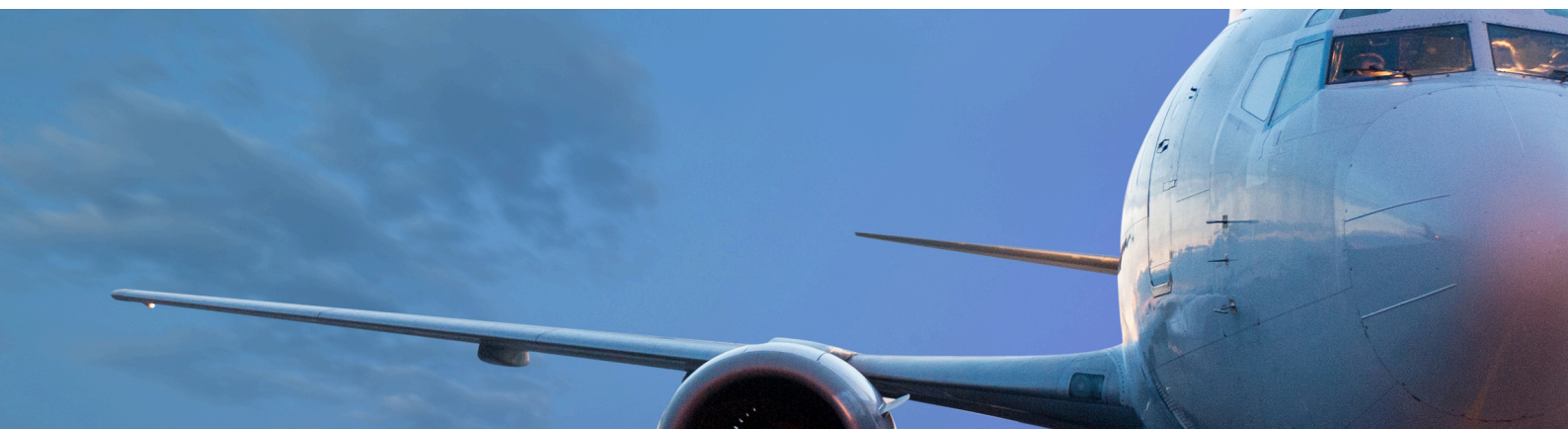
Participants

Participants	Description	Goal Alignment
Clas-SiC Wafer Fab	World's first pure-play open foundry for Silicon Carbide (SiC) power semiconductors, based in Fife, Scotland.	Strongly aligned with goals to boost productivity and digitalise supply chains. Already technologically advanced, with high potential to adopt and showcase digital trade tools.
Kimbland Distillery	Independent, farm-to-bottle Scotch whisky distillery located on Sanday, Orkney Islands	Represents small/emerging exporters. Participated to gain foundational knowledge in trade and compliance, aligning with the Pilot's goal of enabling digital access to new markets.
Skene Scotch Whisky Ltd	Boutique whisky bottler and cask broker with a focus on high-value, export-led Scotch whisky supply chains.	Ideal test case for digital trade. Their complex documentation and export experience helped validate digital tools across real-world, commercially active supply chains.

Key findings

- Digitalisation is feasible today for many trade documents and processes, with several already accepted by UK and Taiwan authorities.
- Commercial invoices and packing lists were successfully generated and exchanged.
- There were delays and procedural blockers, especially for documents such as Certificates of Age, which remain in the 'red' category.
- Participating businesses demonstrated clear ROI from adopting digital workflows, including reductions in shipment handling time, lower document error rates, and improved end-to-end visibility.
- However, adoption still requires support. Some businesses needed guidance or reassurance on data privacy, legal equivalence, and stakeholder onboarding.
- The pilot showed how governments could assess dependencies, map vulnerabilities, and stress-test supply chains for pandemics and other disruptions.












Key Benefits of the Pilot

Category	Details
Operational Efficiency	<ul style="list-style-type: none"> • Clas-SiC: Shipment processing time reduced from ~6 hours to ~2 hours (67% improvement) • Whisky: From ~120 minutes to ~30 minutes (75% improvement)
Email Traffic Reduction	<ul style="list-style-type: none"> • Over 80% reduction in shipment-related emails, improving clarity, responsiveness, and reducing digital carbon footprint
Document Handling	<ul style="list-style-type: none"> • 70–80% of shipment documents replaced with digital forms • Improved accuracy, consistency, and reduced duplication
Environmental Impact	<ul style="list-style-type: none"> • Annual CO₂ savings for Clas-SiC ~ 68% • Up to 90% reduction for whisky exports
Cost Savings	<ul style="list-style-type: none"> • Reduced man-hours lead to lower labour costs • Streamlined processes free up staff for higher-value activities
Communication & Visibility	<ul style="list-style-type: none"> • Real-time task tracking, alerts, and dashboards replaced unclear, multi-threaded email chains • Enhanced visibility and coordination across stakeholders
Error & Risk Reduction	<ul style="list-style-type: none"> • Automated validation reduced rework and delays due to manual errors
User Experience	<ul style="list-style-type: none"> • Participants reported smoother, more controlled workflow and easier coordination

Lessons Learned

- Digitalisation cannot succeed without trust and clarity across the supply chain. Human behaviour and institutional inertia remain the biggest challenges.
- Trade digitalisation needs to be pitched as practical and achievable, rather than as an abstract or purely technical agenda.
- Governments must play a central role in harmonising digital documentation standards and recognising ETRs and digital signatures in law.

The UK-Taiwan TDP demonstrated that, when approached collaboratively and with real business use cases, digital trade corridors are achievable. The pilot offers clear and measurable examples of how cross-border supply chains can be improved through digital transformation. However, it also shows that further reform is required, particularly in regulatory recognition of digital documentation.

Document/Process	Classification	Notes	Barrier Type
Commercial Invoice	 Green	Fully digitalised and accepted in all test shipments	None
Packing List	 Green	Fully digitalised and viewable to stakeholders	None
Air Waybill (AWB)	 Green	Digitalised version created and accepted	None
Export Declaration	 Green	UK exports supported eDeclarations	None
Import Declaration	 Green	Taiwan customs accept eDeclarations	None
Certificate of Origin (CofO)	 Amber	Out of scope for this pilot, not tested with Taiwan Customs	-
Certificate of Age	 Red	Not accepted in digital form by UK export compliance systems	Public Sector

Future pilots should expand this work by:

- Building on the 'green' digital documents that worked in this pilot.
- Addressing 'red' barriers through legal review and bilateral cooperation.
- Deepening collaboration with banks and insurers to test electronic trade finance mechanisms.
- Embedding ESG and Scope 3 carbon measures into trade flows.
- Inclusion of all transport modes: sea, air, road & rail.

UK-Taiwan TDP is not just a proof of concept; it is a proof of progress. The time to scale digital trade is now.





Introduction

Participants

Clas-SiC Wafer Fab

Clas-SiC Wafer Fab, based in Lochgelly, Fife, Scotland, is the world's first pure-play open foundry dedicated to Silicon Carbide (SiC) power semiconductor fabrication. Formed in 2017, it operates from a custom-built ISO Class 5 cleanroom, equipped to process 150 mm SiC wafers, supporting both JBS/MPS diodes and MOSFETs, from 650V to above 3.3kV.

SiC technology is critical to enabling next-generation power systems, unlocking lighter, smaller, more efficient devices. Demand is rapidly increasing in sectors like EVs, renewables, rail, aviation, and industrial power conversion. Clas-SiC's model positions it as a vital enabler, offering accelerated prototyping and early production capacity that aligns with global energy and net-zero ambitions.

With its unique open-fab business model, deep technical expertise, modular IP assets, and strong strategic backing, Clas-SiC Wafer Fab is uniquely positioned to accelerate innovation and meet surging global demand in SiC power semiconductors. The recent investment and leadership momentum signal readiness for its next phase of growth.

Clas-SiC Wafer Fab was considered suitable for participation in the UK Taiwan Trade Digitalisation Pilot (TDP) due to the following strategic alignments and capabilities:

Kimbland Distillery

Kimbland Distillery is a small, independent Scotch whisky distillery founded in 2020 by Sebastian Hadfield-Hyde. Located on Sanday, one of the Orkney Islands in northern Scotland, it's recognised as the northernmost Scotch whisky distillery in the world.

Kimbland Distillery is a pioneering farm-to-bottle operation combining heritage farming, sustainable practices, and modern distillation on remote Sanday Island. Their focus on unique local barley, environmental ethos, and commitment to Scotch whisky tradition sets them apart in the evolving Orkney whisky scene.

Skene Scotch Whisky Ltd

Skene Scotch Whisky Ltd, established in 2014 and headquartered in Edinburgh, Scotland, is a boutique independent bottler and cask broker specialising in premium Scotch whisky. The company offers a full-service supply chain model, sourcing, maturing, bottling, and branding, under the philosophy of delivering high-quality, small-batch whisky expressions with regional authenticity.

Skene operates across key whisky-producing regions in Scotland and maintains an agile inventory of rare single malts, single casks, and bespoke blended malts. Its flagship products include the Black Tartan range, a collection of Highland blended malts, and limited-release bottlings such as the Black Tartan '88, a critically acclaimed 31-year-old single-cask blend.

Reviving heritage labels like Skene Dhu, the company targets both traditional and modern whisky audiences, with an expanding footprint in Southeast Asian markets including Taiwan and Singapore. Skene's cask-to-glass service model supports private labelling, collector markets, and export-ready distribution, making it a flexible partner for global whisky trade.

With a strong focus on quality, traceability, and brand storytelling, Skene Scotch Whisky exemplifies Scotland's evolving independent bottling sector while maintaining deep roots in artisanal production and export-led growth.

Alignment with Pilot Goals

Clas-SiC Wafer Fab

Clas-SiC Wafer Fab's participation in the UK-Taiwan Semiconductor Trade Digitalisation Pilot aligns directly with the Pilot's core objectives of boosting productivity and driving supply chain digitalisation. Operating a state-of-the-art, modular silicon carbide foundry, Clas-SiC relies on precision logistics and clean supply chain management to support its highly specialised manufacturing processes. Participation in the TDP offers the opportunity to streamline international logistics, eliminate manual paperwork, and enhance operational efficiency, key productivity goals of the Pilot.

Furthermore, Clas-SiC's existing integration of advanced fabrication technologies and modular process systems demonstrates a strong readiness for digital transformation. This technical foundation positions the company well to adopt and showcase the digital trade tools and end-to-end supply chain visibility solutions championed by the SSTDP, further aligning with the Pilot's objectives.

Kimbland Distillery

Kimbland Distillery's participation in the Pilot reflects its ambition to build foundational knowledge and capabilities in international trade. With no prior experience exporting, Kimbland viewed the TDP as a valuable opportunity to gain practical insight into the procedures necessary for successful trade with Taiwan. This includes understanding and complying with all relevant export and import regulations. Their involvement supports the Pilot's goal of enabling smaller and emerging producers to confidently enter new markets through clearer, digitalised trade processes.

Skene Scotch Whisky Ltd

Skene Scotch Whisky Ltd. was an ideal participant for the TDP, given its export-led business model, high-value supply chain, and detailed documentation processes. The company's agile size and existing experience operating within complex cross-border trade environments made it well-suited to trial and demonstrate digitalisation initiatives. Skene's participation provides a visible and tangible case study, illustrating the potential return on investment (ROI) and interoperability of digital trade solutions, from cask to customs to customer. This aligns closely with the Pilot's aims of validating digital tools within real-world, commercially active supply chains.

Methodology

The TDP was structured to test the real-world viability of fully digitalised trade corridors between the UK and Taiwan. This pilot applied two core tools developed by LogChain, the Mercury Framework and Sigma Methodology, to map, measure, and improve key trade flows. These tools were supported by a traffic light system to classify the digital readiness of documents and processes.

Mercury Framework

The Mercury Framework is an evolution of the traditional SIPOC model (Suppliers, Inputs, Processes, Outputs, Customers), adapted specifically for trade digitalisation. It enables structured documentation of current and future states of trade processes. For the TDP, four additional diagnostic elements were introduced:

1. Cycle and Process Time – Measurement of operational and document-processing time before and after digitalisation.
2. Carbon Impact (Scope 3) – Identification of emission reductions by removing paper-based steps and redundant transport legs.
3. Volume and Format of Data – Capturing the number and type of documents used (e.g. physical A4, PDFs, digital forms), aiding Scope 3 and efficiency assessments.
4. Clarity of Outputs – Ensuring simplified and actionable data flows to ensure practical usability for shippers, SMEs, and customs agents.

This framework was applied to each shipment or trade flow to benchmark the 'as-is' process and compare it against the digitally enhanced version.

Sigma Methodology

This is a five-phase practical deployment method used during onboarding and implementation of digital shipments:

1. Select – Choose a representative shipment or trade flow for digitalisation.
2. Simplify – Strip back non-essential steps to streamline the trade process.
3. Standardise – Apply global data and document standards (e.g. MLETR).
4. Secure – Protect data through encryption, blockchain, and digital signatures.
5. Share – Deploy across stakeholders using cloud platforms, real-time updates, and APIs (where allowed).

This structured approach ensured each participant could focus on practical transformation rather than theoretical change.

Traffic Light Classification

A simplified classification tool was used across the pilot to identify digitalisation status at both document and process level:

- Green – Fully digitalised and accepted during the pilot.
- Amber – Can be digitalised but currently constrained (e.g. back-office systems not yet ready).
- Red – Cannot yet be digitalised due to legal, technical, or policy barriers.

This system was used across documents, data flows, and modal operations, with clear attribution of whether the barrier was public sector (e.g. customs law) or private sector (e.g. legacy ERP systems or lack of awareness).

Scope and Objective

The scope and objectives of the pilot were established through a series of initial virtual workshops conducted via Microsoft Teams with all participating shippers: Clas-SiC Wafer Fab, Kimbland Distillery, and Skene Scotch Whisky. These engagements were designed to ensure a clear and shared understanding of the pilot's aims, parameters, and expectations across all participants.

The discussions in each session focused on the following key areas:

- Defining the specific scope of goods and the documentation required for each shipment.
- Identifying key stakeholders and existing performance indicators within each organisation.
- Determining the trade lanes to be digitalised to enable effective resource planning, workflow alignment, and clear process ownership throughout the supply chain.

For Clas-SiC Wafer Fab, it was agreed that the pilot shipment would involve a small consignment of silicon carbide wafers, with Fuyi Powertech, an existing Clas-SiC client based in Taiwan, acting as the consignee. DHL, Clas-SiC's established logistics service provider, would manage the shipment execution. Following this agreement, arrangements were made to conduct a detailed process mapping phase on-site with the relevant Clas-SiC personnel to capture the current processes and documentation flows. Initial contact was made with Fuyi Powertech to explain the pilot's scope and objectives, and in response, they identified suitable personnel to support the process mapping of their receipt procedures in Taiwan.



For Kimbland Distillery and Skene Scotch Whisky, the virtual workshops served a similar purpose. Each session established clarity on the goods to be shipped, the associated documentation, and the specific aspects of their respective trade lanes to be digitalised. Both companies identified key stakeholders and agreed on baseline performance indicators.

Following these sessions, arrangements were made to carry out on-site process mapping with relevant personnel from both companies. Initial contact was also made with the respective consignees to outline the objectives of the pilot and clarify their roles within the process.

These collaborative activities ensured that all participants had a clear understanding of their roles and the expected outcomes of the pilot, laying a strong foundation for the subsequent phases of digitalisation and process improvement.

Key Stakeholders

Consignees

Fuyi Powertech

Fuyi Powertech, based in Taiwan, is a specialist in the design and manufacture of next-generation power semiconductor devices, including Silicon Carbide (SiC), Gallium Nitride (GaN), and IGBT technologies. Established in 2023, the company leverages over two decades of industry expertise to deliver high-performance solutions for applications in electric vehicles, renewable energy, and energy storage systems. Fuyi's commitment to innovation, quality, and sustainability positions it as a key player in advancing efficient, low-carbon power systems globally. As the consignee for the Clas-SiC shipment, Fuyi Powertech provided support for process mapping activities relating to receipt procedures in Taiwan.

British Office Taipei

For Kimbland Distillery's inaugural export shipment, the British Office in Taipei served as the consignee. This arrangement reflected the unique nature of Kimbland's participation in the pilot, which aimed to provide the distillery with practical experience in international shipping procedures. The British Office's involvement allowed Kimbland to complete the export process within the project's timeframe while gaining valuable insights into compliance with Taiwan's import regulations.

Private Client (Skene Scotch Whisky)

For Skene Scotch Whisky Ltd, the consignee was a whisky connoisseur client based in Taiwan. The shipment involved a single bottle of Skene Dhu 1905, a sixteen-year-old single malt from Linkwood Distillery. The selection of a private client as consignee

provided an appropriate real-world scenario to demonstrate the digitalisation of a high-value, regulated, and documented supply chain.

Logistics Service Providers

DHL Express

DHL Express, a global leader in time-sensitive logistics and a division of Deutsche Post DHL Group, was the appointed logistics service provider for the shipments from Clas-SiC Wafer Fab and Kimbland Distillery. For these pilots, DHL provided:

- Time-Definite International (TDI) services, offering next-day or scheduled delivery from the UK to Taiwan.
- End-to-end tracking within their global network, including proactive shipment updates.
- Customs clearance services, leveraging in-house expertise to manage export and import documentation and ensure compliance with Taiwanese regulations.
- Convenient collection and delivery, covering pick-up from the UK premises and final delivery in Taiwan.

For Clas-SiC, DHL delivered silicon carbide wafers to Fuyi Powertech. For Kimbland, DHL managed the shipment of whisky to the British Office Taipei. In both cases, DHL's services ensured swift, compliant delivery of high-value, time-sensitive goods. Due to time constraints and the established nature of DHL's processes, the company was not directly involved in detailed discussions related to the pilot; the focus remained on digitalising upstream processes up to the point of collection.

FedEx Express

FedEx Express was the selected logistics provider for Skene Scotch Whisky's shipment. Recognised globally for reliable, secure, and fast international deliveries, FedEx provided:

- Express shipping for small, high-value items from Scotland to Taiwan.
- Export documentation support, assisting with commercial invoices and customs declarations.
- Import customs clearance in Taiwan, including handling alcohol-specific import regulations, taxes, and duties.
- Recipient compliance management, requiring personal identification or import permits to meet Taiwanese import laws for alcohol.

Like DHL, FedEx operated under standard procedures and was not involved in the pilot's detailed process discussions. The focus remained on digitalising Skene's internal processes prior to handover to the logistics provider.



Process Mapping

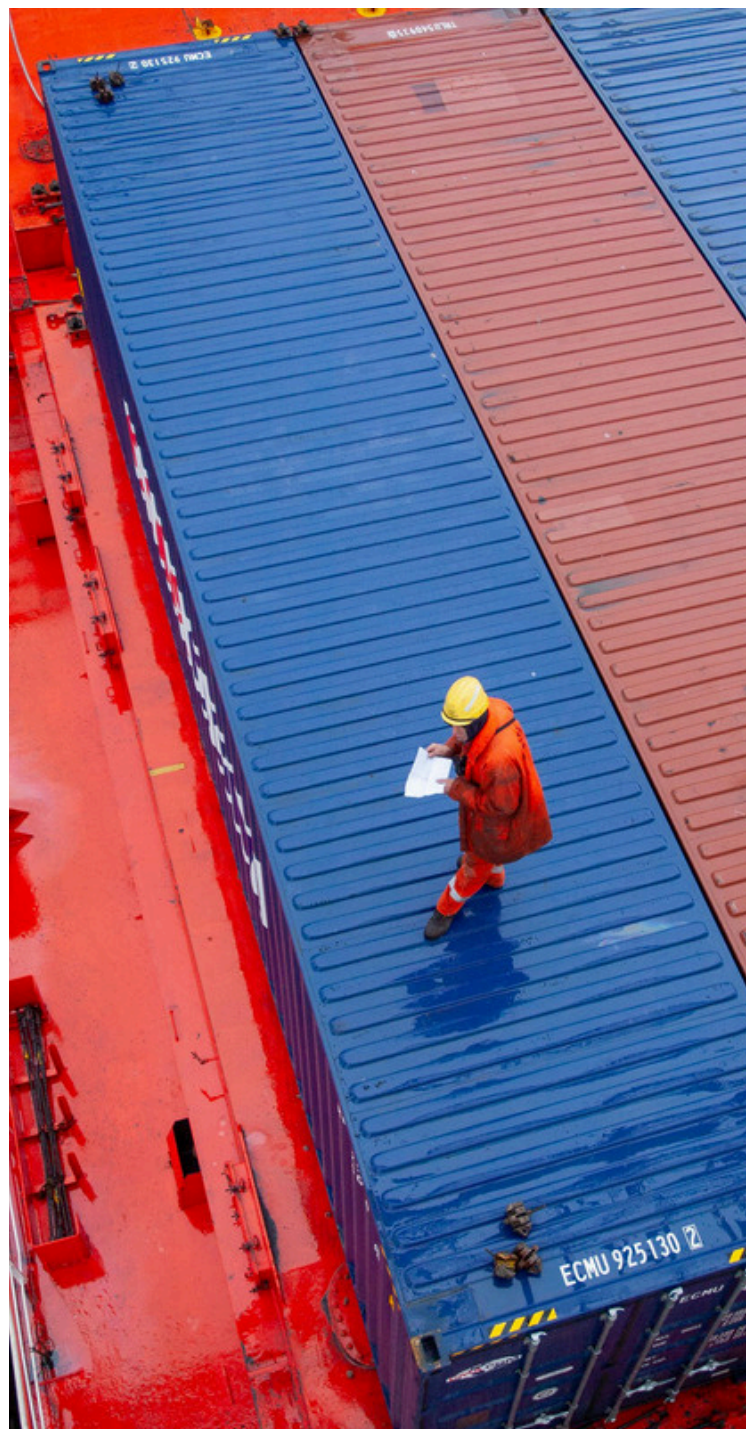
The initial phase of the process mapping is to establish the “As-Is” process and understand the current manual/paper-based process using Mercury’s Resources and Workflow Steps sheets to capture:

- Manual tasks
- Paper document flows
- Time and cycle durations
- Data formats (emails, PDFs, paper)
- Identify all actors and their roles.
- Document the end-to-end physical and documentation flow (from purchase order to delivery).
- Note timeframes, dependencies, bottlenecks, and pain points.
- Collect supporting materials (forms, documents, procedures).

Digitalisation Opportunities

During this stage of the process the focus is on identifying areas where digitalisation can improve efficiency, including:

- Highlight pain points in the “As-Is” process (e.g. delays due to paper documents or communication delays).
- Identify documents and processes suitable for digitalisation.
- Pinpoint opportunities for automation (e.g. auto-validation, real-time notifications).



Current Process

Clas-SiC Wafer Fab

The steps of the current “As-is” process were identified and are shown in the summary in Table 1 alongside the corresponding steps of the digitalised workflow.

Table 1. Clas-SiC current shipment processes & digitalised workflow

Step	Summary	Digitalised process
Issue Purchase Order	The order process begins with Fuyi Powertech issuing a purchase order, specifying the required product type, quantity, and shipping destination. This purchase order is then sent via email to the Clas-SiC Logistics Manager.	Purchase order uploaded to platform by consignee and validated digitally by shipper. Utilising e-signatures and auditable time stamps.
Approve Outgoing Quality Report (OQR)	The OQR is a critical internal document used to validate all aspects of outbound shipments. It verifies key details such as the type and quantity of wafers being shipped, the quality and integrity of packaging, and the completion of all relevant engineering inspections. The OQR must be reviewed and approved by several key stakeholders, including engineers and supervisory personnel.	Approved OQR uploaded to the platform utilising e-signatures and auditable time stamps.
Confirm Shipping Requirements	The internal sales order processing steps capture the specific product requirements for the order and assign relevant details, including sales order numbers, customer codes, destination information, and associated reference numbers.	Shipping details uploaded to the platform utilising e-signatures and auditable time stamps.
Download Wafer Maps	In wafer manufacturing, wafer maps are visual representations or data grids that display the status, location, and quality of individual die (chips) on a semiconductor wafer. These maps are essential tools for identifying and tracking manufacturing defects, yield performance, and testing results and accompany the wafer shipments.	CWF0018 Inspection maps uploaded to the platform utilising e-signatures and auditable time stamps.

Table 1. Clas-SiC current shipment processes & digitalised workflow (continued)

Step	Summary	Digitalised process
Compile Information for Goods Shipment	All relevant information and documentation are compiled for the shipment, including sales order index details, customer information, and any special instructions or customer-specific requirements.	All relevant documentation uploaded to the platform utilising e-signatures and auditable time stamps including: Sales order Index, customer information, special instructions and customer specific instructions and accessible to relevant parties.
Create Advice Note	An advice note for the shipment is generated using the internal system and reviewed for approval by the Logistics Manager before being emailed to the customer. The details of the advice note are then manually recorded in the Advice Note Index spreadsheet.	Advice note and advice note index uploaded to the platform utilising e-signatures and auditable time stamps.
Check Weigh Consignment	The package is weighed, and its dimensions are recorded for inclusion in the commercial invoice details.	Weight & dimension details uploaded to the platform utilising e-signatures and auditable time stamps.
Conduct DHL Booking	The Logistics Manager enters all shipment details into the DHL portal, providing the necessary information to facilitate export, shipping, and import processes. The Manager also confirms the scheduled collection time for the package.	Commercial invoice details and copy of entry to DHL portal uploaded to the platform utilising auditable time stamps.
Retrieve waybill	DHL provides a copy of the corresponding waybill for the consignment, along with shipping labels to be affixed to the package prior to collection.	Copy of waybill and shipment receipt uploaded to the platform utilising auditable time stamps.
Package Goods for Shipment	The package is prepared for shipment by affixing the shipping labels and including copies of the advice note, wafer maps, and Outgoing Quality Report (OQR) inside. Once complete, the package is placed in the designated collection area for pickup by DHL personnel.	The package was prepared and all required documents accessible via the platform utilising auditable time stamps.

Table 1. Clas-SiC current shipment processes & digitalised workflow (continued)

Step	Summary	Digitalised process
Prepare Pre-alert	A pre-alert email is sent to DHL to confirm the scheduled collection time for the consignment, including copies of the commercial invoice, waybill and transport label.	Step created in digital workflow, but entry made via DHL portal.
Notify Customer	An email is sent to the customer containing copies of all relevant shipping documents, including the commercial invoice, transport label, waybill, Outgoing Quality Report (OCR), wafer maps, and advice note. Other Clas-SiC departments are copied into the email chain.	The Consignee was able to access all relevant information from the platform including commercial invoice, transport label, wafer maps, waybill, OQR and advice note simulating electronic transferable records, utilising e-signatures and auditable time stamps.
Consignment collection	DHL arrives on-site between 14:00 and 16:00 on the scheduled date to collect the package.	Confirmation of collection completed in platform utilising e-signatures and auditable time stamps.
Update Shipment Master Document	Shipment details are manually recorded in a spreadsheet known as the Shipment Master Spreadsheet.	Step created in digital workflow, but spreadsheet updated manually by Clas-SiC personnel.
Receive Consignment	The current process does not include a step to record delivery confirmation. Shipment status can be monitored through the DHL portal.	Confirmation of receipt completed in platform utilising e-signatures and auditable time stamps.

Kimbland Distillery

As Kimbland had no prior experience exporting products outside the UK, their processes were primarily designed for domestic shipments. After reviewing these procedures, it was agreed that they would adopt established best practices for exporting whisky to Taiwan as a foundation for developing a tailored digital solution. The agreed-upon processes were aligned with industry best practices, as demonstrated in the Skene Whisky shipment workflow.

Skene Scotch Whisky

Skene has an established history of exporting to the Asian market, particularly Taiwan, although many of these shipments were previously handled on an ex-works basis, with customers arranging collection directly from Skene’s premises. Their current procedures were reviewed and are outlined in Table 2 alongside the corresponding steps of the digitalised workflow.

Table 2. Skene Whisky current shipment processes & digitalised workflow

Step	Summary	Digitalised process
Issue Purchase Order	The order process begins with the consignee issuing a purchase order, specifying their requirements and shipping destination. This purchase order is sent via email.	Purchase order uploaded to platform by consignee and validated digitally by shipper utilising e-signatures and auditable time stamps
Generate Sales Order	<p>The function of the sales order process step is to formally authorise and document the sale within the organisation, serving as an internal control mechanism that communicates the order details to all relevant departments, such as production, warehouse, shipping, and accounts. It acts as the internal record of the transaction and ensures consistency and traceability by capturing key information, including:</p> <ul style="list-style-type: none"> • Product description and quantity • Price and payment terms • Delivery date and destination • Customer details, codes, and reference numbers • Sales order number and internal tracking information <p>This step ensures that all departments work from a single, verified source of truth, aligning operational activities with the customer’s order requirements.</p>	Required documentation uploaded to the platform and accessible to relevant parties utilising e-signatures and auditable time stamps.

Table 2. Skene Whisky current shipment processes & digitalised workflow (continued)

Step	Summary	Digitalised Process
<p>Raise Commercial Invoice</p>	<p>The function of the commercial invoice step is to provide a formal document that details the sale of goods for export and serves as a core reference for customs clearance, taxation, and shipment processing. It includes key information such as:</p> <ul style="list-style-type: none"> • Seller and buyer details • Description of the goods • Quantity, unit value, and total value • Currency, Incoterms, and payment terms • Place of origin and HS codes (if applicable) • Shipping method and destination <p>The commercial invoice acts as both a legal document and a financial record, enabling customs authorities in the destination economy to assess duties and taxes. It also supports the consignee in fulfilling import requirements and may be used for insurance or payment purposes. In short, it facilitates compliance, financial accuracy, and smooth movement of goods across borders.</p>	<p>Required documentation uploaded to the platform and accessible to relevant parties utilising e-signatures and auditable time stamps.</p>
<p>Obtain Certificate of Origin</p>	<p>A Certificate of Origin is required for whisky exports to verify that the product is genuinely produced in Scotland, supporting its status as "Scotch Whisky" under protected geographical indication (GI) regulations. It is essential for customs clearance in many countries, such as Taiwan, and assures importers and authorities of the product's authenticity, helping to prevent fraud and ensure compliance with international trade requirements.</p>	<p>Step created in digital workflow, but application process completed manually using British Chamber of Commerce process.</p>

Table 2. Skene Whisky current shipment processes & digitalised workflow (continued)

Step	Summary	Digitalised process
Obtain Certificate of Age	<p>A Certificate of Age is required to confirm that the whisky has been matured for the legally mandated period—typically a minimum of three years in oak casks, ensuring compliance with Scotch Whisky regulations. It provides assurance to customs authorities and importers, particularly in markets like Taiwan, that the age statement on the label accurately reflects the youngest spirit in the bottle, supporting both regulatory clearance and consumer trust.</p>	<p>Step created in digital workflow, but application process completed manually using HMRC process.</p>
Prepare Packing List	<p>The function of the packing list in a whisky shipment is to provide a detailed breakdown of the physical contents of the package, supporting both logistics handling and customs clearance. Specifically, it:</p> <ul style="list-style-type: none"> • Lists the type, quantity, and description of the items included (e.g. number of bottles, volume per bottle, packaging type) • Provides weight and dimensions of the shipment • References key shipment identifiers such as the commercial invoice number, sales order number, or waybill number • Assists warehouse and transportation personnel in verifying the shipment contents during pick-up, transit, and delivery • Supports customs inspection by confirming the physical contents match the declared documentation <p>In short, the packing list ensures physical accuracy, facilitates smooth logistics handling, and reinforces compliance throughout the shipping process.</p>	<p>Required documentation uploaded to the platform utilising e-signatures and auditable time stamps.</p>

Table 2. Skene Whisky current shipment processes & digitalised workflow (continued)

Step	Summary	Digitalised process
Conduct Booking	Shipment details into the DHL/FedEx portal, providing the necessary information to facilitate export, shipping, and import processes. The manager also confirms the scheduled collection time for the package.	Step created in digital workflow, but process completed manually using DHL Portal.
Retrieve waybill	FedEx provides a copy of the corresponding waybill for the consignment, along with shipping labels to be affixed to the package prior to collection.	Information obtained from DHL portal and uploaded to the platform utilising auditable time stamps.
Package Goods for Shipment	The package is prepared for shipment by affixing the shipping labels Once complete, the package is collected by/delivered to the LSP.	Confirmation of collection completed in platform utilising e-signatures and auditable time stamps.
Generate Advice Note and Notify Customer	An email is sent to the customer containing the Advice Note copies of all relevant shipping information, including the commercial invoice, transport label, Air waybill number.	The Consignee was able to access all relevant information from the platform including advice note, commercial invoice and waybill details, simulating electronic transferable records, utilising e-signatures and auditable time stamps.
Receive Consignment	The current process does not include a step to record delivery confirmation. Shipment status can be monitored through the FedEx portal.	Confirmation of receipt completed in platform utilising e-signatures and auditable time stamps.

Documentation

To facilitate the shipment of a consignment of semiconductor wafers from the UK to Taiwan, the following documents were used:

- Purchase Order
- Outgoing Quality Report
- Wafer Maps
- Sales Order
- Advice Note
- Waybill
- Shipping Label
- Commercial Invoice
- Special Instructions
- Shipment Receipt

Most of these documents are generated internally by Clas-SiC and are either emailed or printed as needed. In some cases, multiple copies are produced, e.g., hard copies of the Wafer Maps are both placed inside the shipment package and affixed to the outside.

The documents required to enable the shipment of whisky from Scotland to Taiwan handled by LSPs like DHL and FedEx are as follows:

Commercial Documents

Document:	Created by:	Purpose:	Shared with:
Purchase Order (PO)	Consignee (buyer)	Formal request for goods; triggers the sales process	Shipper (UK seller)
Sales Order (SO)	Shipper	Internal confirmation of sale; used to coordinate production, inventory, and shipping	Internal departments only
Commercial Invoice	Shipper	Core document for customs valuation; details sale terms, product, and pricing	Consignee, LSP (FedEx/DHL), and customs authorities
Packing List	Shipper	Specifies physical contents (item description, quantity, weight, dimensions)	LSP and customs
Advice Note / Dispatch Note	Shipper	Notifies the consignee of dispatch, includes tracking info and key references	Consignee

Regulatory / Compliance Documents

Document:	Created by:	Purpose:	Shared with:
Certificate of Origin (CofO)	Shipper, often validated by a Chamber of Commerce	Confirms country of origin for customs and trade agreements	Customs and consignee
Certificate of Age (CoA)	Shipper or distillery	Confirms whisky age; required for import classification	Customs and consignee
Export Declaration (UK)	LSP acting as customs broker (FedEx/DHL), based on shipper's data	UK customs requirement to export controlled goods	UK HMRC (not typically shared with consignee)
Import Permit or ID (Taiwan)	Consignee	Required for alcohol import into Taiwan; may include personal ID for private imports	DHL/FedEx Taiwan and Taiwan Customs

Transport Documents

Document:	Created by:	Purpose:	Shared with:
Air Waybill (AWB)	LSP (FedEx/DHL)	Contract of carriage; includes shipment routing, tracking number	Shipper, consignee, customs
Shipping Label	LSP via online portal	Identifies and tracks the package in transit	Affixed to shipment box / package

Current Communication and Process Overview

The shipment processes targeted for the pilot are characterised by a high degree of manual communication, document handling, and data entry, relying heavily on email and online portals for coordination both internally and externally.

For Clas-SiC Wafer Fab, communication typically begins with an email from the client, Fuyi Powertech, outlining their specific requirements. This is acknowledged by Clas-SiC through a formal confirmation email. Subsequent internal coordination, covering preparation, packaging, and dispatch of goods, is managed primarily through email exchanges between relevant departments. Documents such as the Outgoing Quality Report require multiple approvals, often involving up to seven signatures, secured either via email or a shared online file system. All shipment-related data is recorded in a master Excel spreadsheet, with extracts converted to PDF and distributed via email as necessary.

Although it was not feasible to capture every individual email, it was confirmed that an average of five emails are exchanged to execute a typical shipment to Taiwan.

Coordination with DHL is handled through their online portal, with Clas-SiC logistics personnel manually inputting shipment details. Key documents, including waybills and shipping labels, are downloaded from the portal. Upon collection, DHL drivers scan the package, and collection confirmation is accessible via the DHL system. For Taiwanese customs clearance, Fuyi Powertech submits shipment details via the Taiwan Customs portal, using information provided by Clas-SiC logistics via email. DHL also notifies Fuyi Powertech by email when the package is scheduled for delivery.

For Kimbland Distillery and Skene Scotch Whisky, the processes follow similar manual pathways. All client communications regarding shipments begin with email exchanges, including the transmission of purchase orders and order acknowledgments. Shipment booking is handled either via the logistics service provider's online portal (typically DHL Express or FedEx Express) or through their staffed service centres for small consignments such as single bottles. In cases where service centre drop-off is used, the logistics provider's staff manually input shipment details on behalf of the shipper.

Summary of Current Processes

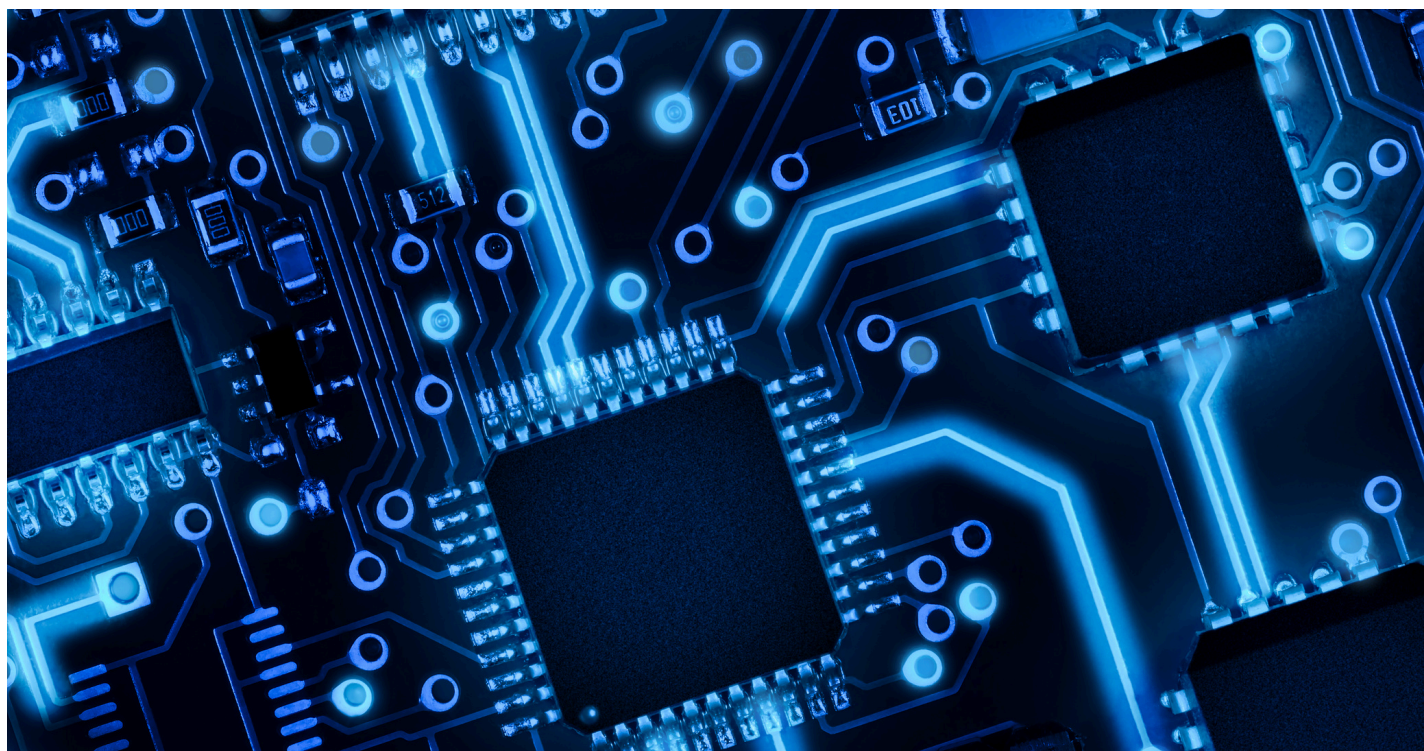
Clas-SiC Wafer Fab:

- Over 20 discrete steps, each requiring document generation, validation, or approval.
- At least 10 documents manually created or uploaded (e.g, Outgoing Quality Report, wafer maps, invoices, waybills, shipping labels).
- More than 5 email notifications exchanged per shipment.
- Shipment booking via manual data entry into DHL's portal.
- Post-shipment activities include manual updates to tracking spreadsheets and delivery acknowledgments.

Kimbland Distillery and Skene Scotch Whisky:

- Over 11 discrete steps, each requiring document generation, validation, or approval.
- At least 9 documents manually created or uploaded (e.g, invoices, certificates of age and origin, waybills, shipping labels).
- More than 5 email notifications exchanged per shipment.
- Shipment booking via manual data entry into the logistics service provider's portal or via manual input at a service centre.

Across all participants, the current processes are heavily reliant on manual intervention, email communications, and fragmented systems, presenting clear opportunities for digitalisation and efficiency improvements through the pilot initiative



Pilot Process Development

Digital Workflow Design

At this stage of the process mapping phase LogChain created a vision of the optimised, digitalised process, including:

- Design the future-state workflow using the digital platform.
- Define new user roles and responsibilities.
- Determine how data will flow digitally
- Incorporate compliance, security, and interoperability considerations.
- Redefine workflow steps with improved automation.
- Define expected Deliverables (e.g, validated e-documents, real-time updates).

To ensure the successful execution of the pilot, a process flow was developed and configured to support the specific requirements of the shipment process. This phase involved collaboration with key personnel from both the shipper and the consignee and included the following activities:



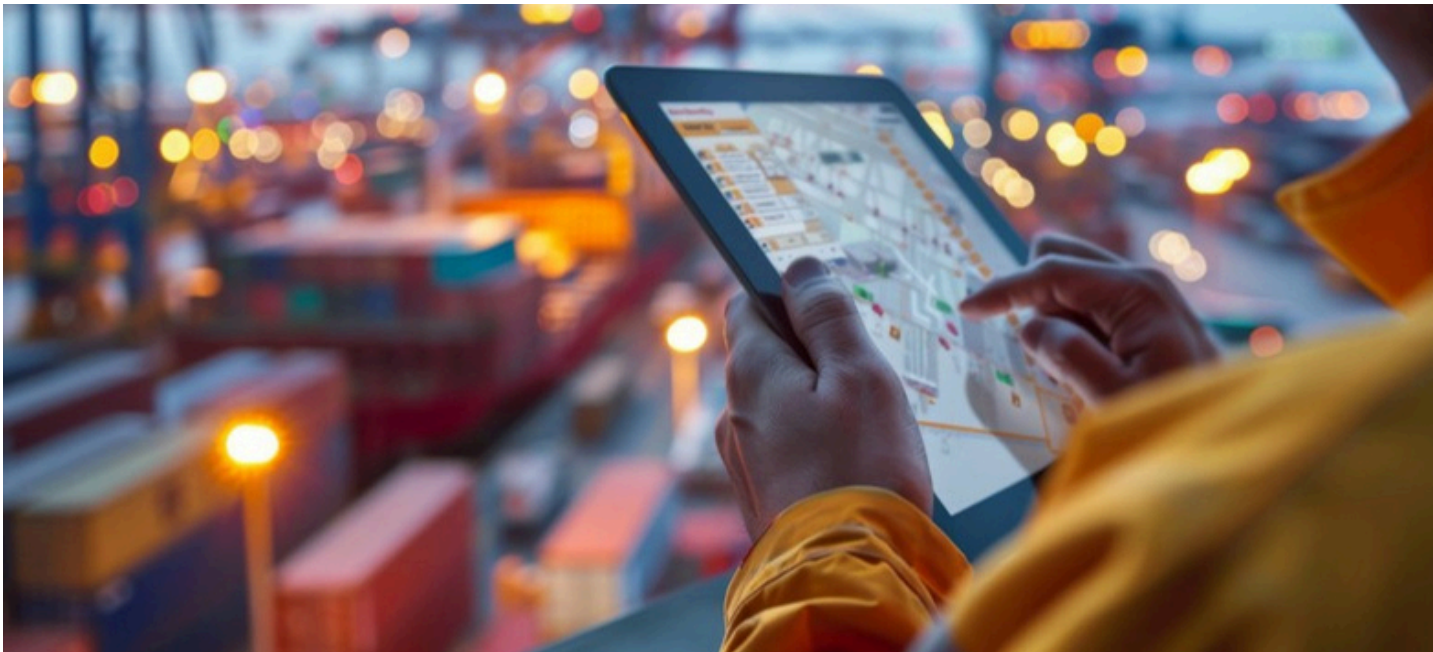
Process Template Configuration

A process template was created to reflect the unique workflow of each of the participants shipment procedures, including document generation, approval processes, and communication protocols. The job template for Clas-SiC is shown in Table 3, and the job template for Skene Whisky is shown in Table 4.

Platform Introduction and Training

Relevant personnel from both the shipper and the consignee were identified and onboarded to the platform. Access permissions were configured according to each participant's role in the process, e.g, logistics staff were granted access to document upload and approval features, while the consignee was given visibility into shipment details and customs information relevant to their responsibilities.

Targeted training sessions were delivered to all relevant personnel to ensure they were comfortable navigating and using the platform. Simulations of the shipment process were conducted to walk users through each step, from order confirmation to final delivery, allowing participants to ask questions and identify any process gaps before executing the live pilot.



Pilot Activation

With the pilot jobs created and all relevant stakeholders trained and onboarded, the pilot shipments were executed to validate the digitalised workflows under real-world conditions. The goal during execution was not only to complete the shipment successfully but also to observe how digital tools supported communication, documentation, and traceability across the full shipment lifecycle and record any issues

Initiation of Shipments

Clas-SiC Wafer Fab

The shipment process began with Fuyi Powertech submitting an order request via email, in line with their usual procedure. Clas-SiC acknowledged the request and initiated internal workflows through the digital platform, ensuring full visibility and traceability throughout each stage. Key documents, including the Outgoing Quality Report, wafer maps, shipping labels, and commercial invoices, were uploaded to the platform, significantly reducing reliance on emails and shared drives. Approval workflows were handled digitally, streamlining the process compared to previous manual methods.

Kimbland Distillery

The shipment initiation began when a staff member at the British Office in Taipei (BOT), trained on the platform, successfully uploaded a purchase order request for a bottle of whisky. Kimbland staff were notified via the platform, reviewed the request, and acknowledged its receipt, triggering the job activation on the system.

Skene Scotch Whisky

A whisky connoisseur in Taiwan initiated the shipment by uploading their order for a 16-year-old single malt through the platform. This notified Skene staff, who reviewed, accepted, and acknowledged the order within the system, activating the job on the platform.





Interaction with Logistics Service Providers

Clas-SiC and DHL

Clas-SiC logistics personnel manually entered shipment details into the DHL portal, using standard operational processes. DHL was not directly engaged in the pilot but managed the shipment through its existing platform. Confirmation of pickup and scanning by the DHL driver was successfully recorded. Shipment documentation was provided both digitally and in hard copy. Clas-SiC shared the necessary documentation with Fuyi Powertech through the platform, supporting their customs clearance activities in Taiwan.

Kimbland Distillery and DHL

Kimbland selected DHL Express for its fast, reliable service to Taiwan. The consignment was delivered to an approved DHL facility along with the commercial invoice and required export documentation. DHL securely packaged and labelled the shipment, assigning a unique waybill number to allow tracking via their portal. Kimbland updated the platform with these steps to inform stakeholders and provide access to shipment documentation.

Skene Scotch Whisky and FedEx

Skene selected FedEx Express, delivering the bottle directly to an approved FedEx facility for prompt processing. Required documentation, including the commercial invoice, Certificate of Age, and Certificate of Origin, was submitted to meet customs and carrier requirements. A unique tracking number was issued, enabling full visibility throughout the shipment's journey. These details were entered into the platform to update stakeholders and centralise document access.

Receipt in Taiwan

Clas-SiC Shipment (Fuyi Powertech)

Fuyi Powertech submitted the customs declaration via Taiwan's Customs portal, using documentation provided by Clas-SiC through the platform. DHL provided automated delivery notifications. Upon receipt of the shipment, Fuyi Powertech confirmed delivery through the platform, which automatically notified Clas-SiC personnel.

Kimbland Distillery Shipment (British Office in Taipei)

The shipment was accepted by DHL on 25th June. During transit, DHL contacted the British Office Taipei (BOT), requesting online authorisation through Taiwan's EZway app to permit DHL to act as their customs representative. BOT completed this step, but on 27th June, DHL UK placed customs clearance on hold, citing missing details on alcohol content and bottle volume. Kimbland promptly provided the information, allowing the shipment to proceed over the weekend.

On 30th June, DHL Taiwan again suspended clearance for the same reason. The consignee provided a copy of the commercial invoice, confirming the necessary details were already included. The shipment was subsequently released and delivered to BOT on 1st July.

Skene Scotch Whisky Shipment (Taiwan Client)

Upon arrival in Taiwan, FedEx requested the consignee's online authorisation via the EZway system to act as their customs representative. The shipment was held pending completion of this requirement. Following submission of the authorisation, the shipment was released for final delivery, though the process resulted in a three-day delay.



Use of Digital Trade Mechanisms

The pilot actively tested or simulated the use of the following digital trade mechanisms:

Mechanism	Notes
e-Signatures	Successfully used on commercial documents and selected declarations
Electronic Transferable Records	Simulated, but legal acceptance remains varied between jurisdictions
e-Invoices	Used across multiple participants, subject to internal ERP constraints
e-Customs Declarations	UK-compatible, Taiwan-facing integration incomplete due to policy gaps
Time-stamps	Deployed via platform audit trail
Digital Identities (cross-border)	Not available in Taiwan. Tested internally using tokenised identities in UK

Pilot Outcomes

The Clas-SiC pilot shipment was successfully executed, with all steps completed as planned and without any reported issues, delays, or deviations from the agreed process. The time required to complete the order process using the digital solution was measured and compared against the traditional manual approach. Feedback from participants was gathered to evaluate the effectiveness, efficiency, and overall user experience of the digitalised workflow.

The whisky pilot shipments were also successfully executed, with the digital workflow providing end-to-end visibility and process control. While the core process steps were completed as designed, both the FedEx and DHL shipments encountered customs-related delays. These were primarily due to repeated requests for documentation and incomplete authorisation procedures, highlighting the ongoing challenges associated with manual communication and fragmented document handling in traditional processes.

Despite these issues, the digital platform delivered notable efficiency improvements. The time to complete the order process was reduced compared to manual methods, and participant feedback confirmed a smoother and more streamlined user experience. A key benefit was the centralised task tracking and in-system messaging, which led to an estimated 80% reduction in email traffic, simplifying coordination and reducing the risk of missed or duplicated communications.

Summary on Shipment Processing Time

The current shipment process for Clas-SiC is highly manual, requiring extensive effort to gather information from internal and external sources, prepare documentation for both email distribution and inclusion with the physical shipment, and update internal systems and spreadsheets. This process typically takes up to 6 man-hours per shipment. Through digitalisation, these activities can be streamlined and partially automated, reducing the processing time to approximately 2 man-hours, representing a 66.7% improvement in operational efficiency.

Similarly, the current shipment process for whisky shipments is also manual, involving information gathering, document preparation, and updates to internal records. Under the existing workflow, this process takes up to 2 man-hours per shipment. By adopting a digitalised workflow, the processing time can be reduced to approximately 30 minutes per shipment, representing a 75% improvement in operational efficiency.

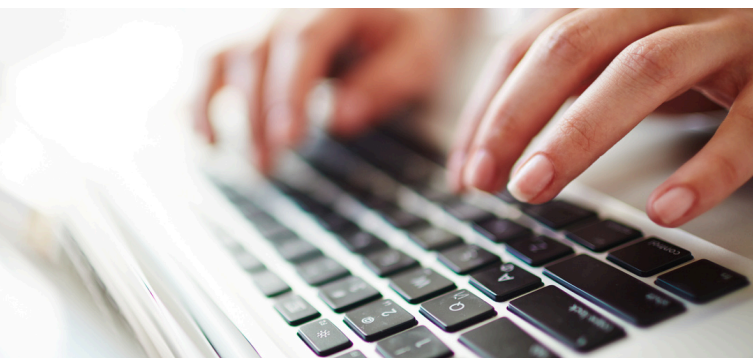
Overall, the introduction of digital solutions across both pilots demonstrates significant time savings and efficiency gains, reducing administrative burden and freeing resources for higher-value activities.

Summary on Email Correspondence

The current shipment processes for both Clas-SiC and whisky shipments typically involve over 5 email-based notifications exchanged between stakeholders to coordinate activities and provide status updates. These email exchanges often contribute to delays, particularly when responding to requests from consignees across different time zones.

The introduction of the digital platform has significantly reduced the need for email communication by centralising information sharing and providing stakeholders with real-time access to shipment status. This eliminates the need for repeated email requests and improves overall transparency and responsiveness.

In addition, the platform enhances internal communication at Clas-SiC by allowing departments to share documents, approvals, and status updates directly through the system. This further reduces reliance on email and contributes to improved process efficiency and coordination.



Document Handling and Digital Forms

Most shipment-related documents for both Clas-SiC and whisky shipments can be replaced with structured digital forms within the platform. These forms can be automatically populated with data entered at the point of origin, improving accuracy, consistency, and overall operational efficiency.

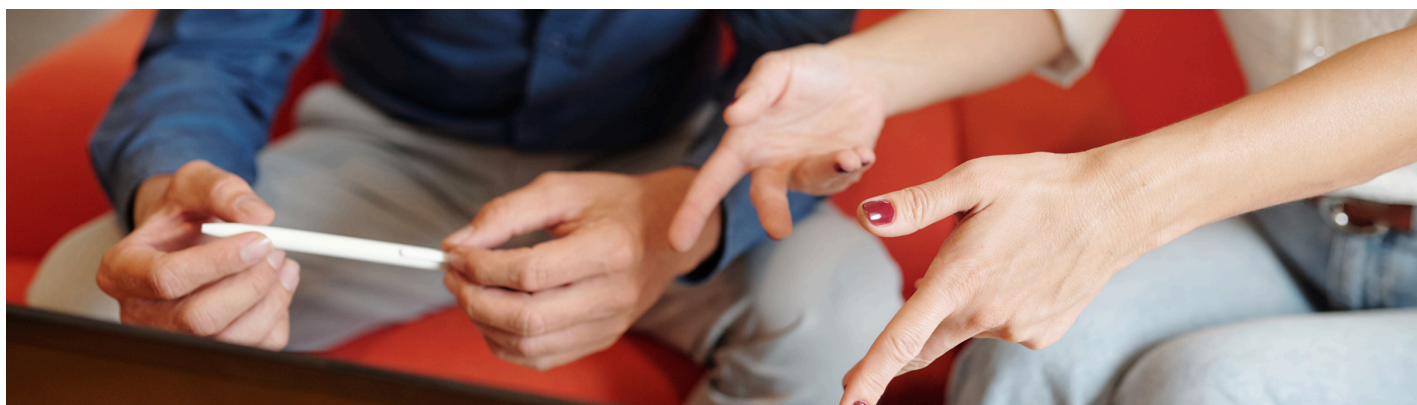
For Clas-SiC shipments, of the 10 documents currently required, 8 could be generated digitally through the platform, significantly reducing manual effort and the risk of errors. Similarly, for whisky shipments, of the 9 required documents, 8 could be generated digitally, with the exception of specific regulatory documents such as Certificates of Age and Origin, which still require manual issuance.

An example of this approach includes the use of a digital purchase order form for clients to submit their requirements. This data can then auto-populate related documents such as shipping instructions and advice notes, eliminating manual duplication and reducing potential errors.

Furthermore, integration with logistics providers, such as DHL via API connection to the digital platform, would enable seamless data exchange, allowing shipment and tracking information to be automatically uploaded to and retrieved from the DHL portal. This further enhances process efficiency and reduces manual input requirements. Documents able to be digitalised are summarised in Table 5.

Table 5. Summary of Digitalised Documents

Document	Digitalised	Notes
Purchase Order	Yes	Email or platform-submitted PO is standard in B2B exports
Sales Order	Yes	Internal document; can be fully digital within shipper ERP or digital platform
Commercial Invoice	Yes	Must be digitally signed and contain all required fields; digital copies (PDF or platform-generated) are widely accepted by both carriers and customs.
Packing List	Yes	Accepted in digital form; typically uploaded to carrier system or shared via email.
Advice Note	Yes	Digital/email notification is standard.
Export Declaration (UK)	Yes	Filed digitally via HMRC CHIEF or CDS systems; managed by LSP
Import Permit (Taiwan)	Yes	Provided digitally by consignee; submitted to customs electronically or through DHL/FedEx portal.
Air Waybill	Yes	Issued digitally by carrier; functions as the master shipment document and is valid electronically.
Shipping label	Yes	Always generated and printed from the courier's digital platform.



Benefit Summary

The implementation of the digital platform introduced a fully digitalised, action-based workflow that transformed the current shipment process from a fragmented, email-driven approach into a streamlined, role-specific system. Tasks were clearly assigned, tracked in real time, and supported by direct alerts and a personal dashboard, eliminating delays caused by unclear responsibilities and redundant communication.

Key benefits include:

- Real-time task alerts on desktop (and mobile if required)
- Centralised dashboards for action tracking
- One-click document approvals
- Defined role-based access, replacing broad email distribution
- Systematic reduction in email traffic and manual coordination
- Significant reduction in manual administrative work
- Increased staff capacity for higher-value activities
- Improved operational efficiency and consistency
- Cost savings through reduced task completion time
- Transparency of the shipment process

Email Load Reduction

Under the current process, each shipment typically generates around five separate email chains, often involving multiple recipients across internal teams and external stakeholders. This results in significant operational overhead, increased potential for miscommunication, and contributes unnecessarily to the organisation's digital carbon footprint.

With the adoption of the digital platform, email communication is largely replaced by platform-generated alerts and in-system messaging. Only task-relevant personnel are engaged at each stage, eliminating unnecessary recipients and reducing duplication of information.

As a result, it is estimated that the platform delivers a reduction of more than 80% in email traffic per shipment. This leads to greater efficiency, improved clarity in communications, and contributes to lowering the digital carbon footprint associated with shipment processing.

Quantitative Estimate: CO₂ Emissions from Email Usage

Carbon Emissions per Email (Source: BBC, ADEME)

- Standard email (no attachment): ~4 grams CO₂
- Email with large attachment: ~50 grams CO₂

Assumed Email Volume in Logistics Process (per shipment)

Taking an average of 5 emails per shipment the assumed distribution:

- 40% standard emails = 2 emails × 4g = 8g CO₂
- 60% with attachments = 3 emails × 50g = 150g CO₂

Total estimated CO₂ per shipment: ~ 158 grams CO₂

Annual Impact (Clas-SiC Example Scenario)

If 300 shipments occur per year:

- Email-based process CO₂ = 300 × 0.158 kg = 47.4 kg CO₂/year

Switching to a centralised digital workflow (e.g. LogChain) could reduce these emissions by over 68%, bringing the total down to:

- < 15 kg CO₂/year, primarily for essential system notifications.

Environmental Impact Highlights

~0.158 kg of CO₂ saved per shipment

~32.4 kg CO₂ saved annually with

digitalisation (based on 300 shipments/year)

A summary of the potential environmental benefits is provided in Table 6.

Table 6. Environmental Benefit Summary

Category	Email-Based Process	Digital Workflow	Estimated Reduction
CO ₂ per shipment	~0.158 kg	<0.05 kg	~68%+
Annual CO ₂ (300 shipments)	~47.4 kg	<15 kg	~32.4 kg

Annual Impact (Whisky Shipment Example Scenario)

If 100 shipments occur per year:

- Email-based process CO₂ = 100 × 0.158 kg = 15.8 kg CO₂/year

Switching to a centralised digital workflow (e.g. LogChain) could reduce these emissions by over 90%, bringing the total down to:

- < 5 kg CO₂/year, primarily for essential system notifications.

Environmental Impact Highlights

- ~0.108 kg of CO₂ saved per shipment
- ~10.8 kg CO₂ saved annually with digitalisation (based on 100 shipments/year)

A summary of the potential environmental benefits is provided in Table 7.



Table 7. Environmental Benefit Summary

Category	Email-Based Process	Digital Workflow	Estimated Reduction
CO ₂ per shipment	~0.158 kg	<0.05 kg	~90%+
Annual CO ₂ (100 shipments)	~15.8 kg	<5 kg	~10.8 kg

Productivity Gains

Clas-SiC currently invests considerable time in administrative tasks to manage shipment processes, including shipment coordination and preparation. Digitalising these workflows presents a significant opportunity to reduce manual effort, improve process efficiency, and free up staff for more strategic activities. With automation and system enhancements, such as auto-populated forms and streamlined processes, Clas-SiC could achieve time savings and operational improvements. By digitalising the shipment workflow, the company reduces processing time per shipment by 66.7%, saving 4 man-hours per shipment.

Digitalising administrative tasks to manage the whisky shipment processes, reduces manual effort, improves process efficiency, and frees up staff for more strategic activities. With automation and system enhancements, such as auto-populated forms and streamlined processes, Skene Whisky and Kimbland Distillery could achieve time savings and operational improvements. By digitalising the shipment workflow, Skene Whisky reduced processing time per shipment by 75%, saving 90 minutes per shipment.

Document Management

The digital platform offers the capability to replace many of the traditional shipment documents with custom digital forms. These forms can replicate the layout and structure of current physical or spreadsheet-based documents or be designed to meet electronic compliance standards (e.g. for a Waybill).

By transitioning to digital documentation through a digital platform, organisations can significantly reduce paperwork, increase efficiency, and improve the accuracy and transparency of their logistics operations. The pilot established that it would be possible for Clas-SiC to eliminate 80% of the documents currently used in their shipment process, and for Skene Whisky to eliminate over 70% of the documents they currently use.

Cost savings

By multiplying the time saved per shipment by the hourly rate of the assigned employee, the cost savings can be easily calculated. Extending this calculation across the total number of shipments per year provides a baseline estimate of the annual cost savings.

Using an average salary of £16.00 per hour Clas-SiC could save at least £1,280.00 per month over 20 shipments (significant annual savings annual saving); Skene Whisky and Kimbland Distillers could save around GBP 192.00 per month based on 12 shipments (£2,304 annually).

Additional benefits

Additional benefits from digitalisation include:

- Direct Data Entry & System Integration: Information currently stored in spreadsheets can be entered manually or, ideally, integrated directly from the source system into the digital platform
- Single Source of Truth: Data is entered once and shared across the workflow with permission-based access, eliminating duplication and reducing errors.

- **Secure Access & Data Protection:** Sensitive documentation is securely stored, with controlled access granted only to authorised users.
- **Real-Time Status Updates:** Data captured at the source ensures the system reflects the most current status, keeping all stakeholders accurately informed throughout the shipment lifecycle.

Digitalisation would have prevented the issues experienced during the pilots and could be implemented further to assist with other aspects of the shipment e.g:

- By digitalising the shipment process in the platform, all critical data would have been captured accurately, shared instantly across DHL’s global operations, and validated in advance, preventing redundant requests and customs clearance delays. This would have ensured the whisky arrived on time for the planned presentation.

- By embedding the EZway authorisation into the digital workflow on the platform, the system would have ensured this critical step was completed in advance. This would have avoided the shipment being placed on hold in Taiwan and prevented the resulting multi-day delay.
- Digital workflows also enable faster approvals, with same-day certification becoming more achievable thanks to electronic submission and e-signing capabilities. Centralised access to documentation and real-time status tracking improves visibility and coordination between all stakeholders, including importers and logistics providers.

Table 8 summarises the potential benefits of a digital solution for Clas-SiC’s shipment processes.

Table 8. Summary of Digitalisation Benefits

Metric	Current (Manual)	Digitalised	Benefit
Processing Time / Shipment	~6 hours	~2 hours	~4 hours saved per shipment (67% improvement in productivity)
Emails / Shipment	~5	~1	~80% reduction in emails
Physical Documents	~10	~2	~80% reduction in document handling
Error Risk	High (manual entry)	Low (automated validation)	Reduced rework / delay risk
Shipment Volume/Month	20 (assumed)	Same	80 hours saved per month

A summary of the potential benefits of digitalisation for Skene Whisky shipments is provided in Table 9.

Table 9. Summary of Digitalisation Benefits

Metric	Current (Manual)	Digitalised	Benefit
Processing Time / Shipment	~120 minutes	~30 minutes	~90 minutes saved per shipment (75% improvement in productivity)
Emails / Shipment	~5	~1	~80% reduction in emails
Physical Documents	~11	~3	~70% reduction in document handling
Error Risk	High (manual entry)	Low (automated validation)	Reduced rework / delay risk
Shipment Volume/Month	8 (assumed)	Same	12 hours saved per month

Digitalisation Results

Overview

The pilot demonstrated that end-to-end digitalisation of trade documents and processes is technically feasible and commercially viable across sectors. However, readiness varies significantly across document types, sectors, and regulatory environments.








Digitalisation success was defined using two main filters:

- Was the document/process fully digitalised during the pilot?
- Could it be digitalised within 12 months, and what stands in the way?

Traffic Light Summary

A traffic light matrix was created and is summarised in Table 10.

Table 10. Traffic Light Summary

Document/Process	Classification	Notes	Barrier Type
Commercial Invoice	 Green	Fully digitalised and accepted in all test shipments	None
Packing List	 Green	Fully digitalised and viewable to stakeholders	None
Certificate of Origin (COO)	 Amber	Out of scope for this pilot, not tested with Taiwan Customs	-
Certificate of Age (Whisky)	 Red	Not accepted in digital form by UK export compliance systems	Public Sector
Air Waybill (AWB)	 Green	Digitalised version created and accepted	None
Export Declaration	 Green	UK exports supported eDeclarations	None
Import Declaration	 Green	Taiwan customs accept eDeclarations	None

Notable Sectoral Differences

- Semiconductors: Participants were typically more digitally mature and willing to trial real-time data sharing. However, third-party logistics integration was limited.
- Food and Drink: Digitalisation was hindered by legacy compliance processes (e.g. physical inspection, certificate stamping).

Whisky Shipment – Clarification

While the whisky shipment was valuable in highlighting the limitations of trade digitalisation, it encountered significant

delays. Paper-based processes required physical stamping of the Certificate of Age, which could not be replicated digitally in this context. For this reason, it is not appropriate to present the shipment as an unqualified success. However, it provided meaningful data on where reform is required.

Issues

The pilot surfaced several operational, regulatory, and behavioural issues that impeded full digitalisation, these are grouped below in Table 11.

Table 11. Issues that Impede Digitalisation

Document/Process	Notes	Barrier Type
Manual Dependency for Compliance Docs (e.g. Certificate of Age)	Delays and duplication during whisky shipment due to reliance on physical stamps	Engage regulators early; explore acceptance of digital twins with tamper-proof audit trails
Discrepancy in email communications volume perception	Underreporting by operational staff led to stakeholder disagreement	Quantify with data extraction/log analysis pre-pilot to avoid perception bias
Low digital readiness among SMEs in food & drink sector	Adoption delayed due to lack of internal system capability	Introduce pre-pilot onboarding or "Lite" platform access
Misconception of customer access burden	Some participants concerned about client onboarding requirements	Clarify access controls and highlight interoperability options

Lessons Learned

Sectoral Readiness Varies Substantially

Sectors like semiconductors are much more digital-ready than traditional goods exporters. Future pilots should calibrate onboarding based on digital maturity.

Legal Reform Is a Parallel Track

Without changes to legal frameworks—particularly in Taiwan—several critical documents will remain non-digital despite available technology.

Pilot Communication Needs Tightening

Variability in internal comms (e.g. number of emails) led to participant disagreements. This can be reduced by clear pre-pilot documentation of current-state metrics.

Human Behaviour, Not Just Technology

Some digital steps were missed not due to technical failure, but because of manual override or habit. Future programmes should include behavioural nudges and training.

Platform-Agnostic Language Helps Adoption

While LogChain powered the pilot, focusing on digitalisation more broadly (rather than brand-specific benefits) helped reassure participants and stakeholders.



Recommendations for Future Trade Digitalisation Pilots

Segment Participants by Readiness

- Provide “lite” versions of digital platforms for low-maturity companies.
- Tailor documentation to technical literacy.

Deploy Sandbox Regulatory Tests

- Establish sandbox environments for digital documents not yet accepted (e.g. Certificate of Age).
- Use pilot learnings to develop bilateral MOUs on document acceptance.

Standardise Metrics Upfront

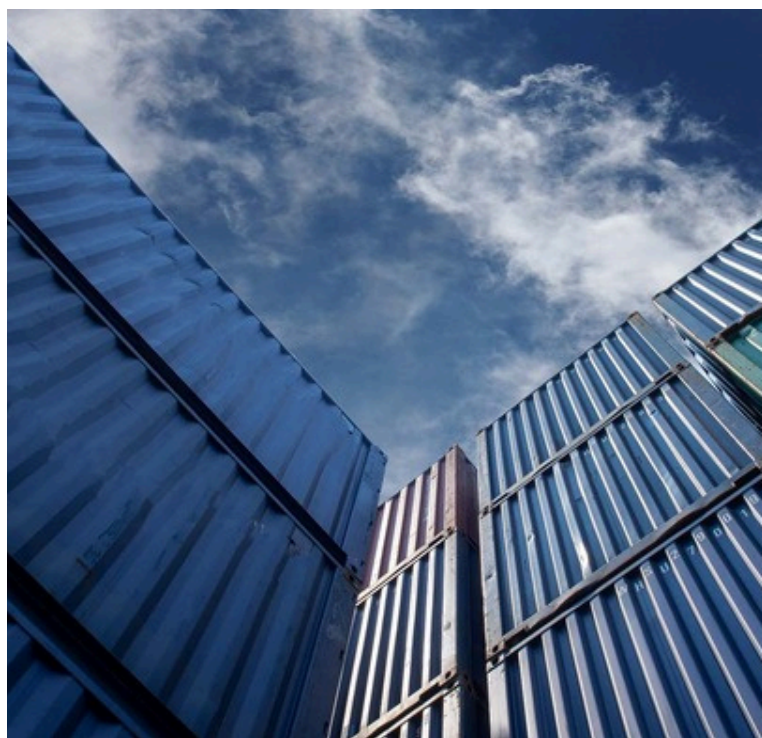
- Agree on email count methodology, time tracking, and cost logging before pilot begins.

Enhance Legal Alignment

- Build cross-reference to bilateral trade arrangements and international best practice such as MLETR to support mutual recognition of :
 - Electronic transferable records
 - e-Signatures
 - e-Customs/eDeclarations

Communicate Benefits with Clarity

- Avoid vendor-centric framing.
- Highlight benefits such as reduced delays, carbon savings, and improved compliance.



Data Security, Transparency, and Resilience

The pilot tested several security, transparency, and performance features of digital trade platforms.

KPI	Outcome
Error Rate	~68% reduction in invoice and packing list errors post-digitalisation
End-to-End Visibility	100% of semiconductor shipments tracked in real-time with geostamped audit trails
Data Security	Zero data breaches reported; all platform activity encrypted and logged
Blockchain Use	All document exchanges and approvals immutably logged
Stakeholder Confidence	Positive feedback from 89% of participants (based on qualitative responses)

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