



Services



Revolutionizing Trade: From Paper to Real-Time Data – And the Potential of Smart Contracts

Trade Tech Series

Over the past century, global trade has been transformed thanks to containers, logistics, and communications. But the documents that underpin trade finance – letters of credit, bills of lading, inspection certificates, insurance documents – remain stubbornly paper-based, moving slowly across borders and requiring manual, line-by-line verification.

For you, this paperwork is more than an inconvenience. A single cross-border transaction can involve up to 36 documents and 240 copies. Those documents can be delayed, lost, or contradictory. Your teams – and your banks – still have to interpret International Chamber of Commerce (ICC) and the Uniform Customs and Practice for Documentary Credits (UCP) rules line by line, along with whatever bespoke conditions your buyers negotiate.

“The result is friction, delay and cost at precisely the moment when global supply chains are under pressure to be faster, more resilient and more transparent,” says John Selvin Raja John, Director, Trade Product Development and Management at Citi.

This “bog” extensive volume of paperwork has real-world implications, notes Carson Bricco, Senior Director, Strategy and Execution at EY US-Parthenon. Paper invoices can take five to seven days to be posted and matched in systems. Only once an invoice is posted and validated can it be discounted under a supply chain finance program. If you typically offer suppliers 45 days of discounting, but a week disappears to processing delays, a meaningful chunk of value is lost.

Mismatches between purchase orders, proofs of delivery, and invoices compound the problem. Exceptions cost time and money to resolve, delay payment, and can even cause the discounting opportunity to expire completely.

“Corporates’ primary motivation is improving performance,” explains Bricco. “Ultimately, they want to unlock cash, solve operational problems, and ensure a stable supply chain and satisfied suppliers. Improving processes so that invoices are posted within a day can add roughly five days of extra discounting time – often equivalent to around 10% more savings for a mature program.”



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How to Get From Documents to Data

In the ideal model, you would no longer rely on documents to represent data. Instead, banks could determine whether conditions are satisfied using structured, authenticated data directly from original sources – for example:

- Confirmation from the shipping line that your containers were loaded on a specific vessel on a particular date, with defined ports of loading and discharge.
- Confirmation from your insurer that the shipment is covered for a declared value and beneficiary.
- Invoice data and commercial terms sent directly by you or your exporter.

This vision is compelling, but execution is difficult. The trade ecosystem includes many participants – banks, carriers, freight forwarders, insurers, inspection companies, platforms, and corporates like you – each operating in different jurisdictions and industries, with different systems, standards, and levels of digital maturity. No single organization can solve the full problem.

Building a Digital Trade Ecosystem

Substantial progress requires collaboration. Industry bodies such as the ICC, BIMCO, and the Digital Container Shipping Association are working with banks, carriers, and technology companies to establish standardized APIs and shared data models.

Electronic bills of lading (eBLs), once niche, now have multiple platforms and vendors. The goal is interoperability – so you are not locked into a single platform or forced to join every network just to manage your documents.

At the same time, the legal environment is evolving. The UNCITRAL Model Law on Electronic Transferable Records (MLETR) gives jurisdictions a way to legally recognize electronic versions of title documents like eBLs and promissory notes. If a country adopts MLETR-style legislation, digital originals carry the same legal standing as paper which means you can rely on electronic documents in court.

Technology and law do not need to move at the same pace, but they do need to move in the same direction. You can use digital data operationally even before every jurisdiction updates its legal framework, but realizing the full benefits of full dematerialization will depend on broad legal recognition.

The trajectory is becoming clearer: by 2030, many expect e-documents to be the global norm, supported by interoperable platforms, common data standards, and more mature legal frameworks. The question is no longer whether this will happen, but how quickly each part of the market will move.

Potential Benefits

A data-driven, automated ecosystem offers meaningful benefits for you:

- **Earlier and more predictable posting of payables** – This expands your supply chain finance window and can help improve working-capital optimization.
- **Fewer disputes and penalties** – Logistics, inspection, and insurance data can be matched automatically to your contractual terms.
- **Can lead to stronger supplier relationships** – Suppliers get paid on time more consistently and can access early-payment options more easily.
- **Can help reduce operational noise** – Your AP teams spend less time fixing mismatches and more time on analysis and value creation.

“Importantly, not all corporates start from the same place,” says Bricco. “Some have already invested heavily in e-invoicing, shared service centers, optical character recognition and AI tools, and have captured most of the currently available efficiencies. Others remain relatively manual and fragmented. For the latter group, the opportunity to leapfrog directly to modern, data-driven solutions – rather than layering incremental tools on top of legacy processes – may be particularly attractive.”

Smart Contracts and Tokenized Payments

So what comes next? Once you have real-time, trusted data flowing across your ecosystem, smart contracts can become a natural next step. These are code that embodies an agreement – “if these conditions are met, then this obligation is performed” – and execute automatically when the required data arrives.

In trade finance, the key obligation is the bank's conditional undertaking: if the exporter meets the commercial terms and the importer does not pay, the bank pays.

A Citi Token Services for Trade pilot for the Panama Canal shows how this can work digitally. Traditionally, a bank issues a guarantee in favor of the canal authority, to help ensure that if the ship owner does not pay the transit fee, the authority can claim from the bank. In the digital version:

- The arrangement is represented by a smart contract on a blockchain.
- Funds are converted into digital tokens held in a wallet.
- Sensors detect when a vessel passes through the canal and send data to the smart contract.
- If the conditions are satisfied, the smart contract automatically transfers the token value from the bank's wallet to the canal authority's wallet – without any bank intervention.

A Pragmatic Path: APIs, Analytics and Generative AI

Letters of credit, which are core trade finance instruments, are typically more complex than the Panama pilot; there may be multiple data feeds, conditions and parties. Moreover, pre-funding through tokens is not directly compatible with the way most importers use LCs, where they pay only when goods ship and documents are accepted.



Nevertheless, the pilot demonstrates that smart contracts can ingest data from IoT sensors, carriers or platforms, evaluate whether the conditions have been met, and trigger payments automatically.

“We recognize that smart contracts aren't about to happen tomorrow in a single ‘big bang’. That's why we're laying a pragmatic path that builds value at each step,” says Andre Carvalho, Head of Receivables Finance at Citi. “But it's also important for ecosystem players such as Citi to have a vision for smart contracts because it allows us to begin to put the building blocks in place and align the many stakeholders involved.”

For you, that pragmatic path starts with open, standardized APIs connecting your ERP, your banks, logistics platforms, and key data sources. Once your plumbing and authentication layers are in place, multiple forms of value emerge long before full smart-contract automation arrives.

The integration of cutting-edge technologies, including Generative AI, is central to this pragmatic path. As a type of Artificial Intelligence that creates new and novel content, Generative AI extends beyond traditional analytical capabilities to generate outputs that can simulate human behavior, drawing from vast datasets. This enables powerful applications such as:

- **Digitized Procure-to-Pay Flows** – As more of your lifecycle is digitized, data quality can improve and manual touch points can be reduced.
- **Generative AI for Onboarding and Negotiation** – Specifically, GenAI can extract key terms from supplier contracts, highlight deviations from your standards, and help accelerate supplier onboarding. This capability is an example of specialized Generative AI, designed for high-impact, function-specific needs within our enterprise.
- **Predictive Analytics for Working Capital** – Aggregated trade and payment data can feed models that forecast cash needs, highlight dilution risk, and flag counterparties likely to dispute or delay.
- **Risk and Compliance Automation** – Automated tools can match insurance terms, assess buyer risk, and monitor for unusual patterns that may indicate fraud or concentration exposure.

These capabilities offer immediate benefits – and they also normalize the digital data flows and standardized conditions that smart contracts will ultimately depend on.

From Vision to Execution

Transforming trade finance will require continued collaboration on standards and interoperability, further legal adoption of frameworks such as MLETR, and ongoing investment by banks, platforms and technology providers. But it also requires action from you and your teams.

At Citi, our approach to Generative AI deployment is guided by five critical principles, ensuring we innovate rapidly while maintaining safety and control. These principles include being **Scaled, Controlled**, prioritizing **Simplicity**, adopting a **Multi-provider** approach, and being **Cloud-first**. This strategic framework enables us to maximize the immediate impact of AI across our organization, integrate robust technology and governance, offer streamlined user experiences, leverage diverse AI models for resilience and cost optimization, and utilize cloud-based solutions for scalability and flexibility. By adhering to these principles, we build a robust, secure, and agile GenAI ecosystem that underpins our advancements in areas like trade finance.

While the transformative potential of AI is immense, Citi is committed to its responsible deployment. We firmly believe in ‘Combining Speed with Safety and Soundness,’ meticulously designing all AI solutions with embedded ethical considerations and continuous human monitoring to ensure accountability, mitigate bias, and comply with regulatory expectations. This approach ensures our AI advancements are robust, trustworthy, and foster confidence across all stakeholders.

For treasurers, procurement leaders, and finance teams, the key next steps include:

- Standardize your internal processes and clean your data.
- Connect to banks and logistics partners through APIs wherever possible.
- Make best use of available supply chain finance and trade platforms.
- Participate in pilots that digitize specific corridors, products, or document types.

No single initiative will transform trade overnight. But each incremental step you take – scanning less paper and consuming more data, using AI for matching and onboarding, piloting smart-contract use cases – moves your organization closer to a future where trade finance operates at the speed and precision that can support your business demands.



Endnotes

https://www.ey.com/en_uk/insights/banking-capital-markets/eight-ways-banks-can-move-ai-from-pilot-to-performance

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