Systems and Methods for Global Trade Management Using Blockchain Technology

White Paper

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Global Trade Management Software

Contents

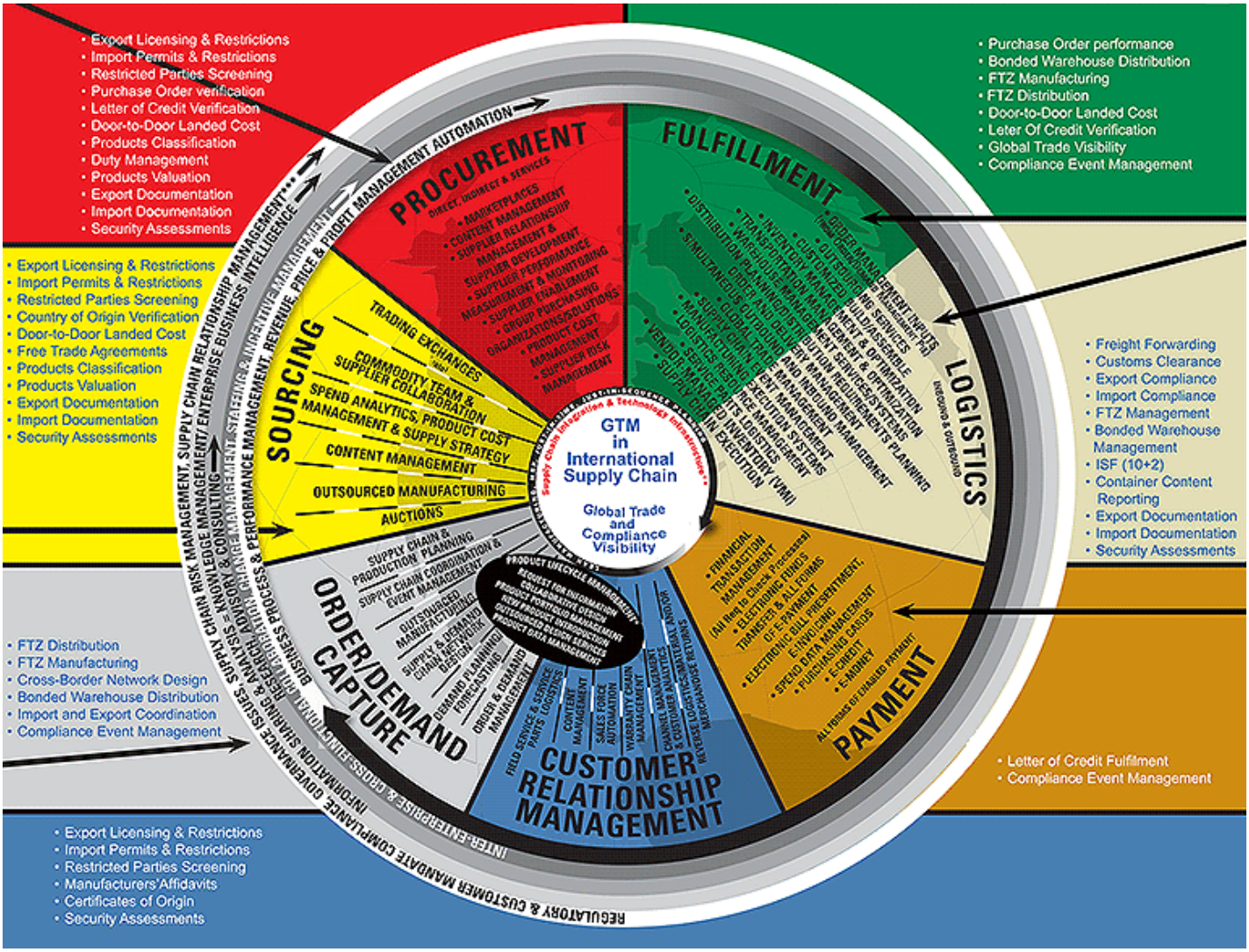
Supply Chains and Global Trade Management

Supply Chain Management

A supply chain is a system of organizations, people, activities, information, and resources involved in moving a product or service from supplier to customer. A Supply chain starts with the transformation of natural resources, raw materials, and components into finished products and ends with the delivery of finished products to the end customer.

Supply Chain Management (SCM) oversees each touch point of a company's product or service, from initial creation to final sale. It encompasses all logistics management activities, including sourcing, procurement, and conversion. Importantly, it includes manufacturing operations and drives the coordination of processes and activities both with and across marketing, sales, product design, finance, and information technology.

With so many places along the supply chain that can impact value, a well-designed SCM system can increase revenues, decrease costs and impact a company's bottom line.



Adopted from Supply & Demand Chain Executive (SDCE) *"SDCE-global-enabled-supply-and-demand-chain-map"*

Global Trade Management

Global trade management (GTM) is the total optimization of the end-to-end international supply chain - from product conception to final delivery - with a focus on the integration of key cross-border regulatory, strategic and system components.[1] GTM ensures a seamless, secure and cost-effective flow of goods, data, and payments.

GTM is impacted by multiple governmental actors that impose policies that regulate the international cross-border aspects of moving products. Global and local governmental organizations, as well as industry groups, play a key role in the field as they create and enforce laws or regulations. These regulations significantly affect the international supply chain and, as a result, the management decisions and configurations that must be made to both comply with these regulations and leverage them for optimal business performance. Compliance with these policies falls under GTM.

The key objective of any GTM package is to manage import and export related functions, financial transactions associated with cross-border trade and information exchange among the supply chain partners. Additionally, GTM systems enable information exchange, also known as “Global Trade Visibility” or “Business Partner Collaboration.”

GTM is comprised of equal parts risk management and trade optimization. For example, trade optimization includes best practices associated with import duty-tax minimization, reduced cost of trade operations, and optimized logistics and transportation routing. Risk management encompasses regulatory compliance, trade security, and disruption planning and preparedness.

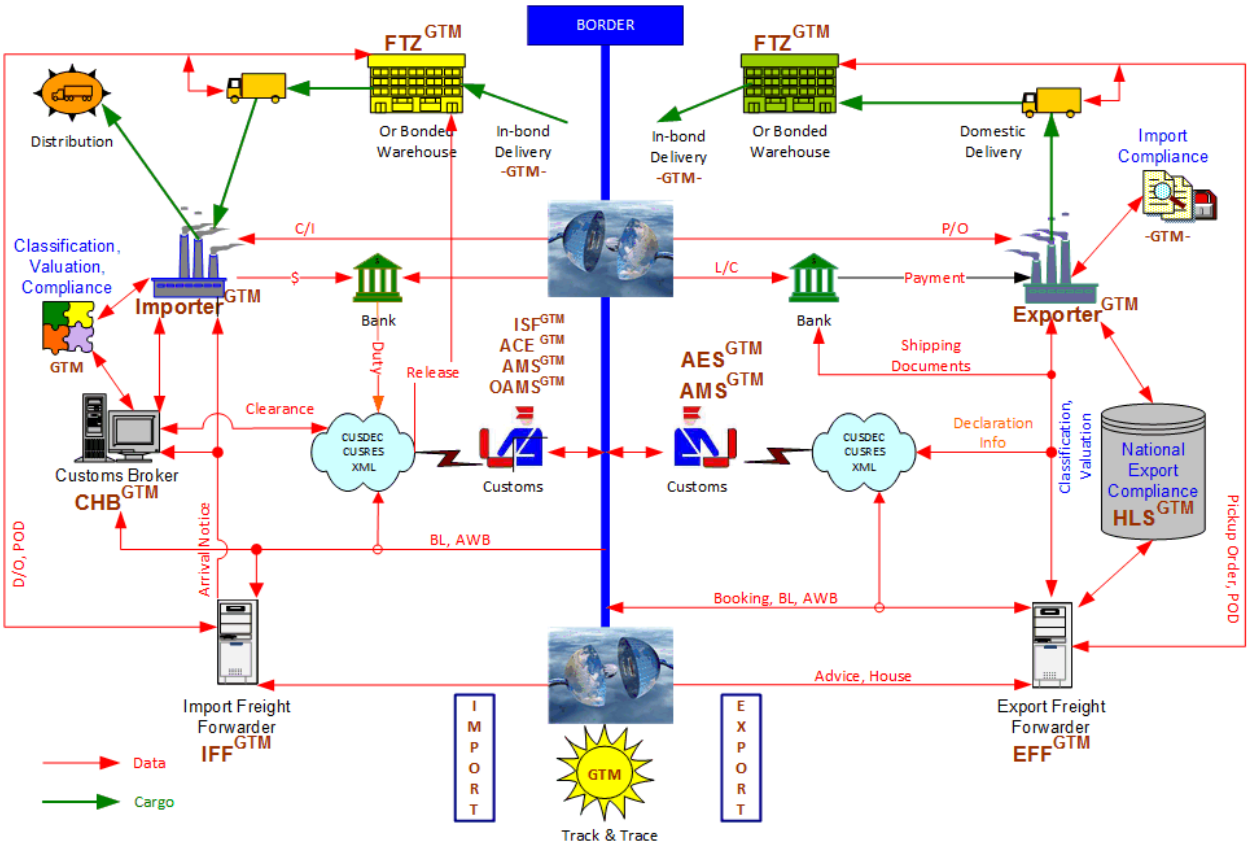
This GTM model allows a company to position trade security and preparedness planning as an "upstream" strategy where, for instance, input on new product sourcing could also include considerations for terrorist risk, port security, vendor screening, and geopolitical stability. Even such issues as multi-currencies, multi-time zones, and multiple languages could fall under this strategy. In essence, GTM converts global trade programs from a potential liability into a much-needed competitive advantage.

GTM at a Glance

Classification	Functions
Trade Functions	Sourcing; selling; export (customer) orders; import (purchase) orders; collaboration; product management; vendor management; document management.
Trade Compliance	Preferential trade agreements; license determination; document management; document filing; product classification (harmonized tariff schedule — HS); customs filings; import rules; export rules; duties/taxes; FTZ (Foreign Trade Zones), RPS (restricted party screening).
Trade Logistics	Carrier booking; global logistics execution; shipment planning; multimode transportation; shipment consolidation; shipment routing; carrier communication; global visibility; landed cost control; shipment documentation.
Trade Finance	Letters of credit; settlement; reconciliation; invoice management; payment; insurance; trade financing.

Adopted from “Developing an End-to-End Global Trade Management Functional Map,” by C. Dwight Klappich/Gartner, Supply Chain Brain.com

[1] As simply defined by W.G. Peck, “Global Trade Management and security”, JOC.com



Interactions between GTM modules and blockchains

Key Challenges solved by GTM blockchain

Compliance	Connectivity	Content
• Low levels of automation leading to penalties, delays, and lost opportunities • Relying on third parties with unproven expertise to execute compliance functions in unknown geographic regions.	• Unable to connect with many partners including customs and service providers. • Lack of GTM events: logistics, financial, and compliance.	• Frequently changing regulatory requirements makes keeping the trade content current a challenge. • Growing concerns on security and non-compliance risks.

Blockchain Technology

Blockchain Concept

A blockchain is an append-only distributed digital ledger that consists of a continuously growing chain of linked blocks, where each block contains a cryptographic hash of the previous block, a timestamp and batches of verified transactions. This iterative process ensures the integrity of the previous block, all the way back to the original genesis block. The blocks cannot be altered retroactively without the alteration of all subsequent blocks and the collusion of the network.
A blockchain is secure by design and exemplify a distributed computing with high dependability of a fault-tolerant computer system. Decentralized consensus, achieved with a blockchain concept, makes it profoundly suitable for the recording of GTM events and processing of transactions related to GTM activities.

Blockchain Types

There are three accepted types of blockchain networks:

1. Public blockchain

A public blockchain has no access restrictions. Anyone can participate in the execution of a consensus protocol, sending and validating their own transactions by running a public node on their local device. All transactions are valid and transparent but anonymous. Therefore, anyone on the private blockchain has the potential to disrupt current business models through disintermediation.

For applications with limited and highly specialized participants, such as Global Trade Management, a concept of a public blockchain violates basic principles of security and restricted visibility.

2. Private blockchain

A private blockchain is permissioned. Nobody can join it unless permission is granted by a network administrator. Participant and validator access is restricted.

A private blockchain is beneficial to a company seeking to incorporate blockchain into their transaction-processing and record-keeping procedures without sacrificing autonomy and running the risk of exposing sensitive data to a public network.

There are three key advantages to the implicit nature of a private blockchain.

- Reduction in transaction costs and data redundancies.
- Simplified data-handling and more automated compliance mechanisms.
- Faster transaction execution time overall.

3. Consortium or Federated blockchain

A federated blockchain can be considered as partially decentralized. It is permissioned but instead of a single organization controlling it, a number of companies might each operate a node on such a network. The administrators of a consortium chain restrict users' rights as they see fit and only allow a limited set of trusted nodes to execute a consensus protocol.

Sidechain and off-chain transactions

A sidechain is a separate blockchain attached to the parent through the use of a two-way peg, such as 2WP, Chain-Relays, etc. The peg allows tokens or digital assets from one blockchain to be securely used in the sidechain and then moved back to the original blockchain if needed. The original blockchain is then referred to as the main chain and all additional blockchains are referred to as sidechains. In the GTM blockchain concept, there is also a childchain. A childchain is a sidechain that is separated from the main GTM blockchain by another sidechain.
A sidechain is responsible for its own security. Since each sidechain is independent, if it is hacked or compromised, the damage will be contained within that chain and won't affect the main chain. Conversely, should the main chain become compromised, the sidechain can still operate.

An off-chain transaction is the movement of value outside of the blockchain. An on-chain transaction - usually referred to as simply 'a transaction' - modifies the blockchain and depends on the blockchain to determine its validity, while an off-chain transaction relies on other methods to record and validate the transaction; i.e. calculation of values that require access to a legacy database.

Smart Contracts Concept

A smart contract is a computer coded protocol intended to digitally facilitate, verify, or enforce the negotiation or performance of a contract. Some blockchain platforms do not have a strict concept of the smart contract, but as they do support the ability to execute customs code and thus can perform similar functions. Once the contract is negotiated on the blockchain and signed by the private keys of the parties, the contract is visible to all participants and it cannot be edited or deleted. The terms of the smart contract are directly written into lines of code and that is automatically executed by the blockchain upon the occurrence of the predefined event. Smart contracts allow the performance of credible transactions without third parties.

Conceptual Design of GTM Blockchain

Any International Supply Chain (ISC) simply cannot perform without cross-border (GTM) components, whereas GTM components can operate in the stand-alone mode. This synergy is a major consideration in the conceptual design of a GTM blockchain.

Potential roadblocks

The first fundamental feature of GTM is rooted in the complexity of governmental, industry, and trade related rules and regulations. The sheer volume of information, its analysis, and calculations required to comply and compute optimal - or even just suitable - alternatives requires significant time and hardware resources. This makes the node prohibitively expensive and is detrimental to a blockchain of any type.

The second problem lies in the nature of the regulations. Regulations change often and dissemination of these changes can pollute traffic and overwhelm storage, especially the nodes that have an infrequent need for such information.

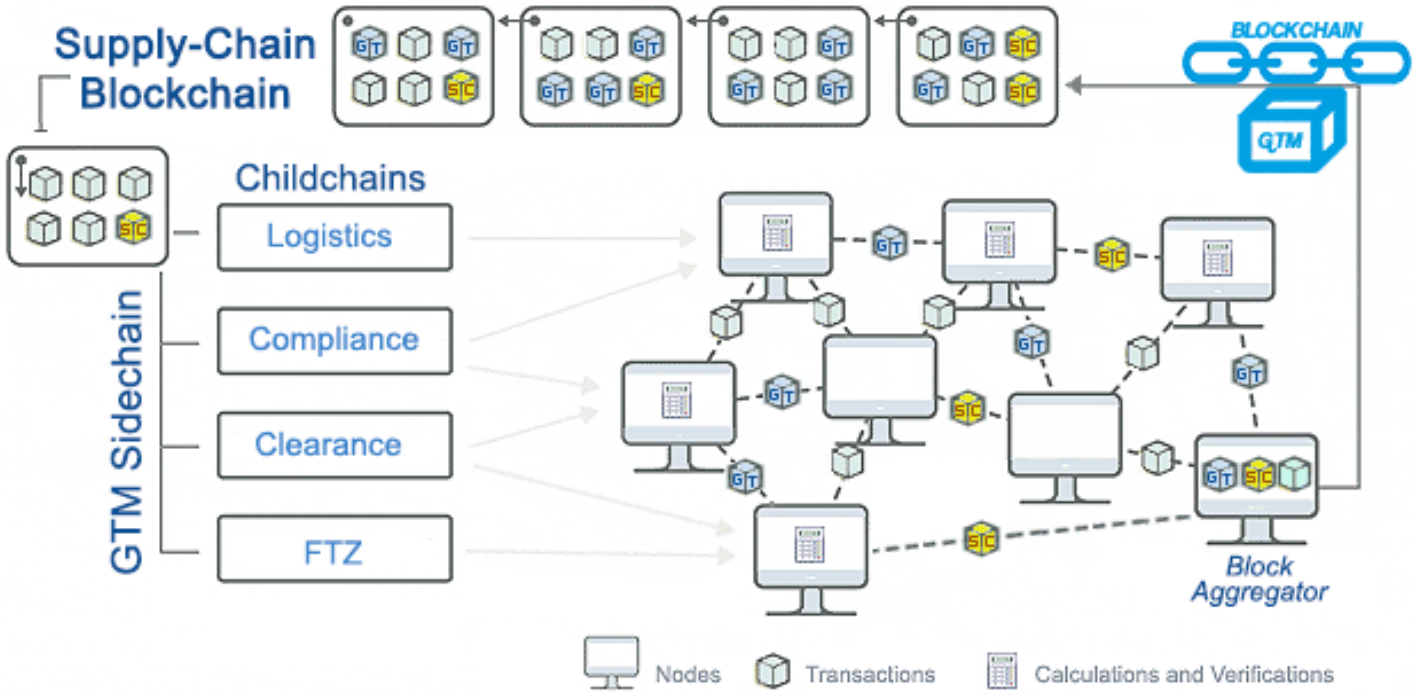
The third problem is caused by the frequency of mandated additions, deletions, and modifications. Practically every change to regulations requires an alteration of the program code. Even the most

rigorous testing of the code cannot guarantee the absence of errors which, in turn, may seriously disrupt the whole operation of a blockchain.

Optimal solution

The suggested GTM solution shall be comprised of the main GTM blockchain connected to its satellite childchains. Each childchain performs specifically designated functions and is allowed off-chain transactions. The results of off-chain transactions, such as calculations and compliance verifications, populate the childchain. The resolved childchain-level smart contracts then flow into the main GTM blockchain. In turn, the GTM blockchain may serve as sidechain to the ISC blockchain. Due to the international nature of Global Trade Management, all blockchains must be able to support multiple currencies, multiple languages/cultures, and time-zones.

This approach limits distribution of data to the decision-involved parties or the supply chain participants that are directly responsible for collaboration between vendors or for the visualization of supply chain processes. Calculations, verifications, and error corrections are confined to the remote nodes, which would not consume resources of the main blockchain. Federated consensus of ISC and GTM blockchains is not influenced by compartmentalization of information in this manner.



A blockchain part of a GTM sidechain is useless without the complete suite of GTM applications, as no GTM functions can be performed and, subsequently, no results can be posted to a blockchain.

Smart Contracts Specific to GTM

As with all GTM contracts, verification of a specific contract's conditions are performed in the childchain responsible for the contract. When all conditions of a contract are met, payment authorizations are distributed to all relevant parties. Either off-chain payment in fiat or on-chain payment in tokens of a pre-defined currency can be exchanged. Off-chain payment in fiat must be confirmed within the appropriate

childchain. All relevant milestones during the life-cycle of a process are posted into the Global Visibility part of the GTM sidechain.

GTM smart contracts are divided into five distinct categories:

Movement of Goods (MG)

These contracts represent the physical movement of goods.

If solely nominated vendors are allowed to participate in the contracts, only events that verify fulfillment of the contracts' conditions are propagated over the blockchain.

If a vendor shall be selected from a pool, an auction to award the contract to the vendor is conducted on the particular childchain. Rules of the auctions are programmed during the setup of a childchain with certain rules programmed to be selected depending on parameters of the movement, e.g., mode of transportation, in-bond requirements, etc.

Agent Services (AG)

These contracts mostly refer to Freight Forwarding and Customs Clearance agents. The Agent services are the most complicated and sophisticated contracts in the GTM blockchain.

The contracts are subject to ever-changing government regulations and always require considerable amount of software and hardware resources and maintenance. All calculations, verifications, communications with multiple government agencies, and accesses to databases must be executed off-chain with final results and documents populating the childchain and GTCV part of the GTM sidechain.

The childchain responsible for agent services must have open duplex interactions with the Import/Export Compliance childchain.

Since agents, especially Customhouse Brokers, provide frequent and comprehensive services require specialized expertise, the trusted agents have already gone through a selection process and would be subject to verification of contract fulfillment events.

For occasional shipments, the selection can be conducted using programmed online auctions in the corresponding childchain.

Import and Export Compliance (IEC)*

Compliance contracts almost always perform auxiliary functions. They are essential parts or crucial milestones of a larger contract. These functions, however big or small, shall be treated as smart contracts. Upon execution of a function, the payment must be authorized by a requesting node, regardless of the final performance of the whole contract. Some functions shall be executed before a contract can commence. Sourcing assignments, letters of credit authorizations, international deliveries- all need to know that mandatory documentation is available and what information is mandatory for cross-border operations.

First and foremost, compliance contracts ensure adherence to numerous governmental rules and regulations to reduce and eliminate fines and penalties.[2]

Most compliance contracts are, in fact, compliance ratifications and verifications of compliance checkpoints that ascertain the validity of the more encompassing contracts on a blockchain. This is similar to how a letter of credit needs multiple compliance endorsements before it can be issued.

As is the case with service contracts, the compliance contracts are also subject to ever-changing government regulations and always require considerable amount of software and hardware resources and maintenance. All calculations, verifications, communications with multiple government agencies, and accesses to databases must be executed off-chain with final results populating the childchain and Global Visibility component of the GTM sidechain. As an additional level of complication, in many instances, compliance software suggests several possible solutions and mandates human intervention to select the optimal one.

*) **IEC** – Import and Export Compliance
IC – Import Compliance
EC – Export Compliance

Duty Management (DM)

These contracts rely heavily on the Global Content maintained in an external database connected to all GTM applications. Due to huge volume of information and frequent extensive maintenance, it cannot be replicated on multiple blockchain nodes.

Duty management contracts determine and/or confirm adherence to the rules of origin, select applicable Free Trade Agreements, and calculate optimal duties and taxes that should be paid to national customs and revenue collecting authorities.

Few contracts, such as landed costs calculations to assist in global sourcing, can be executed as standalone contracts, internal to the childchain.

GTM Childchains

The modular design with pluggable components, along with consensus services, enables multiple deployment options. Different groups of peers can implement their own configurable rule sets for consensus and build their own membership services with custom security roles to handle private transactions and execute confidential contracts.

GTM can be separated into four relatively autonomous blockchains:

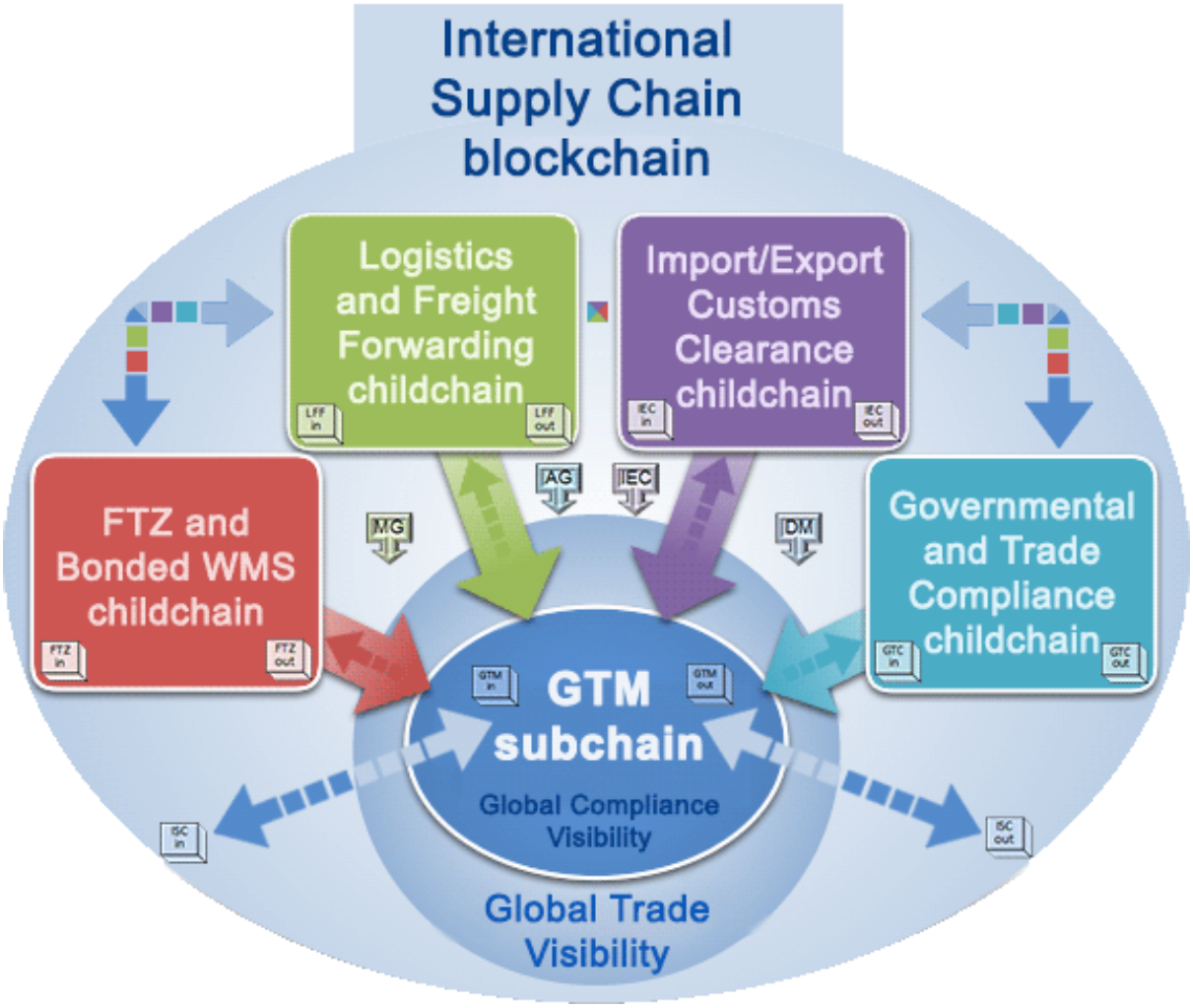
1. Logistics and Freight Forwarding Services
2. Import and Export Customs Clearance
3. Governmental and Trade Compliance

[2] E.g., supply chain participants must be screened against national and international lists of restricted / denied parties at multiple points during the shipment process, certain goods can be prohibited at certain destinations, proper documents must accompany the shipment, proper information must be reported to participating government agencies, etc.

4. Free Trade Zones and Bonded Warehouses Operations.

All these blockchains exchange information between themselves and maintain hierarchical child-parent relations with the main GTM blockchain. Splitting GTM into smaller units will necessitate more coordination and increase maintenance costs without apparent additional benefits. Also, every blockchain must have one or more two-way communication pegs that can further strain resources of adjacent blockchains.

Each childchain is sufficiently self-contained. It is responsible for its own distinct operations, maintains its own audit trails, and retains milestones that are combined into its own Track and Trace (T&T). Requested T&T entries of each childchain are then proliferated into the Global Trade and Compliance Visibility (GTCV) part of the GTM blockchain.



Each GTM childchain is comprised of two parts:

a) The conventional permissioned blockchain, with multiple nodes and information distributed among corresponding databases; and
b) Off-chain GTM module(s) responsible for calculations and verification of compliance functions with results disseminated into the designated blockchain(s). The off-chain GTM modules contain the centralized global compliance content.

This hierarchy eliminates any redundancy of information, the necessity to repeat calculations on the multiple nodes of a blockchain, and allows the GYM system to maintain computer code and global

content - such as Harmonized Tariffs Schedules (HS/HTS), Free Trade Agreements (FTA), or Restricted/Denied Parties Lists (RPL/DPL) - in a single location.

Logistics and Freight Forwarding Childchain

A complete freight forwarding blockchain specializes in arranging storage and shipping of merchandise on behalf of its shippers or consignees. It usually includes tracking inland transportation, preparation of shipping and export documents, warehousing, booking cargo space, negotiating freight charges, freight consolidation, cargo insurance, and filing of insurance claims. Export freight forwarders usually ship under their own bills of lading or air waybills (called a house bill of lading or house air waybill) and their agents at the destination (import freight forwarders) provide document delivery, deconsolidation, and freight collection service. Most logistics functions require manual interventions executed off-chain.

For GTM purposes, only smart contracts responsible for import and export compliance are mandatory. Such smart contracts as inland freight, consolidations, and de-consolidations can be sourced from other specialized blockchains.

Most functions in the compliance category can only be fulfilled by using official content and through communications (*in italic*) with governmental and trade entities. A partial list of smart contracts:

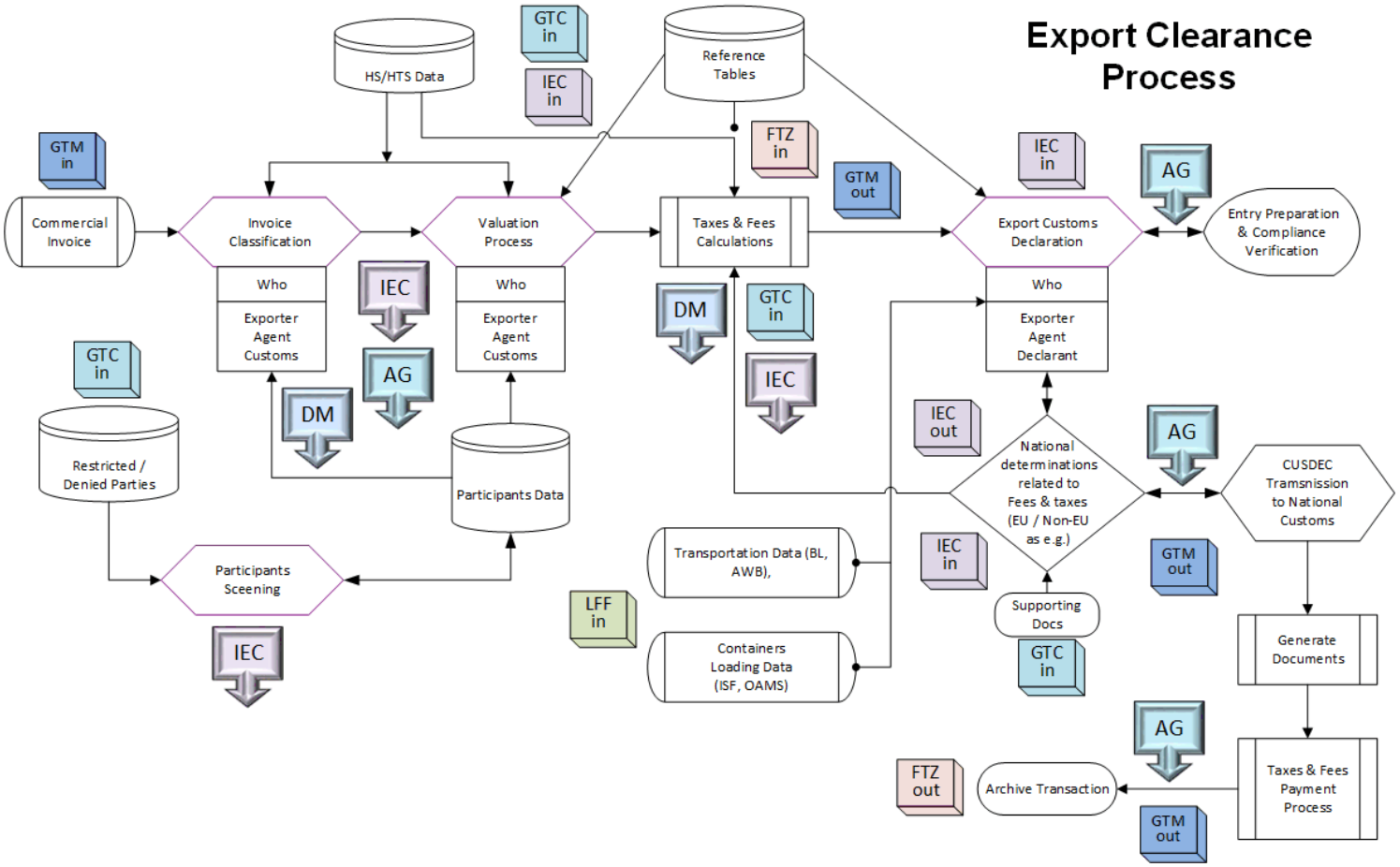
- *Importer Security Filing (ISF) and Additional Carrier Requirements ("10+2").*
- *Ocean Export Manifest electronic reporting.*
- *Processing of electronic air manifests.*
- *In bond shipments reporting and organization with bonded carriers.*
- *The Automated Export System to electronically declare international exports.*
- *Bookings with cargo carriers and* Non-Vessel Operating Common Carrier *(NVOCC).*
- A Known Shipper verification and application.
- Screening against national and international lists of restricted / denied parties.
- Security assessments and surveys management.
- Consolidation of goods.
- De-consolidation of goods.
- Export classification of goods on the national Harmonized Schedule level.
- Export valuation of goods.
- Calculation of multi-leg landed costs.
- Export Control Classification Number (ECCN) determination.
- Required export and import licenses and permits.
- Required export and import documents.
- Storage and retrieval of compliance documents.
- Logistics data mining and reporting.

Import and Export Customs Clearance Childchain

The customs clearance is the documented permission to pass granted by a national customs authority. It allows for import goods to enter the country or for exported goods to leave the country. The process includes the preparation and submission of documentation and information required to facilitate export or import of cargo, customs examination, assessment, payment of duty, and deliverance of cargo from customs after clearance, along with documentation.

The clearance function always involve time-consuming calculations and sophisticated verifications with heavy demand on databases, and obligatory manual interventions. This mandates the execution of these functions off-chain with result posted in the clearance childchain.

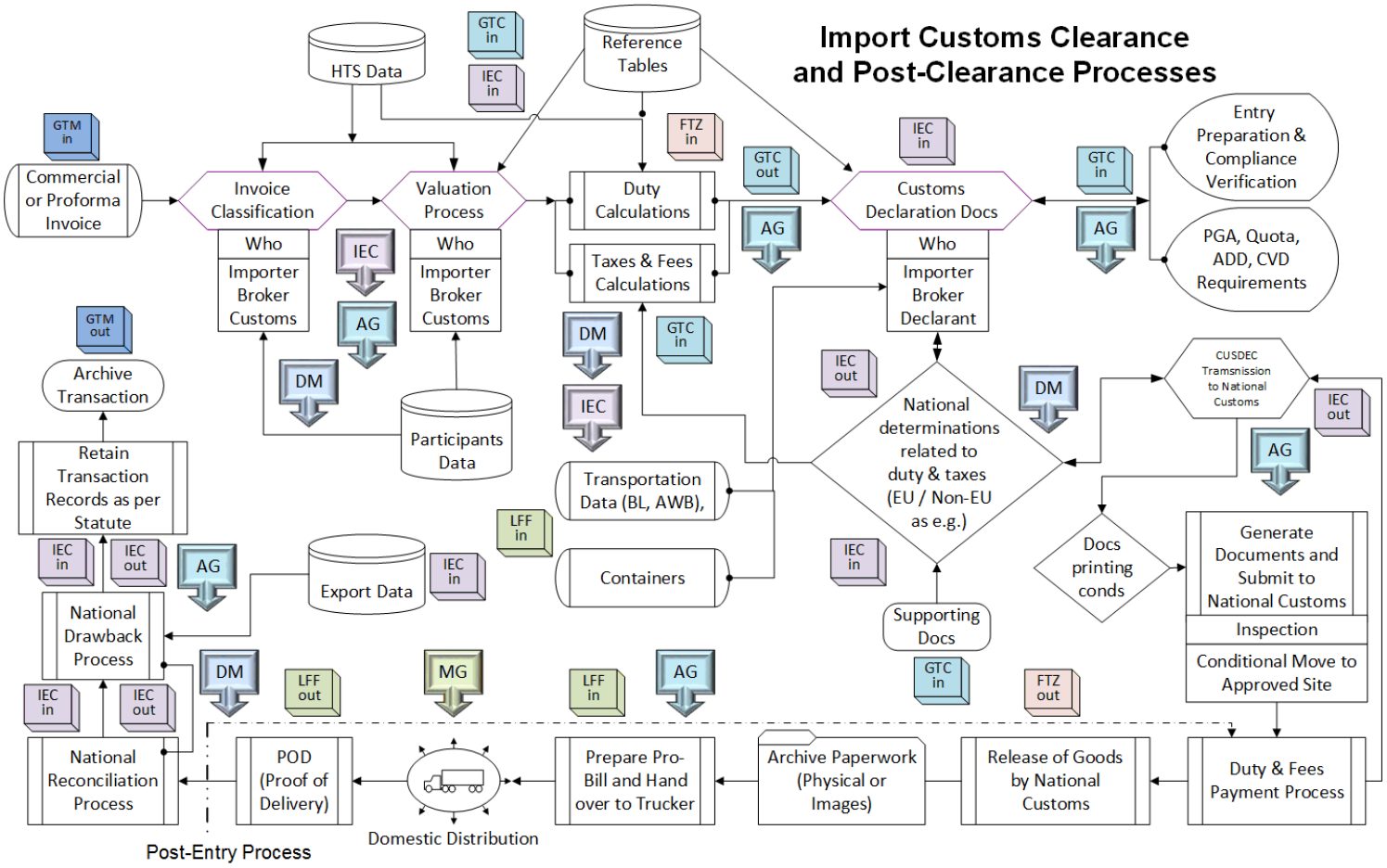
All of the clearance contracts in the blockchain belong to GTM and are mandatory, with the exception of smart contracts responsible for local deliveries of cleared cargo that can be sourced from other specialized blockchains.



Most functions in the compliance category can only be fulfilled by using official content and through communications (*in italics*) with Customs and other Governmental Authorities. A partial list of smart contracts:

- *Importer Security Filing (ISF) and Additional Carrier Requirements ("10+2").*
- *Ocean Export Manifest electronic reporting.*
- *Processing of electronic air manifests.*
- *In bond shipments of goods by bonded carriers.*
- *The Automated Export System to electronically declare international exports.*
- Security assessments and surveys management.
- Determination of the most favorable duty treatments.
- Determination and verification of country of origin.
- Import classification of goods on the national Harmonized Schedule level.
- Import valuation of goods.
- Calculation of landed cost.
- Required import licenses and permits.
- Required import documents.

- *Filing import declarations to Customs and participating Governmental agencies using a National electronic system.*
- *Duty drawback calculations and reporting.*
- *Reconciliation calculations and reporting.*
- Calculation of additional taxes and duties, such as antidumping (ADD) and countervailing (CVD) duties.
- Verification of quotas.
- Storage and retrieval of compliance documents.
- Clearance data mining and reporting.



Governmental and Trade Compliance Childchain

Every GTM childchain contains results generated by smart contracts executed on the clearance childchain. All of compliance contracts in the blockchain belong to GTM.

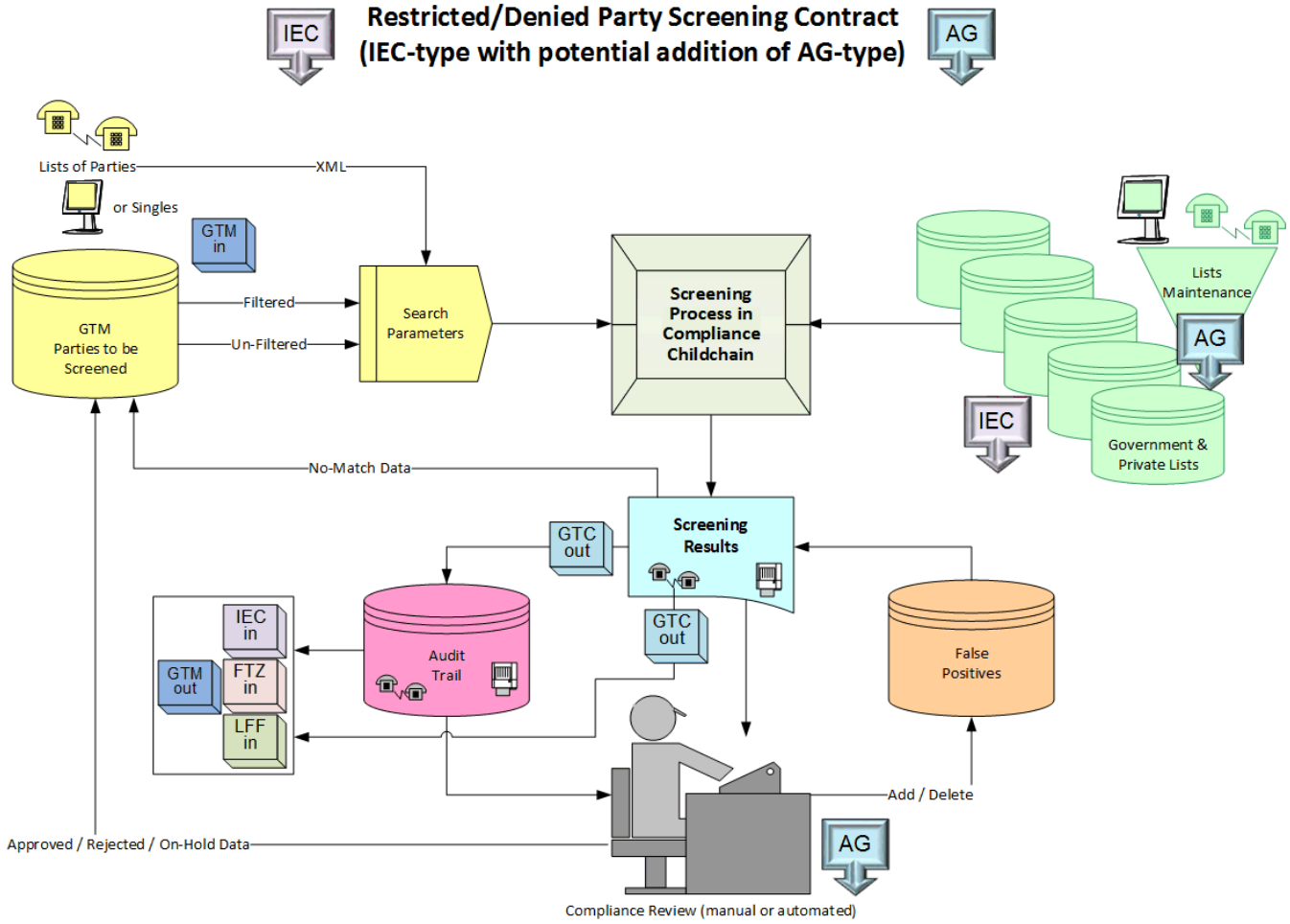
This blockchain is powered by global content sourced from national governmental agencies and trade-related entities. Information is changed daily and availability of historical data is essential. The same information can be stored in multiple languages and displayed in a native cultural format, e.g., dates and numbers. The volume of global content cannot be replicated on blockchain nodes.

The frequency of modifications, additions, and deletions of national rules and regulations requires as frequent modifications to the computer code. Errors in updated programs can have severe negative

impact on all GTM blockchains. Off-chain execution of compliance functions in these smart contracts eliminates volume- and maintenance-related problems in the blockchains.

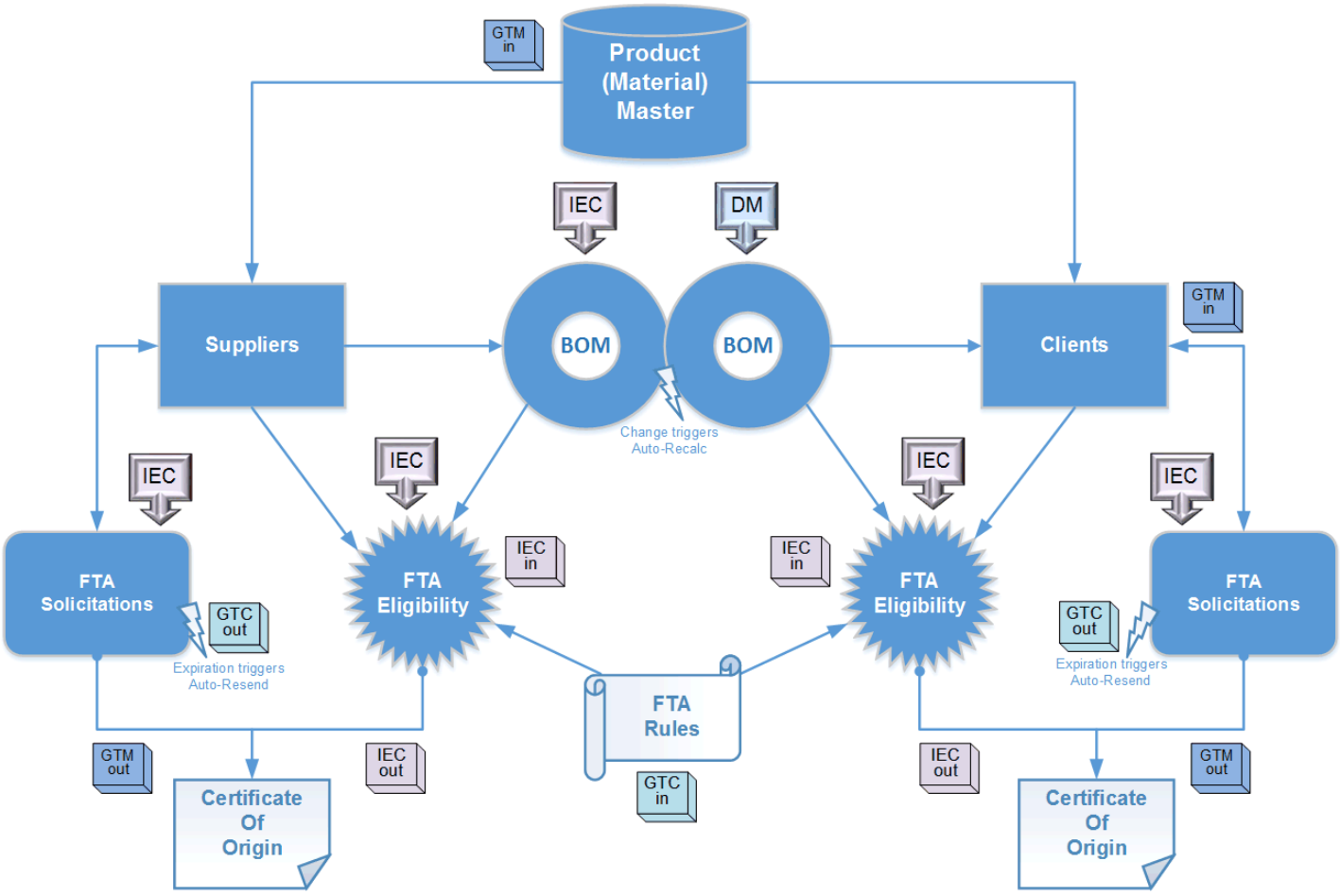
A partial list of smart contracts:

- Screening against national and international lists of restricted / denied parties.
- Security assessments and surveys management.
- Determination of the most favorable duty treatments.
- Determination and verification of country of origin.



- Export classification of goods on the national Harmonized Schedule level.
- Import classification of goods on the national Harmonized Schedule level.
- Calculation of landed cost.
- Export valuation of goods.
- Import valuation of goods.
- Calculation of multi-leg landed costs.
- Export Control Classification Number (ECCN) determination.
- Required export licenses and permits.
- Required import licenses and permits.
- Required export documents.
- Required import documents.
- Calculation of additional taxes and duties, such as antidumping (ADD) and countervailing (CVD) duties.

- Verification of quotas.
- Storage and retrieval of compliance documents.



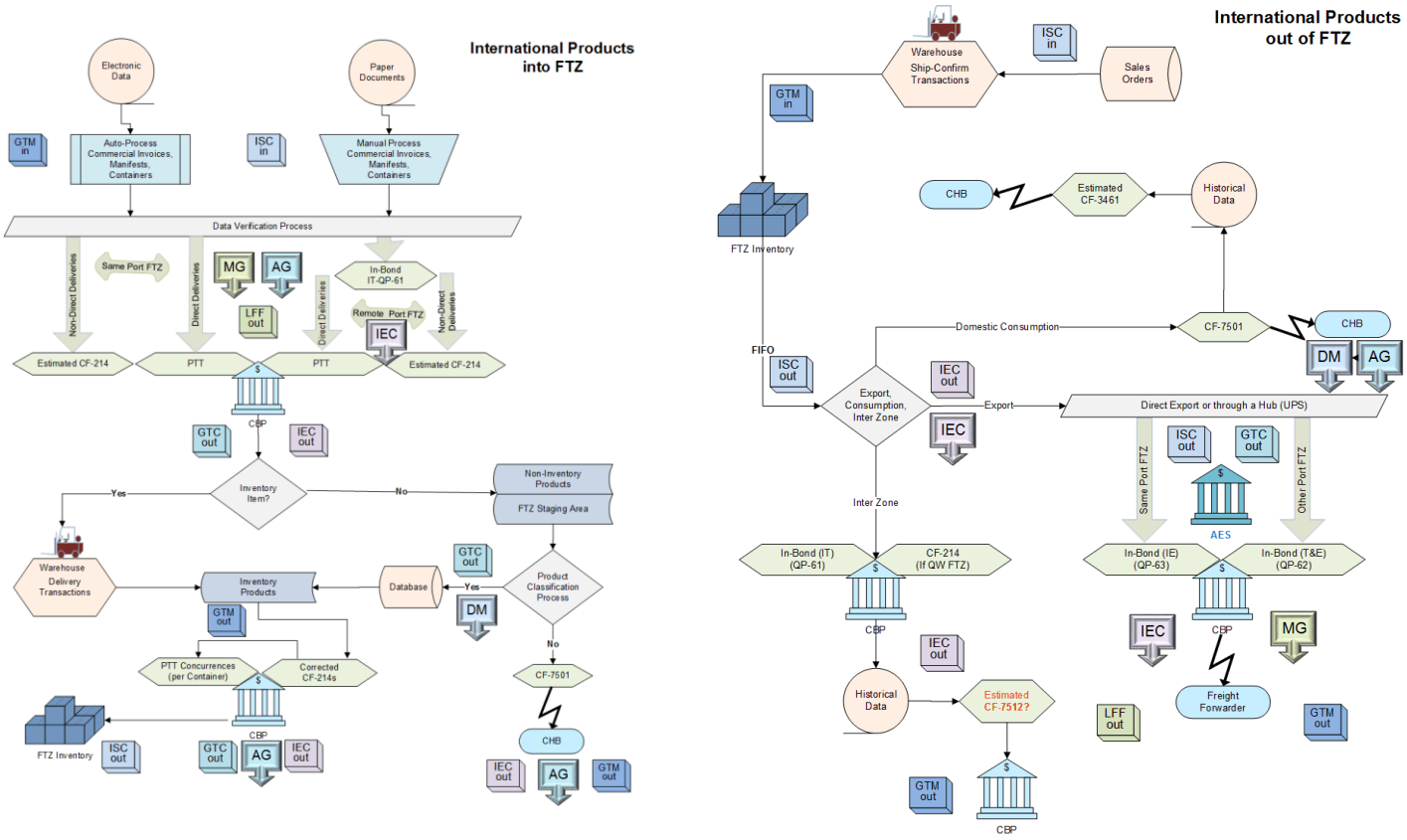
FTA Management Cycle

FTZ and Bonded WMS Childchain

A Foreign/Free-Trade Zone (FTZ) is a specific class of special economic zone. It is a geographic area where goods may be landed, stored, handled, manufactured, or reconfigured, and re-exported under specific customs regulation and generally not subject to customs duty. A bonded warehouse is a secured area in which dutiable goods may be stored, manipulated, or undergo manufacturing operations without payment of duty. Goods can be withdrawn for consumption domestically after payment of duty.

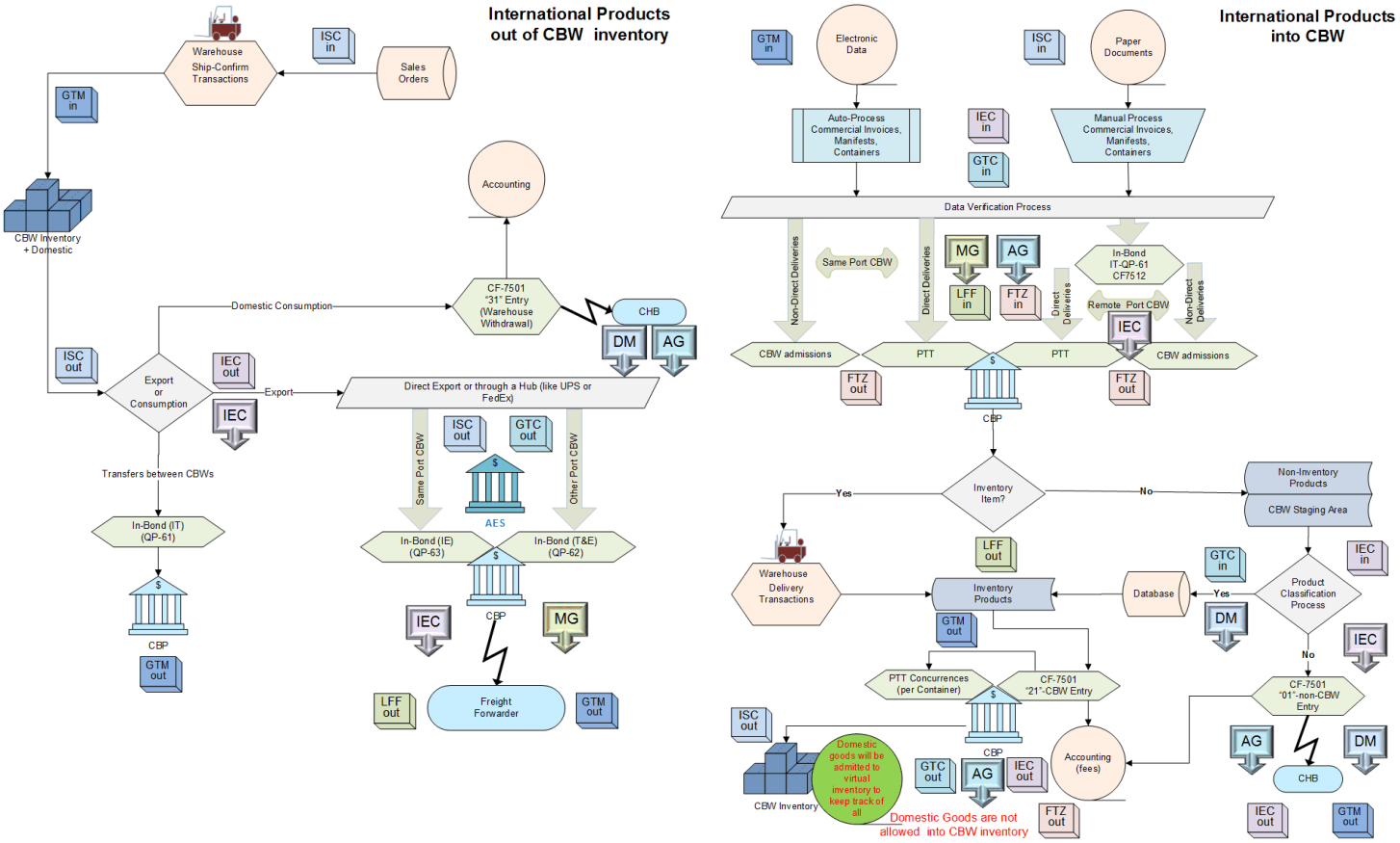
The FTZ process requires import and export customs clearance functionality to move goods out of the warehouses. FTZ contracts do involve time-consuming calculations but each FTZ childchain is isolated, the number of nodes on the blockchain is limited, and nodes can be restricted by a blockchain consensus to specific blocks of transactions. Execution of FTZ functions does not necessitate computerized off-chain operations. A larger FTZ childchain will still benefit from running a centralized off-chain database.

All of FTZ contracts in the blockchain belong to GTM and are mandatory, with the exception of smart contracts responsible for local deliveries of cleared cargo that can be sourced from other specialized blockchains.



Most functions in the compliance category can only be fulfilled by using official content and through communications (*in italic*) with Customs and other Governmental Authorities. A partial list of smart contracts:

- *In bond transfers of goods by bonded carriers.*
- Inter- zone transfers.
- *Permit To Transfer (PTT) requests to authorize within port movements of cargo.*
- Determination of the most favorable duty treatments.
- Determination and verification of country of origin.
- Import classification of goods on the national Harmonized Schedule level.
- Import valuation of goods.
- Required import licenses and permits.
- Required import documents.
- Manipulation and manufacturing permits (CF216 in US).
- Warehouse lots management.
- *Electronic warehouse admissions (CF214 in US).*
- *Filing import declarations to Customs and participating Governmental agencies using a National electronic system.*
- *Duty drawback calculations and reporting.*
- *Reconciliation calculations and reporting.*
- Calculation of additional taxes and duties, such as antidumping (ADD) and countervailing (CVD) duties.
- Verification of quotas.
- Storage and retrieval of compliance documents.
- FTZ data mining and reporting.



GTM Blockchain Flexibility

There are four major GTM participants - compliance specialists, freight forwarders, customhouse brokers, and FTZ operators. Being ultimately responsible for all compliance decisions, many exporters and importers exercise full control of GTM-related functions in-house, effectively acting as one or more of major participants.

The solution makes possible to configure a hierarchical structure of a standalone GTM blockchain to specific needs of any GTM participants who drives the process. Any combination of GTM childchains is possible. As an example:

- Compliance Specialists – may host only a *Governmental and Trade Compliance* childchain and outsource all other childchains.
- Freight Forwarders – may host only a *Logistics and Freight Forwarding* and a *Governmental and Trade Compliance* childchains.
- Customhouse Brokers – must host both an *Import and Export Customs Clearance* and a *Governmental and Trade Compliance* childchains.
- FTZ operators - must host three childchains: a *FTZ and Bonded WMS*, an *Import and Export Customs Clearance*, and a *Governmental and Trade Compliance* childchains.

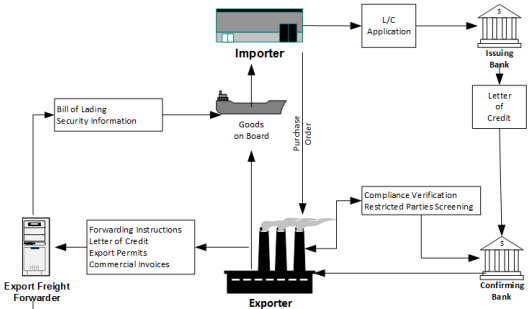
Execution of GTM smart contracts is not affected, only nodes requesting services shall vary, and federated consortiums and federated consensuses may differ.

GTM Childchain Interactions

Inter-communications between childchains allows for inter-sourcing of smart contracts and sharing results with the parent blockchain. It is integral to the GTM sidechain. Charts of GTM processes show how each procedure depends on data derived from multiple data sources.

Sharing smart contracts and data among the blockchains can be utilized using standard facilities provided by blockchain vendors and by using specifically developed web-services, and most blockchain vendors already have built in currency exchanges.

EXPORT PROCESS



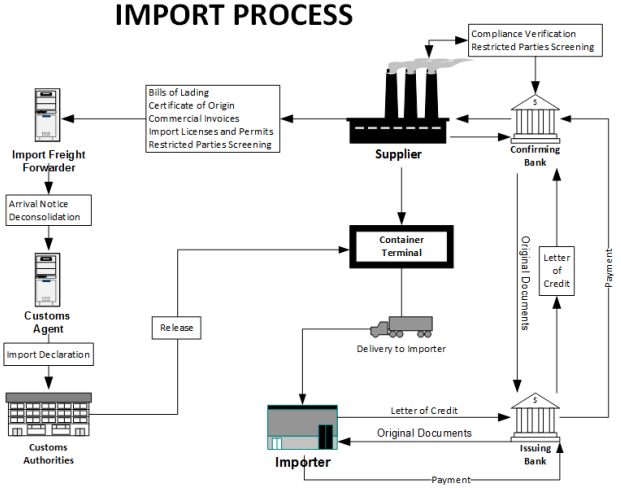
Certificates of Origin
Commercial Invoices
Export Licenses and Permits
Packing List
Export Declaration
Payment Terms
Transportation Modes
Packaging of Products

GTM Contracts	Childchain	Type
Country of Origin Determination	Compliance	DM
Screening of Restricted Parties	Compliance	EC
C-TPATs, AEOs, PIPs, BASC, ...	Compliance	EC
Prohibited Export Countries	Compliance	EC
Export Restrictions and Licenses	Compliance	EC
Import Restrictions and Permits	Compliance	IC
Favorable Trade Agreements	Compliance	DM
Landed Cost Calculations	Logistics	DM,MG
Labeling Requirements	Compliance	IEC
List of Required Documents	Compliance	IEC
Electronic Customs Reporting	Customs	AG
Reports to Other Government Agencies	Customs	AG
In-Bond Deliveries	Customs	MG,AG
Freight Bookings	Logistics	AG
Global Compliance Visibility	GTM	All
Classification of Goods	Customs	AG,EC
Valuation of Goods	Customs	AG,IEC
Quotas	Compliance	AG,IC

Blockchain Interactions

1. The importer arranges for a letter of credit (L/C) to be delivered to the exporter. The Compliance childchain executes compliance related contracts to determine which clauses should be included in the Letter of Credit for the performance confirmation. The importer may also execute a Landed Cost calculation verification.
2. The exporter sends a forwarding instruction accompanied by necessary documents and export and import permits, as determined by the Compliance childchain, to the export freight forwarder.
3. The freight forwarder completes the documents required to move and customs clear the goods and ensures their customs clearance for export purposes either manually or electronically over the Customs childchain.
5. The goods are then consolidated, containerized, delivered to the selected port, loaded on the nominated vessel for onward transportation to the foreign destination using the Logistics childchain.

IMPORT PROCESS



Blockchain Interactions

1. The exporter sends all documents to agents and the importer.
2.. The import freight forwarder deconsolidates the shipment and issues the arrival notice to the Customs agent and/or to the importer, using the Logistics childchain.
3. The importer completes the customs declaration and obtains clearance for import from the national customs authorities and pays all imposed fees, duties, and taxes. Alternatively, the importer may use the services of a clearing agent (customhouse broker) to undertake these tasks on his behalf. Either party uses the Customs childchain.
4. The L/C terms of delivery and payments must be checked before the issuing bank effects payment. The Compliance childchain executes compliance related contracts to confirm the performance.
5. Using the Logistics childchain, the importer or his clearing agent presents transportation documents to the shipping line together with instructions regarding the delivery of the goods. The goods are then delivered to the importer.

GTM Contracts	Childchain	Type
Country of Origin Determination	Compliance	DM
Screening of Restricted Parties	Compliance	IC
C-TPATs, AEOs, PIPs, BASC, ...	Compliance	IC
ISF Filings	Customs	AG
Import Restrictions and Permits	Compliance	IC
Favorable Trade Agreements	Compliance	DM
Ocean AMS Filings	Customs	AG
Labeling Requirements	Compliance	IC
List of Required Documents	Compliance	IC
Electronic Customs Reporting	Customs	AG
Reports to Other Government Agencies	Customs	AG
In-Bond Movements of Goods	Customs	MG,AG
Global Compliance Visibility	GTM	All
Classification of Goods	Customs	AG,IC
Valuation of Goods	Customs	AG,IC
Quotas	Compliance	AG,IC

A single hierarchical GTM blockchain can service any number of supply chains as each request is localized in the dedicated childchain and consumes resources limited to a specific function.

The immutable ledger ensures that records can't be duplicated, manipulated or faked. The supply chain's increased compliance visibility promotes an unprecedented level of trust. Data extracted from compliance activity would be cryptographically recorded in blockchain ledgers run by a consortium of companies limited to only those that depend on GTM information.

The system also provides the option to utilize unique and all-inclusive products definitions as the additional efficient link between any of the various system components and objects within the individual components. This feature alone saves considerable financial resources and time during order processing and cross-border movements.

The described approach allows for complex distributed GTM blockchain systems. Using blockchain technology driven by GTM applications, a GTM blockchain can reveal previously hidden information and

enable users to make informed, automated decisions related to import and export compliance as it affects all areas of international supply chains, including sourcing, deliveries, and financials. Blockchain's ability to attach digital tokens (digital assets) to GTM smart contracts gives businesses greater flexibility and extended financial security in finding markets and pricing risks. It creates more efficient dynamic demand chains instead of rigid supply chains with pre-defined participants and fixed long-term contracts.

Symbols

Blockchain blocks:

Childchain blocks: OUT -> from the Childchain to the Sidechain or another Childchain,
IN <- from the Sidechain or another Childchain to the Childchain.
Sidechain blocks: OUT -> from the Childchain to the Sidechain,
IN <- from the Sidechain to the Childchain.
Mainchain blocks: OUT -> from the Childchain to the Sidechain to the Mainchain,
IN <- from the Mainchain to the Sidechain to the Childchain.

Governmental and Trade Compliance Childchain Block

Import and Export Customs Clearance Childchain Block

Logistics and Freight Forwarding Childchain Block

FTZ and Bonded WMS Childchain Block

Global Trade Management Sidechain Block

International Supply Chain Mainchain Block

GTM Smart Contracts:

Movement of Goods

Agent Services

Import and Export Compliance

Duty Management

Glossary

ACE	The Automated Commercial Environment (ACE) is the system through which the trade community reports imports and exports and the US government determines admissibility
Advice	Shipping advice
AES	The Automated Export System (AES) is the system used by exporters to electronically declare their international exports, known as Electronic Export Information (EEI).
AMS	The Automated Manifest System (AMS) is used for the processing of electronic air manifests
AWB	AirWay Bill (air) is issued by air carrier of goods on receipt of goods after completion of export customs formalities of the country
BL	Bill of Lading (ocean)
BOM	Bill Of Materials
Booking	The act of requesting space and equipment aboard a vessel for cargo which is to be transported
C/I	Commercial Invoice
CBP	Customs and Border Protection
CBW	Customs Bonded Warehouse
CF214	Form 214 - Application for Foreign-Trade Zone Admission and/or Status Designation
CF216	Form 216 - Application for Foreign-Trade Zone Activity Permit
CF3461	Form 3461 - Entry/Immediate Delivery for ACE
CF501–	US Customs declaration form. CBP relies upon Form 7501 "Entry Summary" to determine relevant information regarding the imported commodity
CHB	Customhouse Broker, Customs broker, Customs agent
D/O	Delivery Order
EFF	Export Freight Forwarder, Agent
FTA	Free Trade Agreement
FTZ	Foreign / Free Trade Zone
GCV	Global Compliance Visibility
GTCV	Global Trade and Compliance Visibility
GTM	Global Trade Management
GTV	Global Trade Visibility
HLS	HomeLand Security
House	House **airway bill** (HAWB) issued by a freight forwarder on receipt of goods from shipper agreeing to deliver goods at destination
HS, HTS	Harmonised Schedule, Harmonized Schedule Tariff
IFF	Import Freight Forwarder, Agent
In bond shipment	Refers to import or export shipment which has not been cleared by customs and is transported, stored, or handled with security to the government provided by indemnity bonds.
ISC	International Supply Chain
ISF and "10+2"	Importer Security Filing (ISF) and Additional Carrier Requirements ("10+2") apply to import cargo arriving to the United States by vessel.

Known Shipper	A Known Shipper verification: an entity wishing to tender their own goods for air transportation on a passenger air carrier that has gone through an approval process mandated by the TSA
L/C	Letter of Credit
Master	Master airway bill (MAWB) issued by main carrier of goods on receipt of goods from a freight forwarder to deliver at destination as per agreed terms
OAMS	Ocean Export Manifest is the only method of transmitting required advance manifest information for ocean cargo to US Customs (CBP)
P/O	Purchase Order
POD	Proof Of Delivery
PTT	Permit To Transfer - request to authorize within port movements of cargo
QP	ACE enables the submission of electronic in-bond requests, known as QP
Security assessments	Customs–Trade Partnership Against Terrorism (C-TPAT), Authorised Economic Operator (AEO), Partners in Protection (PIP), Business Anti-Smuggling Coalition (BASC), New Scheme of Certified Companies (NEEC), Secure Trade Partnership (STP), Golden List Program, etc.
WMS	Warehouse management system
Chain-Relay	https://alttex.io/TechPaper_En.pdf
2WP	https://www.rsk.co/blog/sidechains-drivechains-and-rsk-2-way-peg-design