



Tallyx White Paper

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Introduction

As observed by Don and Alex Tapscott, “The technological genie has been unleashed from the bottle to transform the economic power grid and the old order of human affairs.” The universal quest for efficiency has led us to examine how Blockchain affords buyers and sellers a sense of security and trust in doing business and removal of unnecessary costs forced upon the ecosystem. Another key goal is to remove the dependency on a central custodian (clearing house or intermediary) to monitor and affirm the transactions.

Smart Contracts play a key role in any Peer-to-Peer decentralized market, especially where there is an old established order that relies heavily on intermediaries and manual intervention. Global Trade (*refer to Appendix “Brief Introduction of Global Trade” for more details*) is certainly one such domain that fits the bill for: the number of stakeholders & intermediaries; the complexity of interaction; being heavily paper based.

Building decentralized apps are more complicated than building centralized apps as they enforce the need for community participation with decentralized governance. These applications have varying degrees of security, unique configuration and require steep learning curves while implementing broadly similar functionality. Legacy centralized applications impose unnecessary costs on the network, and the walled garden approach does not provide buyers and sellers the discovery and liquidity they require that a network effect could provide them.

Most of the work surrounding the management of business obligations are done manually today, but with the introduction of blockchain smart contracts, it is a natural progression to encapsulate this manual work into a protocol, powered by artificial intelligence and advanced analytics. We believe that a well defined protocol will accelerate the development of various value creation services by the network operators, and is therefore a key factor to enable ecosystems to quickly reach critical mass without getting into the nuts and bolts of core blockchain technology and leveraging domain abstractions built by industry experts.

The Trade Obligation Protocol (TOP) is an open protocol for businesses to manage seller’s fulfillment obligations against buyer’s payment obligations while also facilitating settlements and adding liquidity to the market. TOP brings business obligations standards and well thought decentralized infrastructures to enables easy adoption to facilitate progress to reach critical mass for any TOP supported ecosystem such as Trade Finance, Insurance and Syndicated Lending.

The intent of this white paper is to:

- Provide a brief introduction on market dynamics and the growing trend of decentralization
- Clarify key obstacles that handicap the market today
- Explore opportunities unlocked by game-changing technologies such as blockchain and AI
- Take a deep dive into TOP to demonstrate how we leverage those new technologies
- Describe the Tallyx Ecosystem and our value proposition within it

- Describe the three decentralized apps that we will build including Open Financial Supply Chain, Smart Asset Marketplace and Client On-Boarding; Delve deeper into some key functionality such as dynamic risk assessment and dynamic credit scoring
- Outline our Tokenomics model and distribution scheme

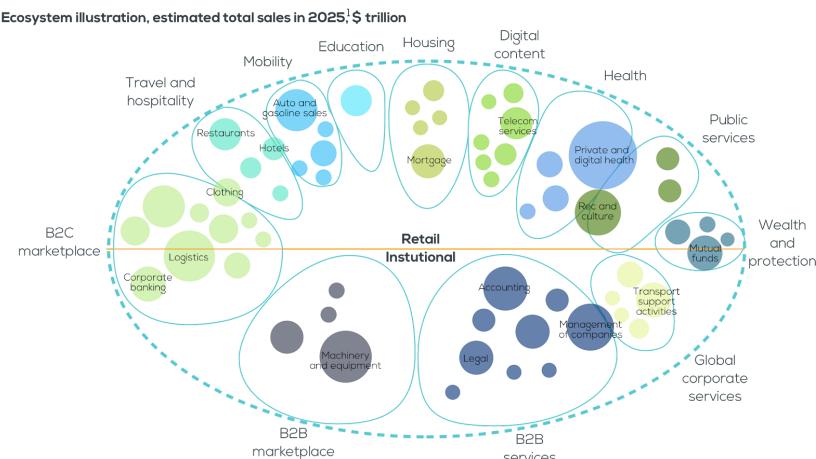
Market Dynamics

Addressable market for Global Trade: it is growing from \$17.2Tn for goods and \$5.25Tn for services in 2017 to **\$23.6Tn for goods and \$7.65Tn for services** by 2025.¹

Revenue: Open account financing revenues of \$29Bn in 2018² represent a growing volume of overall trade finance of \$53Bn and will continue to grow to 62% of global trade finance revenues by 2025. Supply Chain Finance (SCF) remains the fastest growing and the unmet demand is widespread, thereby creating a void for our promising solution to serve.³

Cost: According to BCG there is an opportunity to substantially reduce the cost base for global trade from \$12bn-\$16bn to \$8-\$13bn through digitization, wherein blockchain plays a key role.

Huge growing opportunity for distribution finance: As industries digitize across every sector - from metals, mining, agriculture to financial services, media and telecom, McKinsey estimates that one-third of the world's economy amounting to \$60Tn in trading volume will shift from EDI and traditional distribution to B2B, B2C, and online marketplaces⁴. This will result in new financing needs for sellers and distributors through an open financing marketplace with no barriers to entry.



¹ Circle sizes show approximate revenue pool sizes. Additional ecosystems are expected to emerge in addition to those depicted; not all industries or subcategories are shown.
Source: IHS World Industry Service; Panorama by McKinsey; McKinsey analysis

The growth of new digital revenue pools will require the industry to rethink how trade is financed

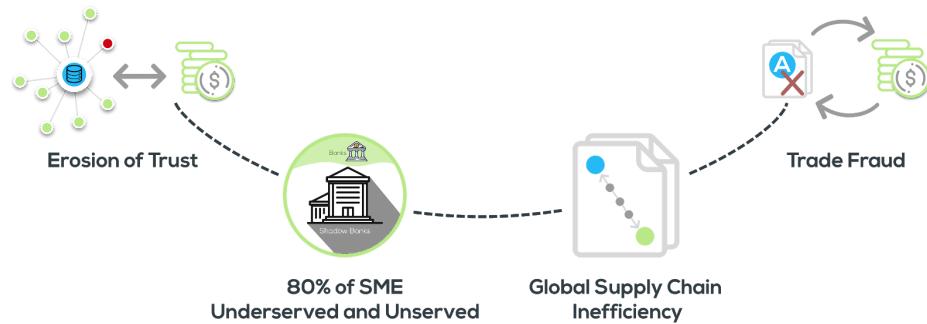
¹ ICC: Rethinking Trade Finance: July 2017; HSBC *Global Trade Finance WebCast* 2017

² Oliver Wyman: Supply Chain Finance: Riding the Waves: 2017

³ BCG Digital Trade Finance Model, 2016

⁴ McKinsey : Competing in a world of sectors without borders 2017

Old World Problems



Erosion of Trust

As our digital footprint expands due to increased use of online services, we start to lose control over who collects our data, who owns it and who is accountable for it. In the legacy world, moving data creates vulnerability, but in a decentralized self-sovereign world, data remains where it's owned, effectively eliminating single points of attack that plagued centralized systems.

Will Little of Hackernoon says: "*We've entered a world where "trust" is moving toward distributed networks of machines that no one person, group, corporation, or government owns. These networks have rock-solid data integrity, zero downtime, and financial incentives for anyone who participates.*"⁵

80% of SME Underserved and Unserved

Supply Chain Finance (SCF) is the fastest growing segment in the trade business. The biggest working capital hurdle for suppliers is lack of access to financing, which is controlled by the funders of SCF programs. Estimates show that the time and cost of this effort are justified only for 1-5% of an anchor buyer's suppliers which leaving the supply chain unoptimized and financially strained.

Global Supply Chain Inefficiency

According to the World Economic Forum's report, reducing international supply chain barriers could potentially increase GDP by almost 5% and total trade volume by 15%, essentially boosting up to three trillion USD into the global economy. A prevailing inefficiency is the industry's antiquated paper-based way of facilitating trade which persists even today. There is a current opportunity to boost working capital by \$1.4Tn through efficiency gains⁶.

Trade Fraud

In 2014, Citigroup's subsidiary in Mexico, Banamex, paid out around 400 million USD in loans to an oil services company backed by fraudulent invoices⁷. In the same year, Standard Chartered Bank suffered

⁵ Will Little: <https://hackernoon.com/a-primer-on-blockchains-protocols-and-token-sales-9ebe117b5759>

⁶ According to PWC working capital report 2017

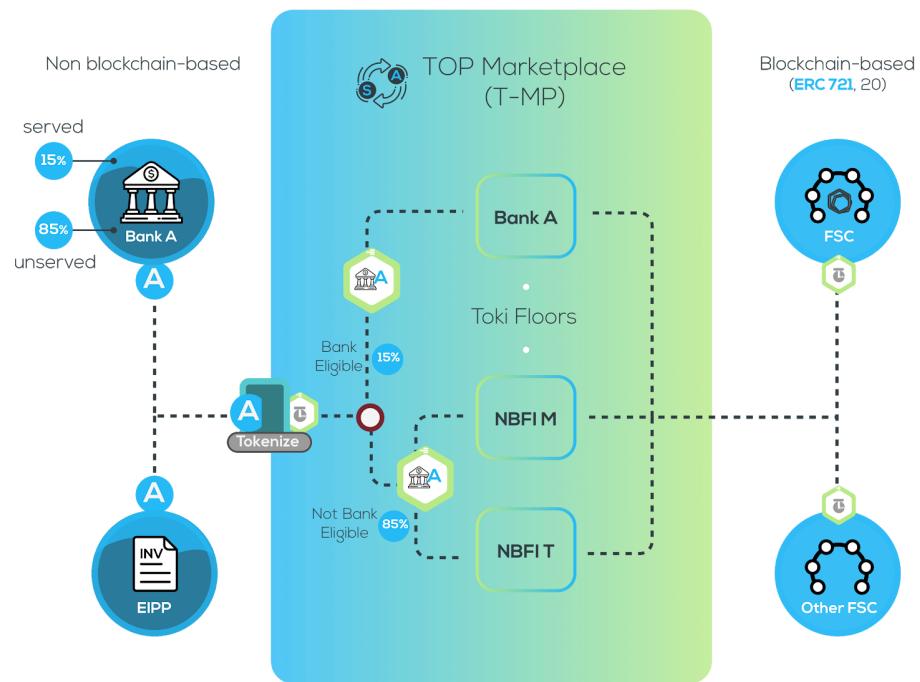
⁷ <https://www.wsj.com/articles/citigroup-hit-by-mexico-fraud-cuts-previous-results-1393595543>

losses close to \$200 million USD when a commodities trading company in China used duplicate warehouse receipts at Qingdao Port to pledge metal as collateral for loans⁸. Agricultural Bank of China (AgBank), third largest bank in China, used paper-based commercial drafts, in 2015. Two bank employees swapped out those commercial drafts located in a vault with newspapers and after trading them, they ended up losing an equivalent of \$578 million USD in funds during a stock market downturn⁹. Even as recent as 2018, Punjab National Bank is investigating up to \$1.8 billion USD fraud backed by letters of undertakings used to retrieve loans from overseas banks¹⁰.

New World Opportunities

Network of Networks

TOP Marketplace(T-MP) is the first digital trade assets marketplace with the goal to unlock working capital for global trade. More importantly, we position T-MP as **network of networks** that will interconnect multiple walled gardens. Not only does it enable those current non-DLT trade platforms to leverage T-MP as their digital trade marketplace with minimum investment, but it also allows them to route non-eligible trade assets to Tallyx so these trade assets can be filtered, reclassified, repackaged and rerouted through different funding channels (trading rooms). It creates a **win-win-win-win** situation for **Tallyx, 3rd party trade platforms, their anchor clients and associated trading partners**.



⁸ <https://www.bloomberg.com/news/articles/2016-05-22/fraud-in-4-trillion-trade-finance-turns-banks-to-digital-ledger>

⁹ <https://www.ft.com/content/182c1b4a-c0bd-11e5-a8c6-deebe63d6d4b>

¹⁰ <https://economictimes.indiatimes.com/industry/banking/finance/banking/everything-you-need-to-know-about-the-pnb-scam/newslist/62929480.cms>

One Portal, Many SCF Options

Tallyx TOP ecosystem provides one stop services for corporates' **working capital needs** as well as **collaboration with their trading partners**. As an anchor client, there is a need to work with multiple funding sources (bank, non-bank financial institution, buyer, securitization) via a single portal. This is especially important to their trading partners since the trading partners work with multiple buyers and are overwhelmed with having to deal with multiple portals.

Global Lien Registry

In order to address the "double spend" issue for financing institutes around the world, TOP Marketplace(T-MP) acts as an open **global lien registry** which provides registration and inquiry of any underlying trade assets being financed. For trade assets originated from 3rd parties, T-MP maintains only limited information plus a hashed number representing the underlying trade asset.

Branded

Toki is an asset-backed token (ERC 721) which can be **branded/customized** for anchor clients so their tokens can be better recognized and accepted in the marketplace and, furthermore, be used to integrate with their trading partners (**Token + Smart Contract is the New Integration**).

Public and Decentralized Governance

Heretofore there have not been any successful public blockchain initiatives to provide a framework for buyers and sellers who are the real stakeholders to own their own evolutionary destiny, where they have the means to shift to a new global trading model that is trustless, transparent and community owned and governed, while preserving the need for businesses to protect competitive data.

Decentralization and Geopolitics

With 7 of the top 10 most valuable companies being globally dominant platform companies, we are at a point of peak centralization and believe that the pendulum can swing toward decentralization. The consequences of centralization are socio-economic, political and also offer a central point of attack for cybercrime. Un-checked use of centralized platforms has led to anti-establishment movements that have rocked the world from the US election tampering to Brexit and many others. Decentralization offers perhaps the best economic alternative and *release-valve* to address these social/political issues arising from the winner take all economic model that centralization represents.

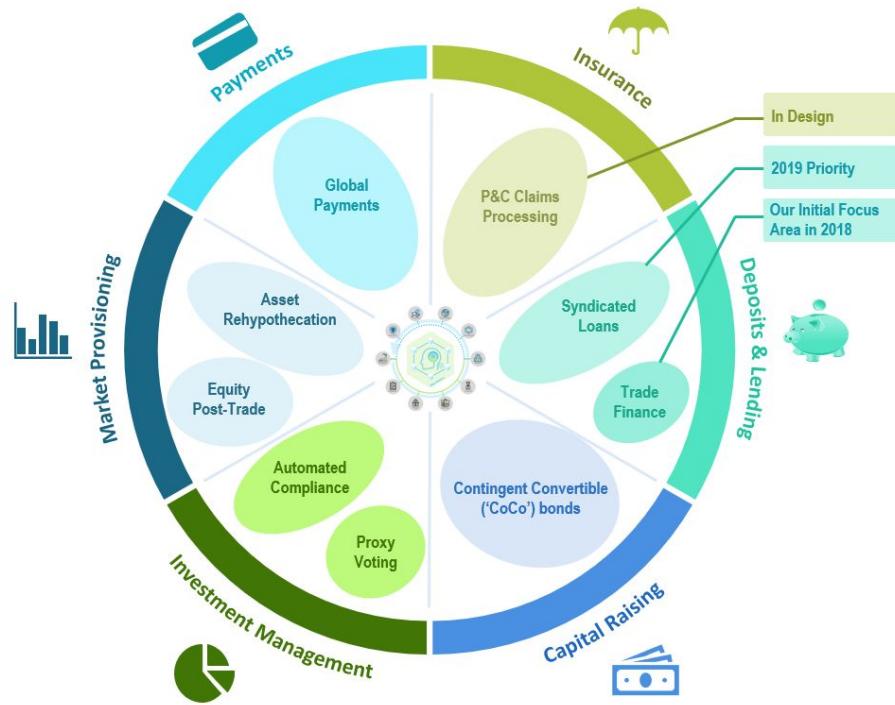
Flatten the Cost

We have a unique opportunity to shift trade transactions to a cost plus basis in a decentralized ecosystem, to enable far more competitive pricing for supply chain and distribution finance. The new price structure will be based on the actual gas costs of the various decentralized ecosystem stakeholders, which could result in a cost deduction between \$8-\$12Bn for the industry¹¹.

¹¹ BCG Analysis

Trade Obligation Protocol (TOP)

One Protocol, Many opportunities

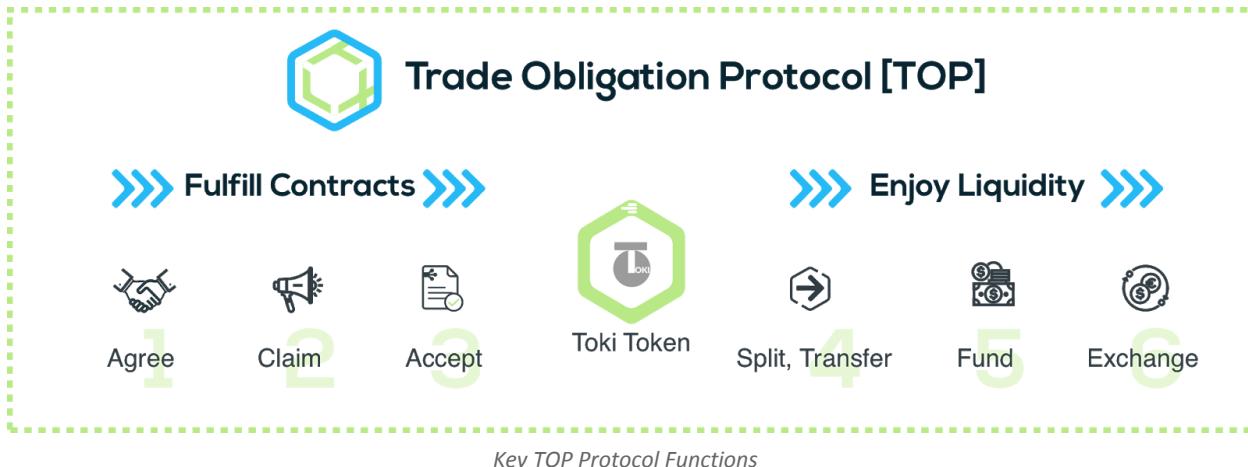


Source: World Economic Forum - 2016 : The future of financial services : An ambitious look at how block-chain can reshape financial services

We see common building blocks that bring buyers, sellers and the financial community together based on the ability to establish contractual terms, make a claim, establish an obligation and settle that claim. Perhaps there are broader applications as identified by the World Economic Forum¹² in Capital Raising, Investment Management, Payments & Market Provisioning which are being pursued by a variety of industry initiatives, however few other than payments are being built on public, permission-less and trust-less blockchain infrastructure in a truly decentralized approach. We believe that focusing and solving on the decentralization of Trade will lead us to practical insights in a community based approach towards building common infrastructure that may be applied to other domains - this is the essence of our protocol. Please see the appendix for key use-cases.

¹² WEF : Future of Financial Services 2016

Overview of TOP

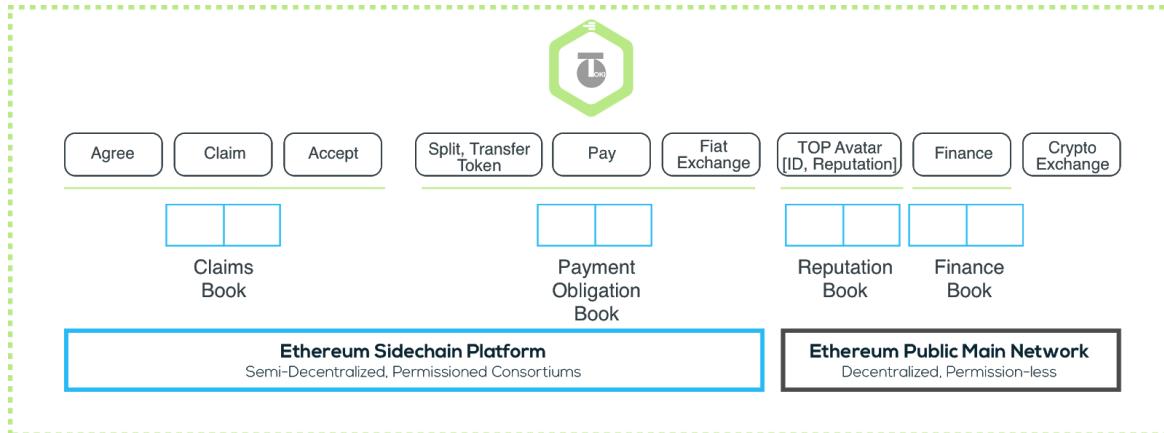


Protocol : The Trade Obligation Protocol (TOP) will provide the foundation to perform contract fulfillment, tokenizing the payment obligation and liquidating the payments obligation arising out of it. The Payment Obligation Token (Toki) will be an asset-backed token (ERC-721¹³) representing the buyer's or the consumer's commitment to pay on a future date or immediately after the goods or the services has been accepted as agreed. Key functions include:

- **Agree** - The buyer and seller (or the service provider and consumer) negotiate on the criteria and/or conditions to be met by the seller (or the service consumer) to form an order. This agreement between the two parties is recorded in this 'Agree' event of the protocol
- **Claim** - The seller (or the service provider) prepares the good or services and makes a delivery to the buyer (or the consumer), claims parts or all of the agreement criteria that have been met with the delivery. This claim from the seller (or service provider) is recorded in this event of the protocol
- **Accept** - The seller's claim is then matched against the agreement (recorded as part of the 'agree' event in the protocol) and any discrepancies are addressed between the two parties outside of the protocol. Once the buyer (or the consumer) agrees that the conditions have been met by the claim, this 'accept' event is recorded as part of the protocol
- **Payment Obligation Token (Toki)** - An ERC721 token is created for every 'Accept' event recorded in the protocol backed by the asset behind the token.
- **Split, Transfer Token** - A Toki can optionally be split to multiple parts and each part assigned to a different owner or the whole token can be transferred to a different owner. Such splits and transfers on the token are record in the registry behind the token. This payment is recorded in this protocol event which refers back the token and the asset behind the token which is getting funded.
- **Exchange** - The payment for the asset behind the token could be a fiat currency or crypto based currency.

¹³ "The Anatomy of ERC721 – BlockChannel – Medium." 23 Dec. 2017, <https://medium.com/blockchannel/the-anatomy-of-erc721-2576e40bfc5b>.

TOP - Smart Contract Modules



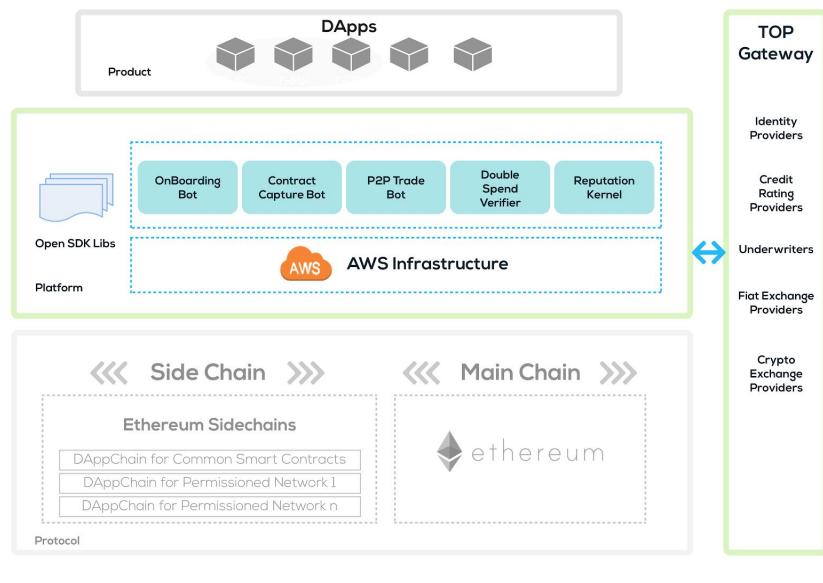
Smart Contract Modules and Deployment

The protocol contains the various smart contracts for the functionality described in the previous section and as depicted in the above diagram. The 'Pay' smart contract is used when there is a payment on the obligation token, whether it is an immediate payment after acceptance or a deferred payment on maturity. The 'Finance' smart contract is used to record a financing transaction that has occurred on the payment obligation. This smart contract will also offer functionality to verify if an asset has already been financed to avoid double spend.

There would be multiple books maintained at the protocol level:

- **Claims Book** - this book maintains all the agreements, one or more claims on these agreements and the acceptance of those claims. The dApps developed on this protocol would be able to use the Claims book to build the provenance of the acceptance, claims to their originating agreements. The data stored on the Claims book will be scoped and entities with the appropriate permissions will have access to it.
- **Payment Obligation Book** - this book maintains the accepted payment obligations, payments made against these obligations and the current outstanding values of the asset behind the Toki
- **Reputation Book** - this book maintains reputation score of the parties participating in the transaction and the network partners. The score is dynamically and aggregated by the protocol based on various criteria like the credit scores, compliance risk, operational risk and performance within the ecosystem
- **Finance Book** - this book will maintain the finance transactions that are created against an asset. This financing transaction could be against the actual Toki or just a registry referring to an external entity like a financial institution. A tool will be provided at the platform level to create an entry into the finance book without uploading any business or sensitive data and also to query if an asset has been financed (*double spend verifier*).

The Platform Layer



The Platform Layer

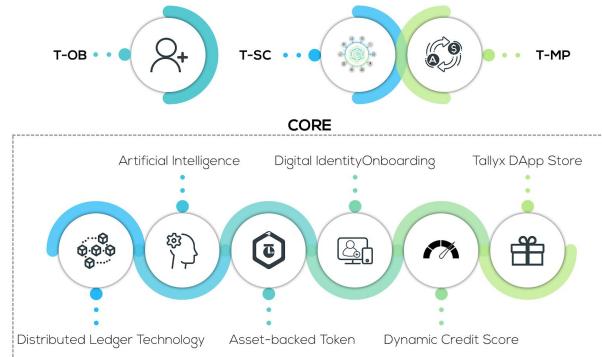
The platform layer contains two aspects - firstly, we have open SDK libraries for client dApps or mobile apps to invoke and integrate with TOP protocol. Platform also contains Artificial Intelligence based services and tools hosted on AWS to help with dApp product development, which includes the below capabilities

- **Onboarding Bot** - Support for integrated OnBoarding for Businesses with KYC, KYCC and AML, email Ids and devices phone numbers etc. This will also include auto verification mechanisms from pre-existing private networks if needed and skip certain on-boarding steps.
- **Contract Capture Bot** - Smart contract designer capability to help with various parties to define conditions and terms, flow of events, rules configuration and finally consensus with multi-signatures for agreements.
- **P2P Trade Bot** - Peer-to-peer messaging support for TOP protocol based trading - agree, claim, accept etc. - with use guiding around alerts, notifications, tracking, enforcement, dispute management etc.
- **Reputation Kernel** - AI based scoring of performance and contribution by parties, network partners and businesses in the TOP ecosystem.
- **Double Spend Verifier Service** - Another key offering of the TOP protocol is the capability to track financing on the assets in the finance book. Finance book is a registry of obligations funded or financed and is maintained on the public shared ledger - Ethereum mainnet. As such this registry is not just limited to the finance transactions arising within the TOP ecosystem but can also host finance transactions that are created outside of the TOP ecosystem and therefore be used to solve double spend fraud through our verifier service.
- **Branded Toki** - Toki can be branded/customized for anchor clients so their tokens can be better recognized and accepted in the marketplace and, furthermore, be used to facilitate integration with their trading partners

TOP Ecosystem - Solution Overview

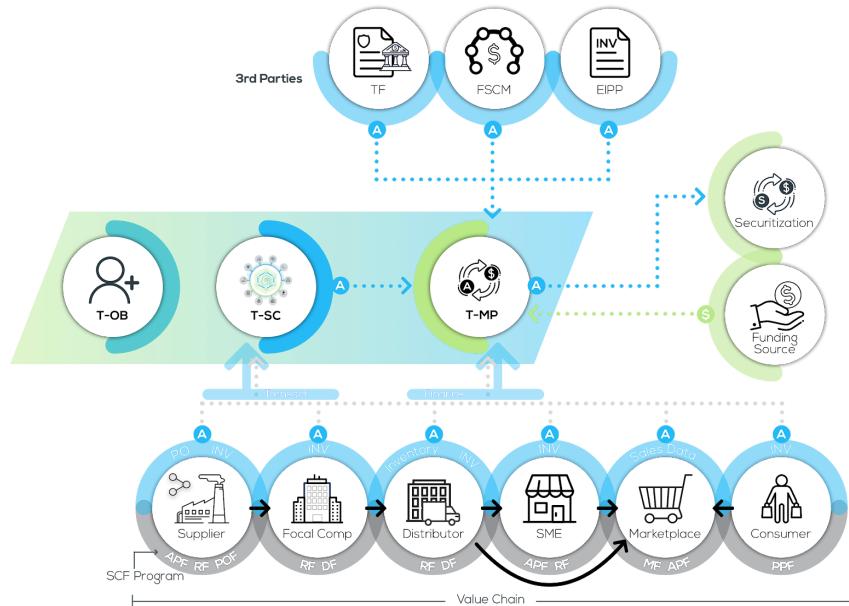
Solution Overview

Our goal is to simplify global trade transactions for every buyer, seller, distributor, and financier, by creating a level playing field and delivering value through a global trade platform. To accelerate the world's transition to frictionless, trustless and decentralized global trade environment, we bootstrap TOP ecosystem with 3 DApps - TOP OnBoarding (T-OB), TOP Supply Chain (T-SC) and TOP Marketplace (T-MP).



T-OB will manage the enrollment and services subscription of ecosystem participants. T-SC enables buyers and sellers to better manage their trade processes end-to-end (from procurement to payment) while providing them with many opportunities to automatically raise working capital and interoperability among various SCF programs. T-MP is an open **working capital marketplace** for the trading of **tokenized trade assets**. It matches/relays trade assets to right investment/financing groups (bank and nonbank financial institutions).

The success of T-MP relies heavily on the quality of the Trade Assets listed. Trade assets from T-SC provide the 2 distinct advantages with full transparency on the underlying assets and its dynamic risk assessment. It leads the new standard of tokenized assets when listing in a digital marketplace.

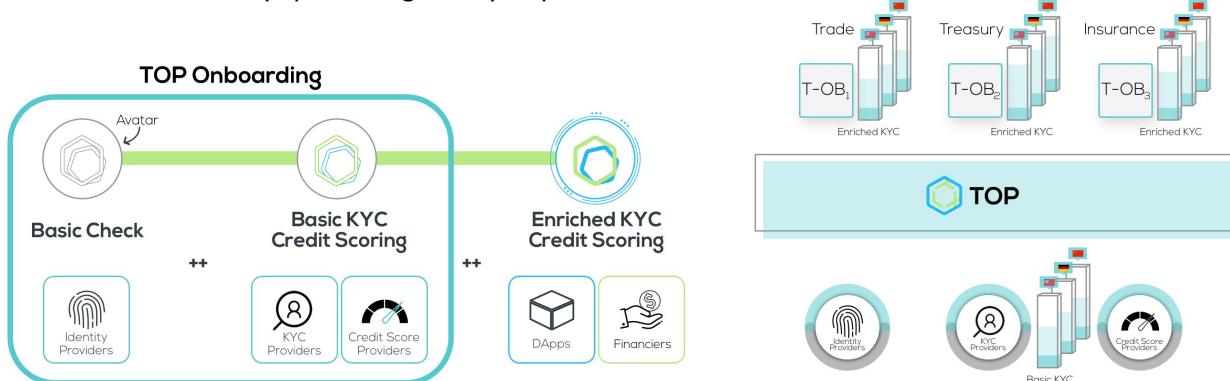


TOP OnBoarding (T-OB)

Traditional methods of on-boarding are typically legacy, paper-based and manual, resulting in on-boarding delays, error-prone and poor customer experience. Backed by the ‘Compliance First’ design philosophy, Tallyx platform enables streamlined on-boarding with embedded compliance screening that covers both breadth (bulk on-boarding options) and depth (calibrate screening strength as needed).

Tallyx provides a layered approach to client onboarding on a need-basis, by collecting and validating as much information as necessary based on the desired activity.

During Tallyx Client On-boarding, clients can first establish their identity through Tallyx accredited 3rd party identity verifiers and KYC platforms and then use this identity for Tallyx on-boarding. After this primary KYC screening (Basic KYC) by TOP, industry domain-aware dApps can further work with identity/KYC platforms for enhanced screening (Enriched KYC) as mandated by the respective industry verticals and country specific regulatory requirements.



In a nutshell, Tallyx T-OB is a win-win offering for financiers, buyers, suppliers and network partners:

- On average, client on-boarding by Financiers takes 26 days and costs US\$6000 per customer (*source: Reuters and Fenergo*). With Tallyx T-OB offering, Financiers can accelerate their customer onboarding process, leveraging the pre-screen step already completed by the ecosystem.
- Tallyx’s innovative T-OB approach will significantly boost the participation percentage in SCF program, accelerating the path for buyers to reach their program goals.
- For suppliers, registering their identity and KYC information with an external service provider enables it to be a single point of identity source for all future on-boarding requirements from any financier.
- The ecosystem can also **bootstrap** (push identity and KYC information to) **back office** systems (SCF, Treasury etc.) of financiers and anchor clients.
- Mass on-boarding with compliance screening to allow bulk on-boarding
- Incentivized approach to refer and onboard wider supplier base by providing incentives for buyers and suppliers for new introductions and volume generated from new leads.

- Community and Alliance program is a campaign driven strategy to invite communities in different market segments (example: Communities of steel exporters, semiconductor exporters etc.) to participate in the platform.

Dynamic Credit Score

To address the issue of inclusive finance, we need an alternative credit scoring model that expands the scope of credit assessment and an evaluation technique that leverages new technologies such as big data analytics, AI machine learning, etc. The traditional credit scoring model uses too few data points to determine creditworthiness, which is limiting.

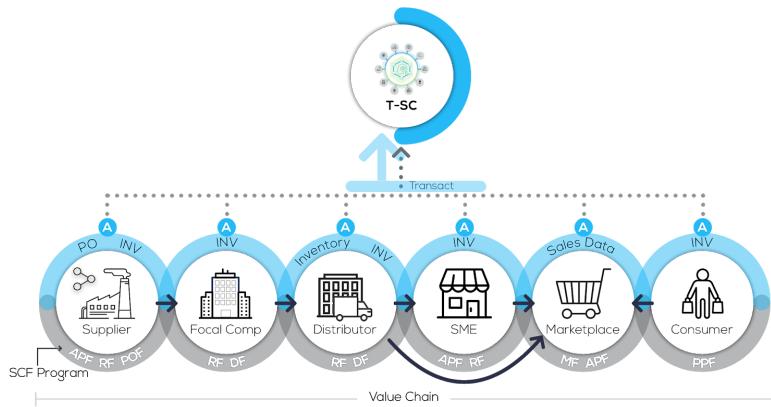
For the past decade, a huge volume of transactions and social data have accumulated to help us make informed credit decisions about millions of unserved and underserved SMEs around the world. The key to making sense of all that data is big data analytics plus machine learning.

Therefore it is critical to ensure that a machine learning underwriting engine is adopted in our platform that is featured with an “**explanatory model**” - being able to identify key model elements, highlight potential modeling errors and provide complete transparency of inner workings.

We can also enable platform service providers with the option to **defer the underwriting process** until their first transaction.

TOP Supply Chain (T-SC)

TOP Supply Chain (T-SC) platform provides supplier and buyer program setup, transaction and document life-cycle services delivered through both omni-channel services as well as open API. It handles the lifecycle of a variety of trade-related applications that require TOP protocol services to create a tokenize trade obligation.



Procure To Pay (P2P)

T-SC enables corporates to manage their business processes end-to-end, from procurement to payment. Furthermore, it provides the complete transaction life cycle management including IoT integration, visibility and control of processes.

Key highlights:

- Digitization of trade documents using OCR and Machine Learning
- Taxonomy templates
- Extract terms and conditions from trade documents for smart contracting
- Support for Credit notes - buyer centric and seller centric option
- Auto accept obligation and issue digital draft
- Payment management

Supported Financial Products

When the need for financing arises, T-SC handles tokenization of the financial products. These tokenized assets are then sent to TOP Marketplace(T-MP) to seek financing by marketplace lenders.

- **Dynamic Discounting:** A method of funding where buyers can use their own liquidity to fund early payment for sellers, using a dynamic sliding rate scale. In addition to traditional methods of buyer initiated dynamic discounting offers, Tallyx will also offer innovations such as:
 - Enable suppliers to initiate discounting request with rate offers
 - Buyers to set their minimum yield threshold
 - BOT driven matching of discounting requests vs. funding offers
- **Approved Payable Financing:** A financing technique based on confirmed receivables (i.e. approved by buyers).
 - Typically offered for approved receivable from reputed buyer with highly reliable rating.
 - Receivables are assigned to the financier when financed, based on non-recourse purchase agreement.
 - Credit risk is typically allocated to buyers.
 - Support for cross-border financing
- **Receivable Financing:** A form of financing method in which suppliers sell individual or multiple receivables (represented by invoices) to a finance provider at a discount.
- **Factoring:** A financing technique that combines working capital management, credit risk protection and account receivable bookkeeping and collection services. Finance provider manages the debtor portfolio and collecting the payment of underlying receivables.
 - Factors purchase accounts from their clients without recourse.
 - It's a "true-sale" of receivables which "go-off" the client's balance sheet.
 - Factors are primarily concerned with the collectability of purchased accounts instead of client's ability to satisfy financial covenants and ratios.
- **PO Financing:** Provide financing against a Purchase Order (PO) submitted by buyers in order to support working capital needs of supplier to fulfill the order.
- **Dealer/Distributor Financing:** Provide financing to Anchor suppliers' dealers/ distributors
- **Post Payment Financing:** Financing method to the buyers to cover their payment obligations.
- **Asset Based Lending** where companies can use their trade assets as collateral for advanced payment from financial institutions.
- **Asset Based Portfolio Financing** where companies can consolidate selected trade assets to form an asset pool under arrangements with financial institutions. The SPV then finances the

acquisition by transforming (credit enhancement and create tranches) the assets as Asset Backed Securities to be sold capital markets.

- Buyers Payment Obligation/Digital Draft where BPO's support differential tenors, exchange corporate BPO for bank BPO, etc.
- **Marketplace Financing:** A financing method to fund the retail segment
- **Credit Memo:**
 - Support for Credit Memos linked to invoices and just stand-alone.
 - Applied during Payment Instruction/Invoice processing

Currently, there are many supply chain financing solutions associated with open account. Supply Chain Financing programs are also not standardized in product definition. In addition, there are different variations and implementations across regions/countries.

The team at Tallyx has deep working knowledge across various supply chain financing programs and common practices in various markets. We also have developed 3 generation of multi-tenant trade finance platforms. This, combined with new age technologies is enabling us to offer a much-awaited disruptive solution to revolutionize supply chain financing.

Dynamic Risk Assessment

It is important to track risk associated with trade assets, not just at the time of financing, but post-financing as well. A good financing system should continue to monitor and reflect risk changes associated with underlying financed assets. Transparency is always appreciated by financiers. With clarity on overall asset portfolio risk, financiers may make adjustments for investing their remaining funds. In the case of negative indicators, it can prompt early intervention and corrective action. Tallyx introduces *Dynamic Risk Assessment (DRA)*, to provide a continuous risk assessment.



DRA will perform the risk assessment based on the risk triage principles. The number one risk factor is the authenticity of the underlying asset, followed by the supplier's fulfillment capability and lastly the

buyer's on-time payment. The best way to confirm the authenticity of an asset is to receive authenticated notifications (with supporting trade documents, a few examples are shown below) from supply chain participants.

Trade Notification	Supply Chain Participant/Service Provider
Inspection certificate	Inspection agent
Certificate of origin	Chamber of Commerce/Manufacturer
Insurance certificate	Insurance company
Proforma Invoice	Supplier
Packing list	Shipper
Inspection certificate	Surveyor/Inspection company
Commercial Invoice	Supplier
Dock Receipt	Freight forwarder
Airway Bill/Bill of lading	Freight forwarder
Advanced shipping notice(ASN)	Supplier
IoT Notification(Example:Temperature data)	IoT device
Goods received notification(GRN)	Freight forwarder/Buyer
Customs clearance certificate	Customs clearance agent

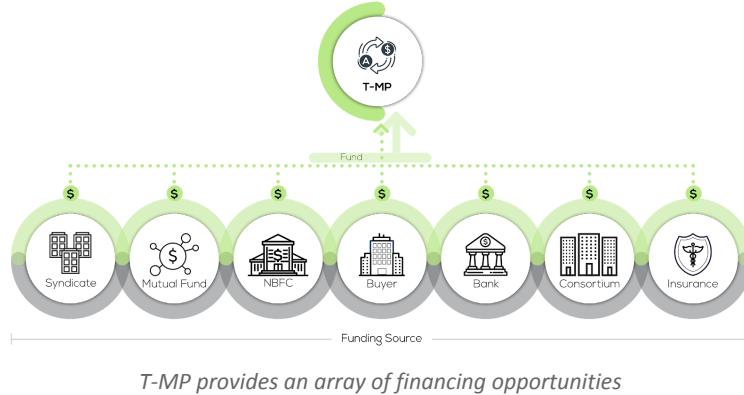
Take receivable financing for example. After the asset (token)has been financed, T-SC tracks trade notifications of each invoice. For each progressive notification received, T-SC updates the risk score of the respective invoice.

T-SC will present the aggregated risk score at the token level. It will also maintain the original risk score and use it to calculate token's Risk Variance Indicator - that is, the percentage change in risk since asset registration. The variance will be presented with a risk color for easy viewing. The various ranges associated with these colors can be easily configured by the financiers. Financiers can easily manage their tokens with colors.

TOP Marketplace (T-MP)

TOP Marketplace (T-MP) allows obligation tokens to be offered for financing, matched, financed, split, assigned and settled through services provided by the underlying TOP protocol stack. SPV's can also grab tokens and offer them through reverse securitization schemes. Other platforms such as EIPP platforms,

Bank SCF platforms, and independent supply chain platforms can also offer tokens for financing directly to T-SC through standard API interfaces.



T-MP is the working capital marketplace where we connect in real time those who need to exchange tokenized digital trade obligations for cash. From the perspective of obligation owner - “I need working capital - connect me with someone who has additional cash in exchange for my tradeable obligation to pay”.

First Global Marketplace For Smart Trade Assets

Smart contracts enable transactions and entities, making sure they are properly codified without relying on manual labour and paperwork. They should act as modular, non-opinionated building blocks that may be assembled and reconfigured. This new capability paves the way in creating **trustless hyper-efficient** markets.

Assets created from T-SC will set the bar for quality, through the transparency of the underlying data which will be recorded in the permissioned distributed ledger. This information can be easily verified through API or by scanning each tokens unique QR code using free App from Tallyx (see figure below). In addition, as seen in the diagram below is “Dynamic Risk Scoring”, an aggregation of the dynamic risk score of underlying assets. The scoring method reflects the principle of continuous risk assessment (as described above under the “Dynamic Risk Assessment” section).

Tallyx introduces the concept of a Permissioned Asset Pool which can be used to ensure a pool of assets is only accessible to certain investment/financing groups that meet certain requirements. Investors/financiers may apply one or more sets of permissions to allow financial institutions the ability to easily source and trade with peers that satisfy the compliance requirements.



The QR Code links to transaction and credit details on each Token

T-MP also supports activities within secondary and tertiary market, where assets purchased by financial institutions can be resold in the secondary market to other financial institutions.

Global Registry for Financeable Trade Assets

In order to address the “double spend” issue for financing institutes around the world, T-MP acts an open global registry which provides registration and inquiry of any underlying trade assets being financed. For trade assets originated from 3rd parties, T-MP maintains only limited information plus a hashed number representing the underlying trade asset.

Network of Networks

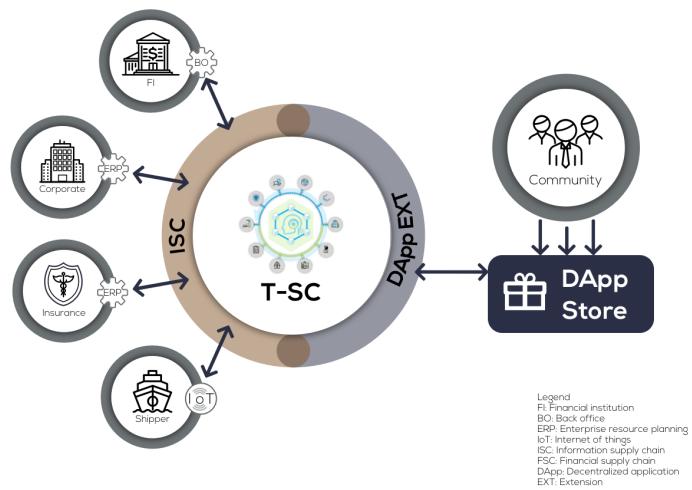
Adopting distributed ledger technology and smart contracts will have a revolutionary impact on the \$3.2Tn loan syndication industry¹⁴, bringing the following potential benefits:

1. Syndicate formation: smart contract can facilitate the formation of a syndicate based on criteria (risk appetite and investment goal) set by individual members of the syndicate.
2. Embedded regulation: smart contract provides regulators with financial details of syndicated loans in realtime to facilitate compliance monitoring.
3. Reduced settlement time in trading: loan funding is facilitated in real time by smart contract, eliminating traditional t+3 settlement and centralized lead agent operational bottleneck, which improves liquidity and drives more efficient capital allocation.
4. Simplified system integration: Reduce middle office and back office costs relating to syndicated loans¹⁵.

DApp Store and SDK Toolkits

In order to encourage community participation, Tallyx provides the dApp store and the SDK toolkit to enable community members to extend the base functionalities of the platform.

With SDK toolkit and branded token support, focal companies can easily customize specific to their industry or to their supply chain ecosystem. Service providers can develop value added services dApps, so they can easily be plugged into the base solution.



Tallyx dApp Store enables a variety of industries to build customized applications on TOP

¹⁴ Bloomberg. Global Syndicated Loans League Tables- Q1 2018

¹⁵ World Economic Forum - The future of financial infrastructure

TOPP Tokenomics

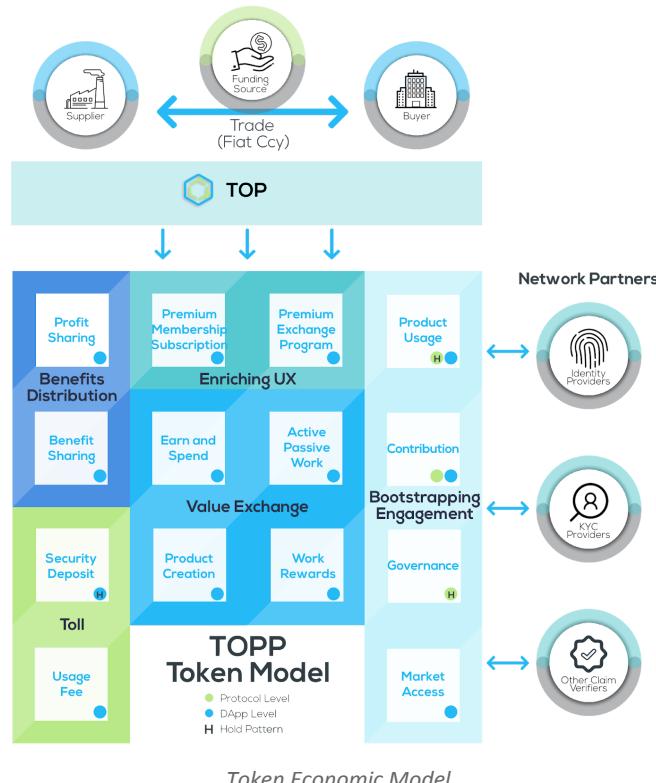
Overview

TOPP is an ERC-20 utility token that will be implemented on the Ethereum Platform, which allows seamless wallet-to-wallet exchange. In addition to buying TOPP tokens during ICO, participants will also be able to buy them through online substitution exchanges.

The core function of the token is to empower its users to interact with products, facilitate value creation and exchange, and to share rewards and benefits to all stakeholders.

TOPP token is designed to fulfill many purposes in the Tallyx Ecosystem.

1. The currency and value exchange mechanism of the Tallyx ecosystem enable friction-less transactions, and forms the basis for economy creation. Network operators can also earn value by completing active and passive (e.g., sharing data) work and can use it to spend on products and services offered in the platform, thereby contributing to the ecosystem.
2. It serves as the ‘right’ token for bootstrap engagement. Owning tokens bestows the rights for product usage, participation in governance, contribution and access to the market.
3. It can be leveraged to enrich the user experience by offering simple features such as joining the network and providing incentives for product usage etc.
4. It can be used as a mechanism for benefits distribution. Re-distribution of appreciated value with stakeholders is expected in the form of profit sharing or benefit sharing.



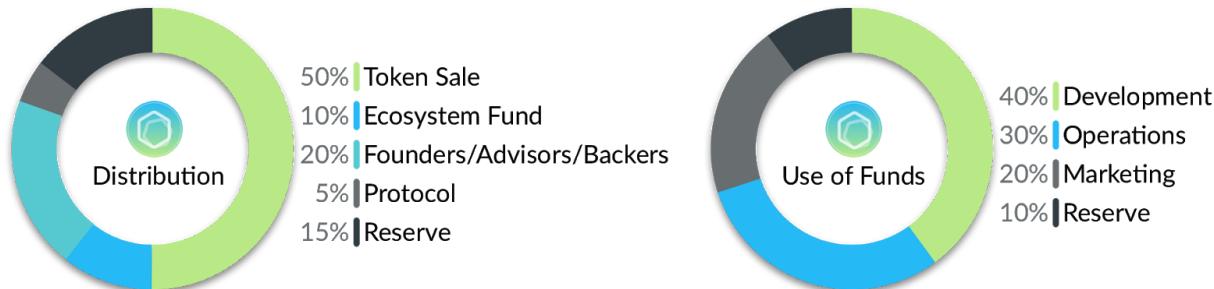
Utility Token - Purpose and Usage

TOPP acts as a utility token for both TOP protocol as well as TOP based applications. Following table summarizes the token purpose and usage:

Purpose	Application Usage for TOPP Token	Protocol Usage for TOPP Token
Bootstrapping Engagement: To enable the broader community to engage with the Tallyx ecosystem and drive token usage and/or holding		
Governance		<ul style="list-style-type: none"> - DApp & Network partners hold TOPP tokens (as stake) for fixed period - Voting weight will be proportionate to the stake owned
Product Usage	<ul style="list-style-type: none"> - Subscription fee based model for use of various supply chain financing products and services - Volume based tiered pricing structure 	Hold number of TOPP tokens for fixed period
Market Access	Right to provide financing to specific group of SMEs	
Contribution	<ul style="list-style-type: none"> - Reward community developers for bug fixing & enhancements - Bounty program 	<ul style="list-style-type: none"> - Reward community developers for bug fixing & enhancement - Bounty program
Value Exchange: To enable buying & selling of assets, rewarding contribution to Tallyx ecosystem		
Buying	<ul style="list-style-type: none"> - Purchase trade assets - Finance trade assets 	
Selling	<ul style="list-style-type: none"> - Sell trade assets - Discount trade assets 	
Earn	<ul style="list-style-type: none"> - Earn rewards from active/passive work - Create data analytics & market analysis report - Sell dApp on dApp store - Integration/customization 	
Spend	<ul style="list-style-type: none"> - DApp - Access to premium data & reports - Service fee - Integration - Paying API 	
Active Work	<ul style="list-style-type: none"> - Client onboarding - Underwriting 	

Passive Work	<ul style="list-style-type: none"> - Submission of trade documents (B/L, Certificate etc.) by 3rd party (Shipper, Freight Forwarder, Inspection Agent etc.) - Identity Validation - Business KYC/Referral - Sharing Identity Info 	
Work Rewards	<ul style="list-style-type: none"> - Rewards by community voting (no. of claps) for quality performance (e.g., low dilution rate, on-time payment, on-boarding throughput) - Additional contributions to the community for benefit of other members (e.g., sharing information, Q&A) 	
Product Creation	<ul style="list-style-type: none"> - Fees to create dApp - Fees to obtain SDK access - Branded Token for buyers, financiers 	
Toll: For collateral, deposits and usage fees such as acceptance, finance placement, exchange of value etc.		
Security Deposit	<ul style="list-style-type: none"> - Optional deposit on securing a creditline - Conditional deposit when exceeding credit limit as collateral (e.g., BPO, Loan etc.) 	
Usage Fee	Collect usage fee in TOPP tokens whenever transaction fee is charged	
Enriching User Experience: For network premium membership subscriptions, incentives of loyalty programs on the marketplace		
Joining a Network	Subscribe Tallyx Elite Membership	
Incentive for Usage	<ul style="list-style-type: none"> - Tallyx TOPXchange Program - The more you finance, the more you benefit - Sign-On Bonus (for SME) 	
Benefits Distribution: For re-distribution of rebates, discounts and benefits accrued from loyalty and usage programs		
Profit sharing	Anchor Client Rebate	
Benefit sharing	<ul style="list-style-type: none"> - Dynamic Risk Assessment: Earn risk reduction points to avail lower financing rate - Tallyx Premium Membership benefit 	

Token Distribution



Token Distribution and Use of Funds

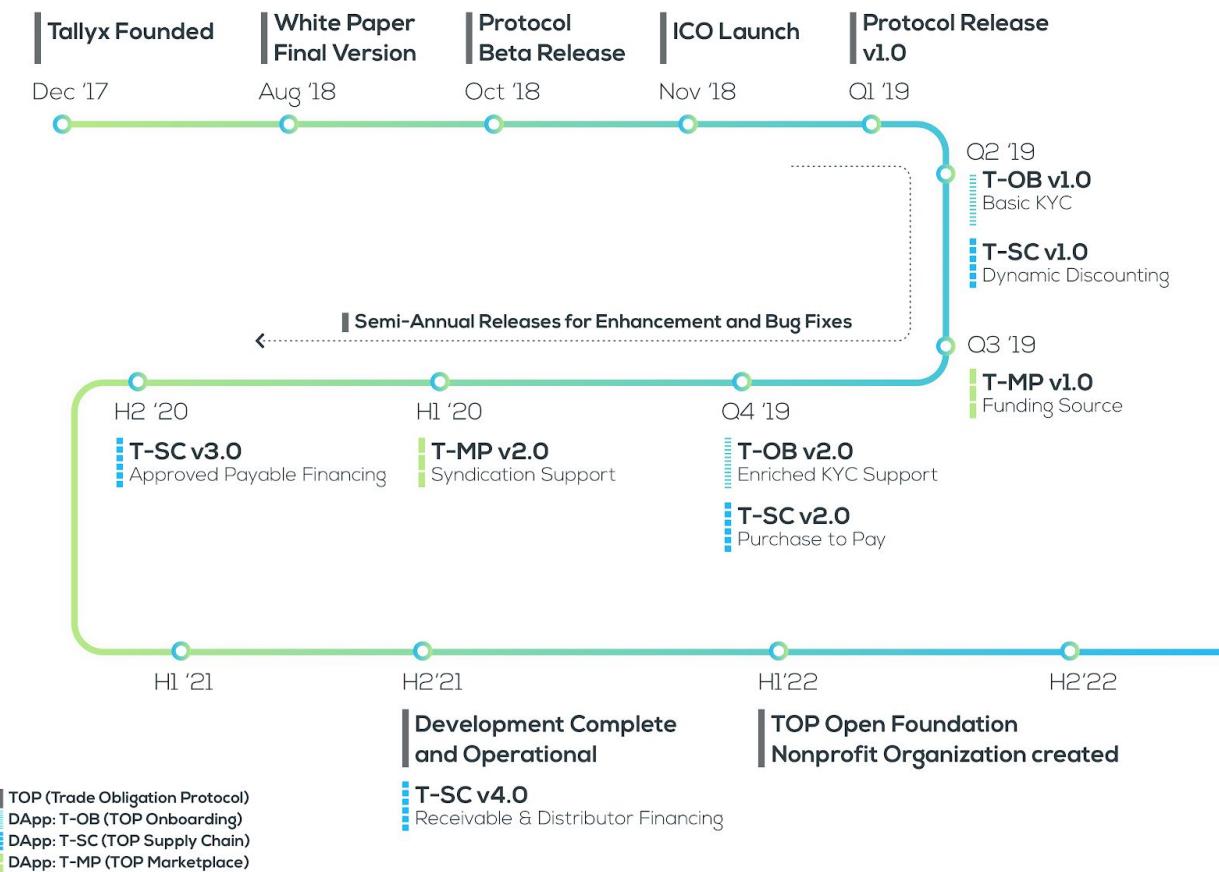
Distribution

Usage	%	Comment
Token Sale	50	TOPP is a token that is designed for the benefit of network participants and stakeholders therefore enshrines the ability for the token holders to govern and benefit from the future evolution of this ecosystem.
Ecosystem Fund	10	The Ecosystem Fund will make investments in bootstrapping the developer ecosystem with a goal of growing the TOP ecosystem. Tallyx is incentivizing our community via TOPP bounty campaign. Details of our bounty campaign will be available on our website in due course: Bounty: 2%
Founding Team, Early Backers and Advisors	20	The founding team's allocation of TOPP will vest over a four year vesting schedule with a eighteen month lockup. Early backers & advisors' allocation of TOPP will vest over 2 years with 1 year lockup.
Protocol	5	Reserved for meeting the future operating costs of the foundation including compensation for employees, operating and marketing costs as well for funding acquisitions, after spin-off TOP foundation as a non-profit organization.
Reserve	15	A portion of the issued TOPP tokens will be held by Tallyx in reserve. This reserve will enable the platform to inject liquidity as required and cater for unforeseen eventualities.

Use of Funds from Token Sale

Usage	%	Comment
Development	40	Development and Maintenance
Operations	30	Operations, Legal and Admin
Marketing	20	Business development, Standards and Marketing
Reserve	10	Reserved for future roadmap

Roadmap



Tallyx Road map - TOP and dApps

Go To Market Strategy

We will focus on **one buyer region in 2018** (from US, EU) - and add additional buyer regions in 2019 (China, Brazil, India). We will work with banks and bank consortia in 2019 to establish a ***smart asset marketplace*** by Q3 2019.

Existing trade platforms can leverage our marketplace as their digital trade marketplace with minimal integration effort by routing relevant trade assets to their managed trading floors on our platform.

Our **target sectors** are in Fuels, Mining, Telecommunications, Agricultural Products, Automotive, Manufacturing and Retail - based on their propensity to digitize and also volume of finance being received. **Marketplaces** such as Alibaba, Amazon, Baidu and JD all afford a new age opportunity in both supplier and distributor financing as they are already digital. We provide traditional **EDI networks** like IBM and Comarch the ability to leap-frog into digital token based finance and open up this sector to non-bank lenders and asset managers.

What	How	Outcomes
Track 1 Focus on the Anchor Buyer H1 2019	<p>We have a partnership with Sirion Labs with 20 major anchor buyers to cross sell our platform</p> <p>Direct meetings with identified anchor clients in each priority industry, with names identified, get help from advisors and friendlies at Citi to reach out</p> <p>AFP conference in Chicago Q4 2018 to target Corporate Treasurers</p> <p>LATAM partners focusing on key Anchor Buyers</p>	<p>One anchor buyer on-boarded along with a substantial part of their extended supply chain to provide deep tier financing and that tokenization is a tangible benefit in liquidity and efficiency</p> <p>Prove that buyers can (a) Extend DPO and (b) achieve an agreed ROI in financing their own supply chain through (i) dynamic discounting and (ii) approved payable financing</p>
Track 2 Focus on Banks H2 2019	<p>Focus on tier 2 banks and bank consortia – specifically LATAM banks and European Banks through our existing network of advisors and senior bankers</p>	<p>On board one tier 2 bank, build custom trading floors on our marketplace for assets they would finance vs assets that their correspondents or non-bank financial companies would finance</p> <p>Start the process of working with consortia – WeTrade, MarcoPolo, Project Wilson (get a seat at the table), APAC, LATAM and Caribbean Banks through our Advisors</p>

What	How	Outcomes
Track 3 Protocol Focus on Trade Finance Ecosystem H1 & H2 2019	Leverage our Advisory Fintech Accelerator partner – MEDICI who has a 10,000 fintechs catalog to help build the ecosystem. Work with key partners – TRULIOO for digital on-boarding, ACCORD for smart-contracts, CIVIC AND UPORT for decentralized digital identity. Ox for Crypto, MasterCard for Fiat	Be at least one of the top 3 contenders for a decentralized global trade protocol with support from key stakeholders and work with the community to build out protocol features and taxonomy specifically for trade finance Broad engagement and interest from the community reflects in the target token value appreciation – in holding and circulation.
Track 4 Go After Suppliers Directly H1 2020	Leverage TOP On-boarding to accelerate supplier on-boarding directly Add both regional and non-bank funding sources to marketplace including marketplace lenders	Build a critical mass of suppliers by simultaneously bringing adequate funding sources on board the marketplace alongside anchor buyer and banks. Custom trading floors are operational across buyers and banks Targeted improvement in average cost of supplier financing
Track 5 Branded Tokens H2 2019	Build out life cycle of procure to pay and offer it free. We will make money on financing. Implement the double spend verifier for fraud avoidance	Branded tokens provide anchor clients a competitive advantage both in terms of visibility and acceptance but also in terms of features offered leading to a “fear of missing out” for anchor clients Double spend verifier gathers enough critical mass to be seen as a cross industry olive branch rather than a competitive threat
Track 6 Protocol Focus on Syndicated Lending H1 & H2 2019	Integrate multiple credit rating providers and select one credit rating engine to build our AI based dynamic risk score Build out taxonomies for Syndicated Lending Target B2B Networks for protocol services	Sellers are able to get financed based on our dynamic risk score First pilot of syndicated lending is launched with outcomes to be verified in 2021 Protocol version 2.0 is launched in preparation for spinning off the foundation as a not for profit.

Seldom does a platform offer a **win-win-win** for all parties; **Buyers** get **extended payment terms** and better control over their supply chain; **Sellers** get access to **inclusive finance** at reasonable rates; **Banks** and Financial intermediaries get access to a much **larger pool** of financeable **assets**.

Summary

For **anchor buyers**, a single portal with multiple supply chain options maximizes reach and effectiveness of deep tier financing. In addition, branded tokens will enable buyers to have greater visibility and affinity with suppliers in their chain. We will provide buyers tools to create and manage smart contracts that define their future commercial relationships.

For **sellers**, our dynamic credit scoring will earn them the right to better financing. Our marketplace rooms will open up additional options for financing. The ability to split Toki will enable suppliers to use all or a portion of their Toki to pay upstream suppliers seamlessly.

For **finance providers**, we will provide a deeper pool of assets by better packaging of underlying supplier risk. We will provide the means for double-spend verification of financed assets. Most importantly we extend the available base of suppliers through our accelerated onboarding program which bootstraps the process but allows institutions to add their specific KYC and AML requirements.

For **application developers**, platforms and ecosystem partners we provide a means to link disparate islands by providing a unified set of building blocks. Toki and TOPP provide the means for tokenization and monetization for app developers and partners in a free market without any imposition of minimum pricing models.

We have designed a **protocol** for buyers and sellers where holding and usage patterns work together to create an ever increasing demand for the TOPP token and offer this on a cost plus basis as an industry game changer.

We are distilling **three decades of experience** in international trade into our IP based decentralized apps to generate a projected \$100mm in EBIT by the end of year 4.

Team



Aditya Menon, CEO

Aditya is a former Managing Director and co-founder of Citi Global Digital Strategy, three time entrepreneur - twice in the trade finance and cash management systems area, First CIO of Yes Bank and Group CIO of mPhasis. He has been a mobile payments evangelist and pioneer as CPO of Obopay. He is an industry visionary, speaker and author in the digital transformation of financial services (see [Bank of the future](#)). He has driven the successful digital transformation of Citi across both consumer and corporate banking for over half a decade, running a strategy consulting division at the top of the firm. He was instrumental in driving Citi's next generation digital architecture, bank of the future project as well their open banking and API program and helped to establish <http://developer.citi.com/API>



Steve Tseng, CPO

Steve Tseng is a seasoned entrepreneur with decades of experience in two successful start-up companies in Trade Finance in USA, and is responsible for product management at Tallyx. During his career, Steve worked as Head of Development, System Architect and Product Owner, defining end-to-end experiences in multiple domains such as Supply Chain and Trade Finance, Payment and Cash Management, Retail and Fintech. Some of major clients he worked with globally include Citi, JPMC, UniCredit, RBS, OCBC, Mandiri, BOC, Compal and was also instrumental in China Supply Chain Cloud projects. His latest project was developing the core supply chain solution for Premium Technologies, a global leader in Supply Chain Financing solution provider - as Chief Product Officer.



**Narasimha Suryanarayana,
CTO**

Narasimha was a Senior Architect at ACI Worldwide Inc. for 11 years and the Product Architect of ACI's Next Gen Universal Payments Framework. He was leading large globally distributed teams on all aspects of Enterprise Architecture including Cloud and On-Premise Deployments, API Management, Canonical Modeling, Entitlements, Responsive Metadata-driven UI Framework and Enterprise-wide Reusable Services, Cloud Scale. He was on the ACI Technology Leadership Council and Architecture Review Board. He also has a deep knowledge of Trade Finance and Open Account from his tenure at Visual Web Solutions where he designed and built complex financial frameworks and settlement engines.



Prasad Krishnamurthy, CDO

Prasad was a Chief Architect at ACI Worldwide Inc, where he led a team of architects providing technical leadership, developing architecture and technology roadmaps in two product portfolios. He has proven expertise in architecting, designing, developing and delivering enterprise software products and solutions in trade finance and payments for over 25+years. He has excellent skills in understanding the business requirements, transforming them into designs, roadmaps and guiding the execution for successful implementations. His experience has spanned both highly successful startups and enterprise platform companies.



**Veerendra Kumar,
VP Engineering**

Veerendra, formerly Director of Engineering at ACI Worldwide, is an Implementation, Support and Operations Executive in Corporate Online Banking Applications, Retail Banking Products and EBPP (Electronic Bill Payment & Presentment). He has with experience in leading cross-border multi-location teams across India, Russia and the US. He is an enterprising leader with proficiency in managing cross-functional teams in Web, Mobile, IVR and EBPP product development.



**Divalkar S Chandru,
Product Manager**

Divalkar was a Senior Business Analyst and Product Owner for ACI's Global Money Transfer Payment Engine. He has monitored industry trends, gathered requirements, developed product road maps, program plans, and managed budgeting and customer engagement. He was one of the early evangelists of Agile Scrum. His earlier tenure at Visual Web Solutions built a strong foundation in supply chain financing, payment clearing & settlement networks, fraud/risk and compliance domains.



Meera Prabhu, CMO

Meera is a senior Strategy and Marketing business leader with more than 25 years in the corporate world, including 20 definitive years of cross functional experience in IBM. Her most recent role in IBM was as Director Cloud Marketing for Asia Pacific, building the brand and driving the Cloud business, leveraging the ecosystem. Meera has also held portfolios in IBMs Global Technology Services, Sales Operations, Customer Support and Business Transformation as part of the India Leadership team. She has spearheaded some of IBM's Strategic Initiatives in the region, of Geographic Expansion and a Global Marketing Centre based out of India. She has a background of Market Research and Marketing Services prior to IBM.



Sally Liang, CSO

Sally Liang is a FinTech enthusiast with extensive experience in Trade Finance, FX Trading and Consumer Banking. Sally was formerly Project Manager at Personetics where she led AI powered financial software product deployment to 20M+ consumers. She was the President of NewFinance NY, the second largest FinTech business network in NYC. Sally plays an active role in embracing the FinTech ecosystem in NY where she hosts events in Blockchain and ICOs as well as running Shark Tank style events to connect entrepreneurs with investors. Sally holds an MBA degree from New York University Leonard N. Stern School of Business.



**Sam Aravazhinavalar,
Lead Blockchain Architect**

Sam Aravazhinavalar was an Architect in the Reference Architecture team at ACI Worldwide Inc. shaping ACI's Universal Payments Framework. He designed and built frameworks and solutions in Trade Finance and Payment ecosystems leveraging emerging technologies. He has vast experience in exploring and adapting technology platforms to the solution space.

Advisors



Carol Realini, Colorado

Carol Realini is a successful Silicon Valley entrepreneur, CEO and expert in financial service innovation. She has created successful companies in multiple new markets – including early executive at network computer leader Legato, founder and CEO at banking customer relationship management leader Chordiant Software, founder and CEO of mobile payments pioneer Obopay, co-founder and board member of faster payments innovator Omney (acquired by Mastercard). She has been recognized as a Top 50 Women in Technology by Corporate Board Member magazine. Her non-profit board experience includes GlobalGiving, Search for Common Ground, and Global Business School Network. Realini received her BA with honors in Mathematics from University of California, Santa Cruz and her MS in Computer Science from California State University, San Jose. She is the co-author of [Financial Inclusion at the Bottom of the Pyramid](#) and [Bankrupt](#).



Ajay Agrawal, New Delhi

Ajay Agrawal is co-founder and CEO at SirionLabs. Ajay has been a securities lawyer and a product visionary in the strategic legal technology space for more than 20 years. Ajay founded and led UnitedLex Corporation in 2006 and led the company through a period of explosive, profitable growth creating more than \$100mn in enterprise value in 4 years. Between 1994 and 2006, Ajay was a securities law expert in some of the world's leading firms and investment banks and structured complex securities offerings of structured Tier I capital, convertible and exchangeable securities, hybrid debt instruments, asset-backed securities and trust preferred securities. In addition to his role at SirionLabs, Ajay serves as an entrepreneur-in-residence at CodeX, the Center for Legal Informatics at Stanford University. Ajay received an LL.M. from Columbia University and holds an LL.B. from Trinity College, Cambridge and a B.A. in Semiotics from Brown University.



Bhaskar Menon, New York

Bhaskar Menon was the Group Chief Executive Officer of e4e Inc. Earlier Mr. Menon was an Independent Consultant and Owner of Circa Advisors LLC and was a Venture Partner of New Enterprise Associates and NEA IUV, L.P., was an Operating Partner of FlatWorld Capital LLC. Mr. Menon was a co-founding team member and served as the President of MphasiS until 2006. Mr. Menon has over 18 years in International Private Banking and Investment Banking with Citibank and Merrill Lynch. He served as a Director on the Board of e4e, Inc., APAC Customer Services Inc., ScioInspire Inc., K-Two Technologies and Semantify Inc. He served as a Member of the Advisory Group at Ujjivan Financial Services Private Limited.



Johnson Lau, Singapore

Mr. Johnson Lau served as an Executive Vice President, Solution Management of BeXcom Pte Ltd. Mr. Lau has spent more than 23 years in the banking industry in Asia, Including banks such as CITIC, RBS and ABN Amro. Mr Lau served as the Senior Vice President in the Global Transaction Services (GTS) Asia Pacific division at ABN-AMRO Bank N.V, where he managed product development for the region covering 15 countries including Japan and South Asia. Mr. Lau also has with him over 19 years of banking experience from Citibank where he was the Chief Information Officer (CIO) and Vice President in Citibank Japan and Taiwan. As CIO, Mr. Lau was responsible for the establishment of the Consumer Banking Information Technology Group, the implementation of a comprehensive Customer Information (CI) System, an automated 24x7 Call Center and e-Banking services.



Venu Parameshwar, Bangalore

Mr. Venu Parameshwar served as Chief Financial Officer at Dunia Finance LLC. Venu has over 25 years of experience in banking and finance in a wide range of functions and countries including India, Australia, Korea, UAE and the UK. His previous roles include Portfolio Risk Manager of Citibank Australia, Treasurer of Citibank Korea, CFO and Treasurer of Citibank India, Regional Consumer Treasurer of Citibank CEEMEA and CFO of Citibank Turkey, Middle East and Africa. His last assignment was the Consumer CFO for the EMEA region for Citigroup where he was responsible for the finance function across Citigroup's consumer business in Western and Central Europe and the Middle East. Venu is an Economics Graduate from the University of Bombay and has completed his Masters in Business Administration from the Indian Institute of Management, Ahmedabad. He is also a Fellow member of the Institute of Chartered Accountants of India.



Mahesh Jain, Bangalore

Mahesh is the co-founder and Chairman of the Integra group of companies. He has led Integra's efforts in building award winning products and services in multiple market segments ranging from banking, imaging, mobile technologies, education and financial inclusion. He is currently focused on building technologies to bridge the accessibility gap with several initiatives in financial inclusion and e-Governance. He has also been associated with education, carbon, and green plantation societies for many years and is the co-founder of a few organizations in this space.

References

- Supply Chain Finance and Block chain Technology - The Case for Reverse Securitization – Erik Hoffman, Urs Magnus Strewe, Nicola Bosia – 2018
- BCG: SIBOS 2017: Digital Innovation in Trade Finance: Have we reached a tipping point?
- Global Supply Chain Finance Forum – Standard Definitions for techniques on Supply Chain Finance: 2016
(http://icc.academy/wp-content/uploads/2016/03/Standard_Definitions_for_Techniques_of_Supply_Chain_Finance.pdf)
- BCG: Three paths to digital supply chain: Jan 2016
- BCG: The digital revolution in trade finance: Aug 2016
- ICC: Rethinking Trade Finance: July 2017
- McKinsey: Supply Chain Finance: The emergence of a new competitive landscape: October 2015
- McKinsey : A brave new world for Global Banking 2017
- McKinsey : Competing in a world of sectors without borders 2017
- Gartner: How to Evolve Your Trade Finance Strategy with Smart Assets and Blockchain: August 2016
- Oliver Wyman: Supply Chain Finance: Riding the Waves: 2017
- Aite Group: ACAA: A study of the business case for supply chain finance: June 2014
- Will Little:
<https://hackernoon.com/a-primer-on-blockchains-protocols-and-token-sales-9ebe117b5759>
- Reinvent Trade Credit Insurance with Blockchain August 30, 2017 by Hmani Ilias
<http://www.ehda.co/insights/2017/8/30/reinventing-trade-credit-insurance>
- World Economic Forum - The future of financial infrastructure:
http://www3.weforum.org/docs/WEF_The_future_of_financial_infrastructure.pdf. The definition of 'Insurance' and the example of P&C insurance claim processes has been referenced from this document.
- Re-fungible Token: <https://medium.com/@billyrennekamp/re-fungible-token-rft-297003592769>
- Anatomy of an ERC-721 Token:
<https://medium.com/blockchannel/the-anatomy-of-erc721-2576e40bfc5b>
- Ethereum Sidechains:
<https://medium.com/loom-network/million-user-dapps-on-ethereum-an-introduction-to-application-specific-sidechains-c0fdc288c5e5>
- The International Chamber of Commerce: <https://iccwbo.org/>
- Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World - Book by Alex Tapscott and Don Tapscott : 2016
- The Truth Machine: The Blockchain and the Future of Everything - Book by Michael J. Casey and Paul Vigna : 2017
- William Mougayar: Tokenomics - A Business Guide to Token Usage, Utility and Value
<https://medium.com/@wmougayar/tokenomics-a-business-guide-to-token-usage-utility-and-value-b19242053416> and

<http://startupmanagement.org/2017/06/10/tokenomics-a-business-guide-to-token-usage-utility-and-value/>

- Aite Group and ACCA : A study of the business case for supply chain finance. 2016
- HSBC Global trade Finance Web Cast
- Client On-Boarding, Thompson Reuters 2017
- Bloomberg. Global Syndicated Loans League Tables- Q1 2018

Appendix

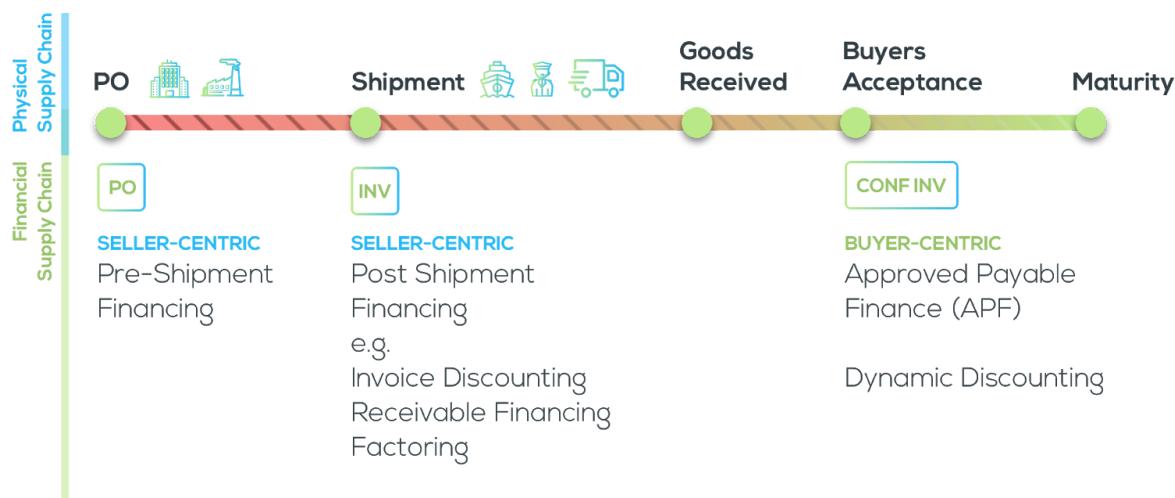
Brief Introduction of Global Trade

In global trade the primary concern for seller is the risk of buyer non-payment upon receipt of goods. Banks inject themselves as **intermediaries** to provide payment guarantee. Letter of Credit (LC) is the instrument proposed by banks for this purpose. Seller need to present all necessary trade documents to banks to meet the terms and conditions specified in LC, bank will make the payment to the seller.

For most corporations, especially for SMEs constantly deal with working capital challenges. It is easier for sellers to arrange financing from their local banks, backed by LC.

As world move towards globalization, global trade shifted towards '**Open Account**' terms instead of LCs. As a result, the trade is not secured by the bank's guarantee and hence, it is difficult for the seller to arrange for financing without LC.

There are various supply chain financing programs to provide alternatives to address seller's working capital needs, as summarized below. Some of these programs are buyer centric and other are supplier centric. Complexity of these finance programs depend on country regulation, sophistication of banking systems and credit markets. Refer to Glossary section for additional details on terminology related to financial supply chain and programs.

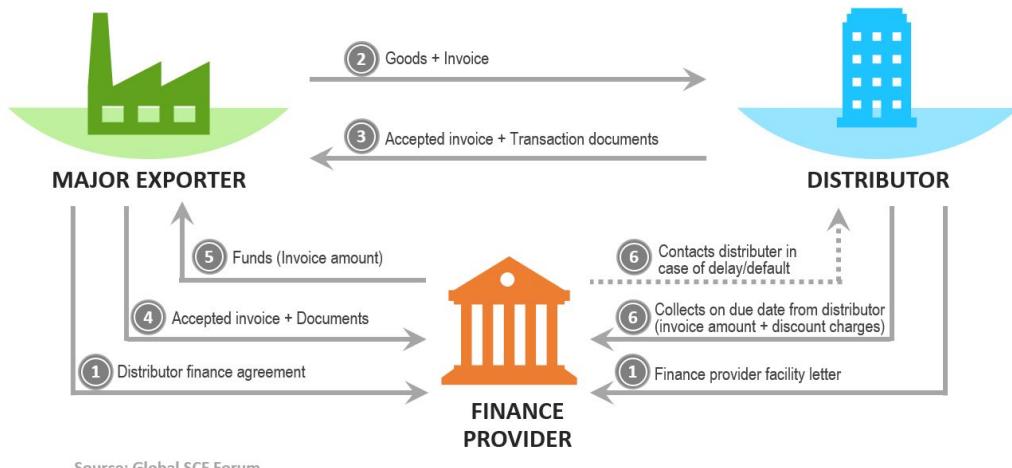


Glossary of Supply Chain Finance Terms

1. **Open account** is a method of payment in international trade. An open account trade is a sale where the goods are shipped and delivered before payment is due, which is usually 30 to 90 days. Obviously, this option is the most advantageous option to the importer in terms of cash flow and cost, but presents the highest risk for the exporter. However, 85% of trades are transacted in open account terms.

2. **Factoring** is a financial instrument that combines **working capital financing, credit risk protection, account receivable bookkeeping** and **collection services**. It is offered under an agreement signed between factor and a seller. Under the agreement, the factor purchases the seller's account receivable.
3. Traditionally, factor purchase accounts from their clients **without recourse**. Because of the factor's assumption of this credit risk, the purchase accounts are treated as having been sold to the factor in a "true sale" which "go off" the client's balance sheet. Therefore, factors are primarily concerned with the **collectability** of purchased accounts instead of the client's ability to satisfy financial covenants and ratios.
4. **Approved Payables Finance (APF)** is provided through a buyer-led programme within which sellers in the buyer's supply chain are able to access finance by means of Receivables Purchase. The technique provides a seller of goods or services with the option of receiving the discounted value of **confirmed** receivables (represented by outstanding invoices) prior to their actual due date and typically at a financing cost aligned with the credit risk of the buyer. A investment grade credit rating and reputable buyer is compulsory.
5. **Bank Payment Obligation (BPO)** is a new payment method replacing "letter of credit" as secured instrument. It is a commitment by a bank on behalf of the importer that payment will be made to exporter upon successful matching of trade data.
6. As per the Uniform Rules for Bank Payment Obligations, the Bank Payment Obligation means 'an irrevocable and independent undertaking of an Obligor Bank to pay or incur a deferred payment obligation and pay at maturity a specified amount to a Recipient Bank following Submission of all Data Sets required by an Established Baseline resulting in a Data Match or an acceptance of a Data Mismatch'
7. **Pre-shipment Finance** is a loan provided by a finance provider to a seller of goods and/or services for the sourcing, manufacture or conversion of raw materials or semi-finished goods into finished goods and/or services, which are then delivered to a buyer. A purchase order from an acceptable buyer, or a documentary or standby letter of credit or a Bank Payment Obligation, issued on behalf of the buyer, in favour of the seller is often a key ingredient in motivating the finance, in addition to the ability of the seller to perform under the contract with the buyer.
8. **Reverse Factoring** is used to refer to a 'softer' variant of Approved Payables Finance, whereby the buyer does not formalise its commitment to the finance provider to pay the invoices at maturity, but does provide information on which invoices it considers valid and correct. In this variant, the buyer may introduce its suppliers to the finance provider. The scheme is then managed as a series of factoring or receivables purchase agreements between the finance provider and each of the sellers and thus lacks the element of an unconditional and irrevocable payment undertaking that is given to finance provider in a standard Approved Payables Finance setup
9. **Trade Receivable Securitization:** Financial Institution purchases trade receivables from clients and attract funding for the clients. The trade receivables are structured into Asset Backed Commercial Paper (ABCP) notes with credit enhancement. These notes are sold to investors in the ABCP market.

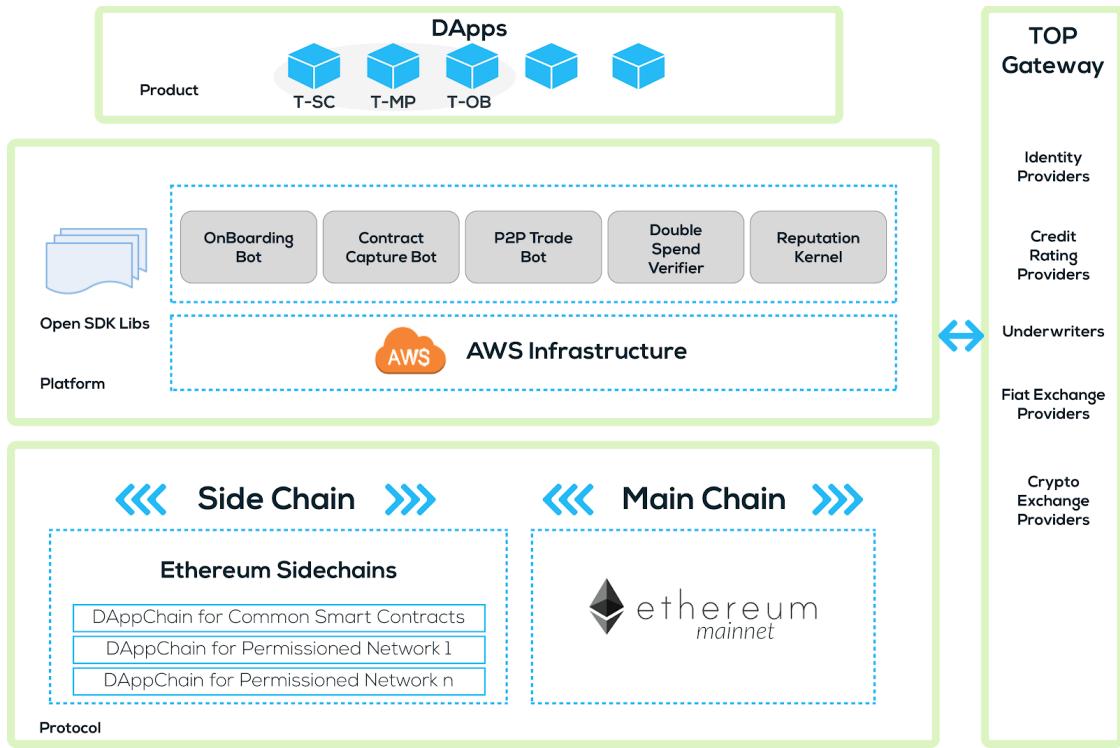
10. **Forfaiting** is the purchase, on a without recourse basis, of trade receivables evidence by bill of exchange, promissory notes, letter of credit receivables or other acceptable debt instruments.
11. The debt instruments are drawn by the exporter and accepted by the importer or simply issued by the importer. They bear an oval or unconditional guarantee or payment issue by the importer's bank.
12. **Warehouse Finance** is a synonym for Inventory Finance, a defined SCF technique herei
13. n and reflects the point that inventory being financed is usually located in a warehouse or in similar conditions. Inventory financing is a form of asset-based lending that allows businesses to use inventory as collateral to obtain a revolving line of credit.
14. **Dynamic discounting** whereby facilitate early payment to suppliers using buyer's excess funds under a "slide discount scale" arrangement.
15. Varied discount (sliding scale) according to the date of early payment request, compared to the traditional hit-or-miss payment terms. No contractual or pre-established early payment terms required, discounting rate can be proposed by either buyer or supplier at later stage and accepted by counterparty.
16. **Distributor Financing** is provided through a seller-led programme where seller is the anchor client with investment grade credit rating. Financial institute provides financing credits to recommended distributors base on their performance records with anchor seller. Under this arrangement, seller has the option to discount the eligible receivables for those distributors. An overall program limit will be applied for each anchor client with sub-limit on individual distributor.



TOP Avatar

All entities, network partners, dApp Service Providers and users participating in the TOP decentralized ecosystem, get assigned a TOP Avatar upon on-boarding. The Avatar contains Identification - unique ID and the Identity Provider - and a Reputation score for performance and contribution of various parties and network partners. TOP decentralized ecosystem incentivizes participants with a gamified Reputation based scoring mechanism, which is implemented in the Reputation Kernel under Platform AWS services.

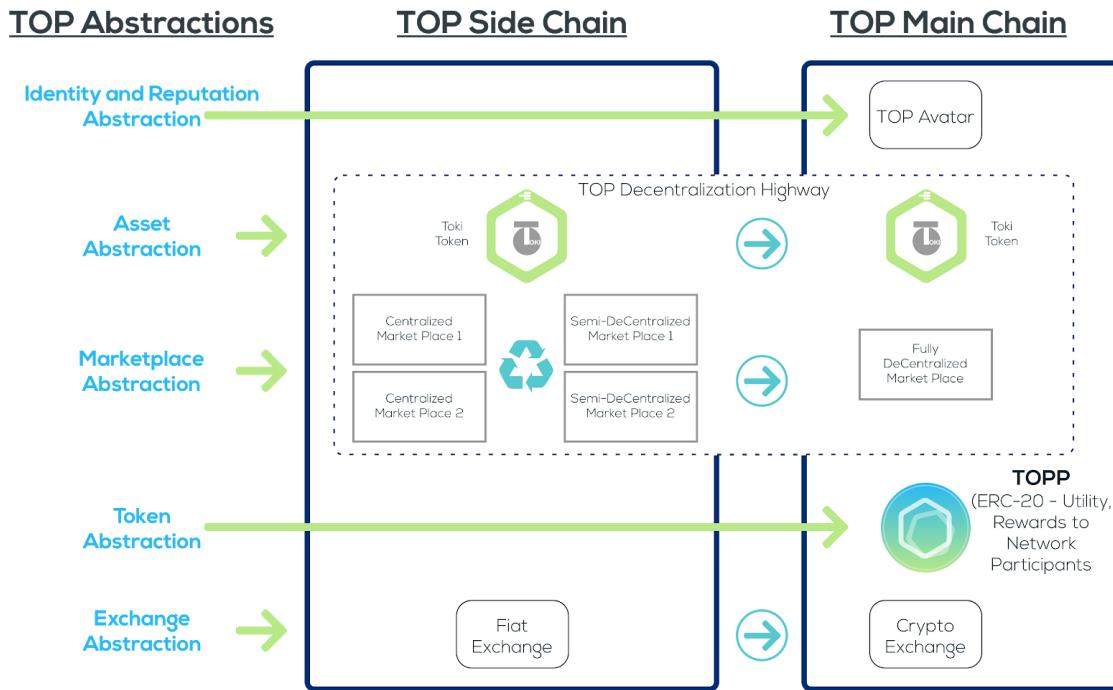
TOP - Technical Architecture



Distributed Ledger Technology

While Ethereum mainnet is an easy choice for the public fully decentralized DLT platform, for the off-chain solution, we are using Ethereum side-chain solutions. Since we see value and the need for the Ethereum token standards of ERC-20 and ERC-721, we prefer Ethereum side-chain or layer-2 solutions where we can deploy tokens based on these standards. Here we have a choice to start with our own Ethereum Plasma deployment or partner with successful Ethereum side-chain operators like the Loom network. (see Appendix for the architecture)

Key Abstractions



This diagram shows the various abstractions offered by the protocol and a path way to get from a centralized or a semi-centralized model to a fully decentralized ecosystem :

- **Identity and Reputation abstraction** is provided by the TOP Avatar deployed in the main chain which offers a unique ID used in the TOP ecosystem for all entities, network partners, dApp providers and the end users.
- **Asset Abstraction** - The payment obligations arising and accepted in a business are tokenized in the TOP protocol. This token can be split, merged or transferred partly or wholly by the owner of the obligation to others. Tokenization also helps in exchanging this for other crypto assets using peer to peer wallets.
- **Marketplace Abstraction** - Toki encapsulates an obligation to either pay immediately or by deferred payment upon maturity. Deferred payment creates a problem in working capital management for businesses as well an opportunity for financing. Enabling a marketplace for Toki is a key feature of the protocol. At the same time, there could be financing opportunities where certain types of businesses or geographies, will make the tokens available to much larger, public decentralized financing marketplaces. The vision of the protocol is to provide a decentralization highway to move such assets between centralized, semi-decentralized and fully decentralized market places.
- **Token Abstraction** with a ERC-20 based Utility token used in the ecosystem to collect fees and offer governance of the ecosystem. **TOPP Token** will be the abstracting other tokens of dependent token economies like the network partners, side-chain infrastructure providers/miners and public Ethereum gas cost.

- **Exchange Abstraction** with the ability to transfer value between entities either in the Fiat currency based exchanges or the cryptocurrency based exchanges. Both these types of exchanges will again have multiple providers or partners.

The Payment Obligation Token - Toki



Various business Flows of Agreements and Claims create Payment Obligations for parties. Once these payment obligation gets accepted by all required parties, the accepted Obligation is the digital asset which is tokenized on the blockchain. The Obligation token can then be split, merged or even transferred fully or partially to others. Ideally an Asset-backed Token should be non-fungible, however the ability to split assign and merge tokens requires us to implement a re-fungible token¹⁶ - basically an ERC-721 (NFT) which is backed by an ERC-20 Token distribution Registry to capture and allow fungibility while maintaining the integrity of the chain.

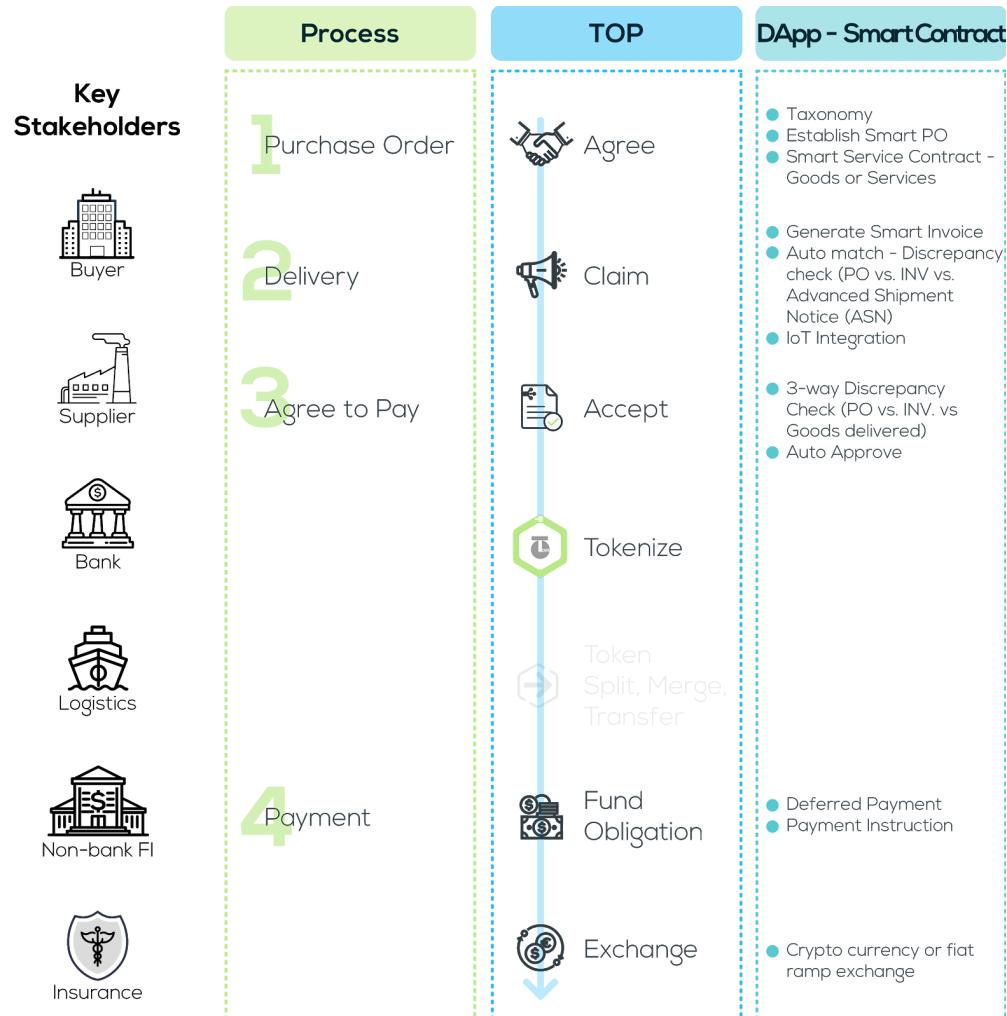
¹⁶ "Re-Fungible Token (RFT) – billy rennekamp – Medium." 26 Feb. 2018, <https://medium.com/@billyrennekamp/re-fungible-token-rft-297003592769>.

TOP - DApp Use-cases

Financial Supply Chain Management

USE CASE 1 | Procure-To-Pay (P2P) - "Bring efficiency and transparency to the supply chain"

P2P collectively refers to end-to-end activities starting from Purchase Order, Order fulfillment, Invoicing of delivery etc. until completion of Buyer Payment. Complexity of the processing lies in establishing the match (discrepancy checking) among Purchase order, Shipment and Goods received. Buyer payment may be at sight or a deferred payment.

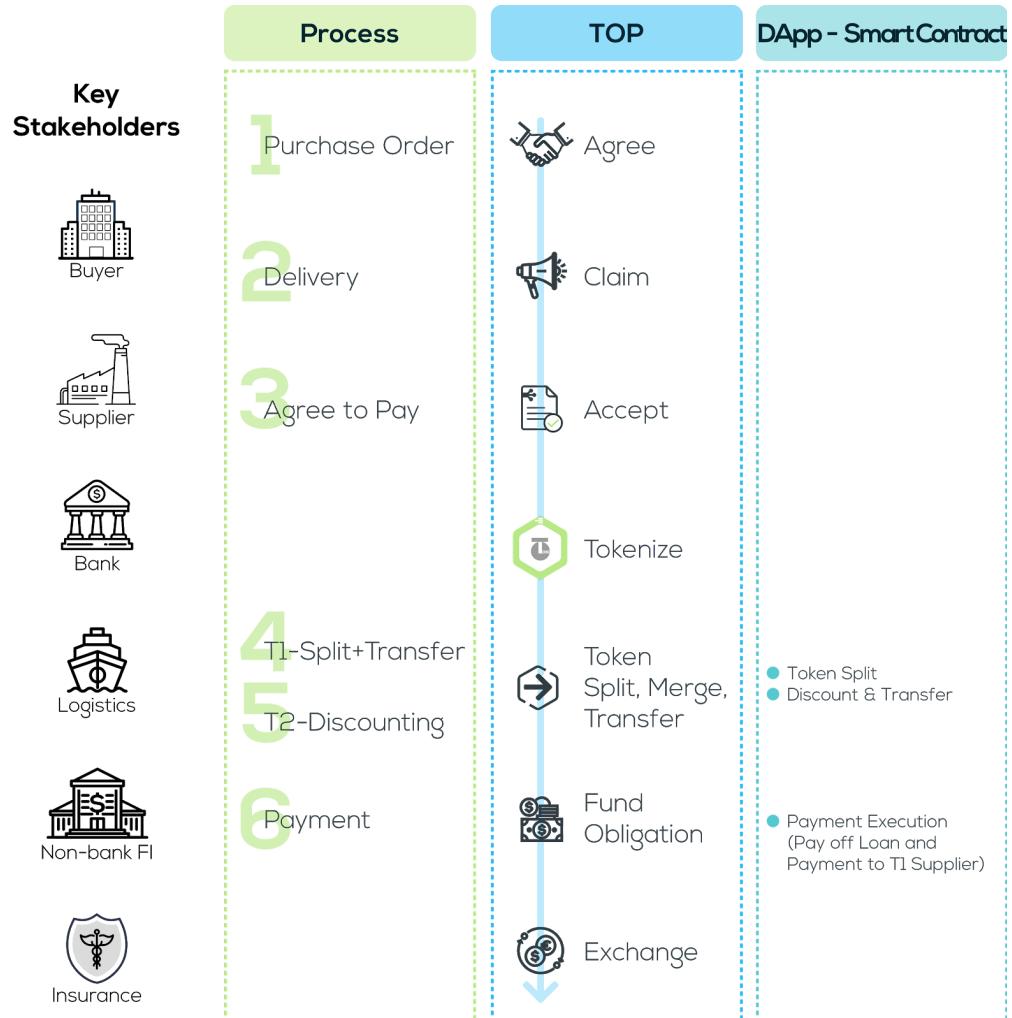


Business Flow Summary

- Establish Purchase Order (PO):** Buyer-Supplier contract, negotiation of PO details and terms, and confirmation of PO.
- Delivery of Goods:** Ship goods, send Invoice and other agreed documents.
- Buyer Agrees to Pay:** Review invoice, discrepancy & dispute resolution, Buyer agrees to pay.
- Pay at Maturity:** Buyer pays supplier on agreed maturity date.

USE CASE 2 | Digital Draft and Finance - "Deep tier financing and unlocking trapped liquidity"

This use case is similar to the P2P use case discussed above. The difference is, buyer will make the payment to the Supplier using Digital Draft, instead of deferred payment. Tier-1 Supplier can then use a portion of this Digital Draft to pay his supplier (Tier-2). This will result in partial transfer of title from Tier-1 to Tier-2 Supplier. This enables financing for Tier-2 Supplier by discounting of the Digital Draft.

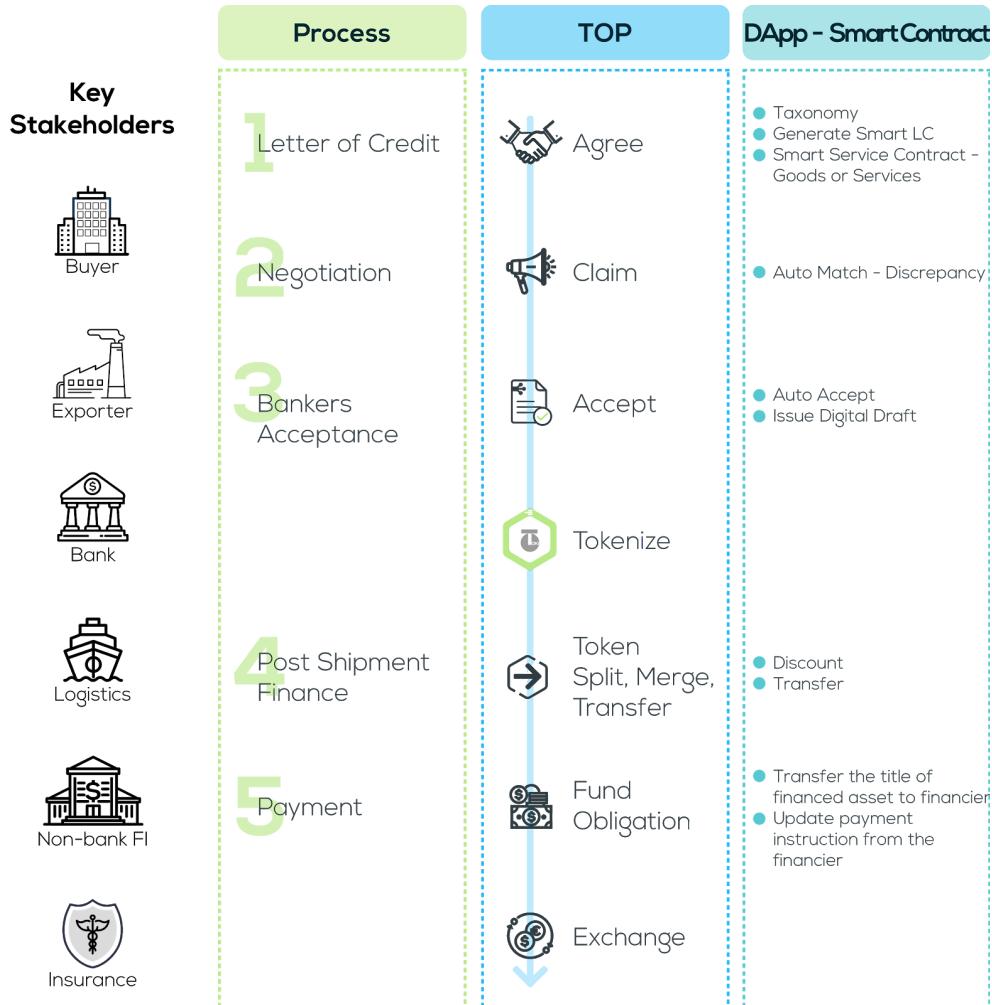


Business Flow Summary

1. Purchase Order (PO)
2. Delivery
3. Buyer Acceptance.
4. **Payment to Tier-2 Supplier** : Tier-1 Supplier makes payment to Tier-2 supplier using 40% of the Digital Draft
5. **Invoice Discounting**: Tier-2 Supplier requests discounting with his portion of the draft.
6. **Payment**: Buyer makes a payment on maturity date. Settlement will involve.
 - 40% of the draft value to settle the loan (discounted by Tier-2 Supplier).
 - Payment to Tier-1 Supplier for remaining balance of the draft value.

USE CASE | Letter of Credit (LC) - "Automate document checking and auto trigger payment"

As ICC puts it, a letter of credit is an unconditional commitment by a bank on behalf of the buyer (customer/importer) to pay the seller (beneficiary/exporter) a specified sum in the agreed currency, provided that the seller submits the required documents and meets the terms and conditions outlined in the Letter of Credit.



Business Flow Summary

- Letter of Credit (LC)** – Issue and Advise.
- Negotiation** : After shipping goods supplier presents all required documents for negotiation of LC.
- Banker's Acceptance**: Issuing bank checks documents against LC terms and accepts the draft presented by the exporter.
- Finance Request**: Exporter requests post shipment finance using Bank accepted draft.
- Payment**: Exporters bank presents draft to Issuing bank. Issuing bank debits buyer and pays the Exporter's bank.

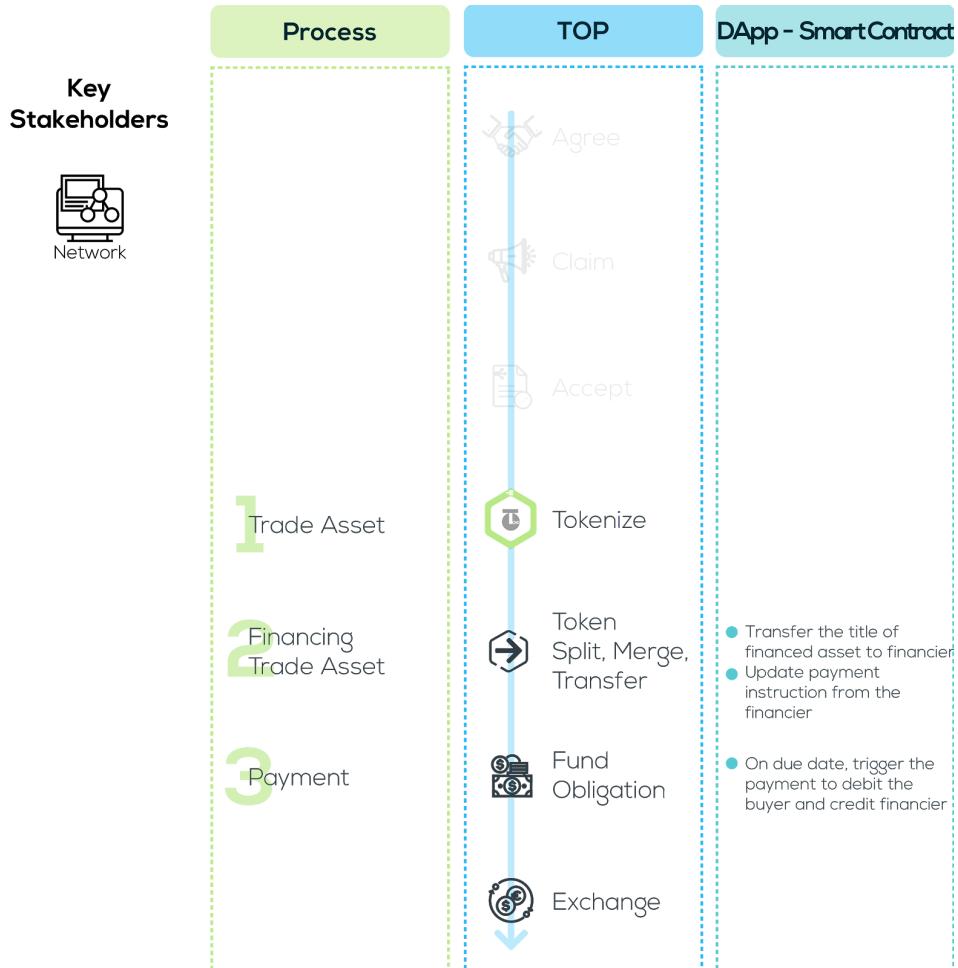
Marketplace

USE CASE | Network of Networks - "Verify lien on a smart asset to eliminate fraud and duplicate financing"

Any solution (Blockchain based or otherwise) can leverage TOP API to:

1. Digitize their assets so they can have an option to trade in the digital marketplace, or
2. They can register their financed assets in the global registry, which addresses the double spend fraud.
3. Provide a lookup through API to verify whether a lien exists against an asset in the TOP registry

The following use case demonstrates the first scenario listed above..



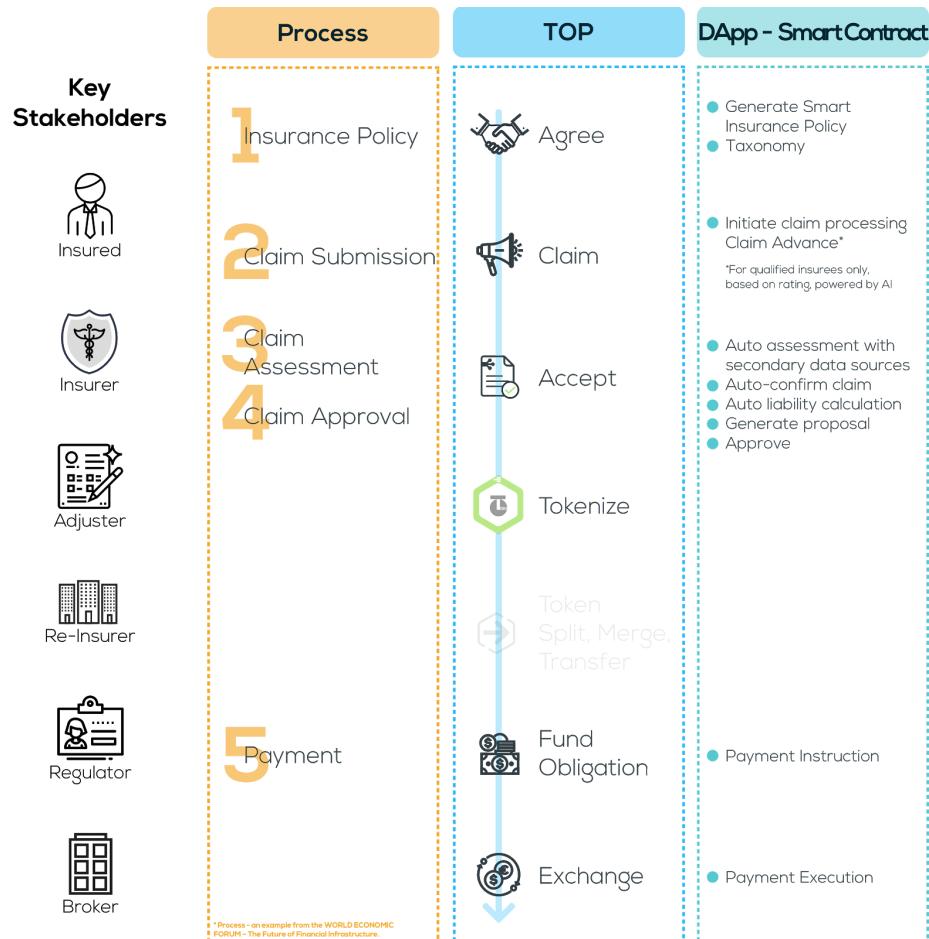
Business Flow Summary

1. **Asset Tokenization** – A non-Blockchain platform uses TOP API to digitize trade assets so they can be traded (or financed) in the TOP marketplace.
2. **Finance** : Trade asset owner requests financing.
3. **Payment**: On maturity, finance is paid off by the asset owner, or by liquidating the asset - as agreed

Insurance

USE CASE | P&C Insurance Claim - "Claim Advance: Why not an early payment?"

Here is an example of a dApp ecosystem using the Protocol to manage a P&C insurance claim. It offers an innovative '**Claim Advance**' feature for qualified customers. The qualification assessment is powered by **AI agent** that analyzes the claim information, customer's transaction history, credit rating, risk profile etc. to determine the early payment eligibility.



Business Flow Summary

- Insurance Policy:** Insured and Insurer negotiate insurance terms. Insured purchases the insurance directly from the Insurer or via a broker.
- Claim Submission:** In the event of a loss/damage to insured article, the Insured party reports it (with supporting details), and submits the claim. Based on the Insured party's rating, the claim may qualify for Claim Advance. AI agents can be setup to determine Claim Advance (i.e. early payment) eligibility for qualified customers.
- Loss Assessment:** Loss adjusters evaluate the damage. If legitimate, Insurer assesses the reasonable monetary value of the claim.
- Claim Approval:** Insurer approves the claim.
- Payment:** Insurer pays Insuree.