



Distributed Ledger Technology

Value Exchange Platform for Trade Finance

October 2017



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Digital Ledger Technology - Value Exchange Platform

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Introduction to the Blockchain Terminology

At first we would like to introduce the most common used terminology in Blockchain



Node

The system and technology infrastructure with a unique identity on the network that hosts data, applications and attachments for all transactions a party is involved.

Altogether connected, the nodes build the distributed ledger network. Currently, nodes run as a JVM run-time environment on cloud or on premise infrastructure and store their data in an H2 database.



Direct Participant

An actor who hosts a node and has full access to the digital ledger: read records or add records that involve its node.

Non-Direct Participant

An actor who is using the infrastructure of a direct participant and has an account to access to the digital ledger: read records or add records that involve only his entity but not everything on the node.



Notary

A *notary* is a network service that provides uniqueness consensus by attesting that, for a given transaction, it has not already signed other transactions that consumes any of the proposed transaction's input states.



Consensus Process

The process to determining whether a proposed transaction is a valid ledger update involves reaching two types of consensus: *Validity consensus* - this is checked by each required signer before they sign the transaction. *Uniqueness consensus* - this is only checked by a notary service.

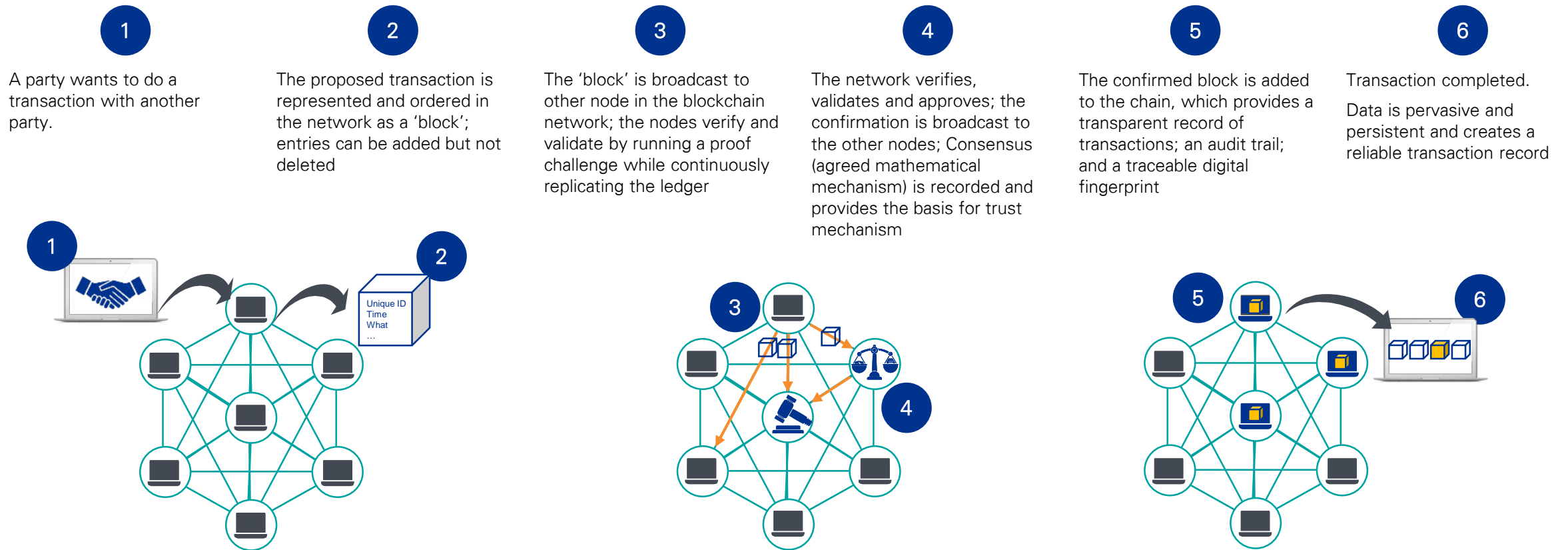


Smart Contracts

Smart contracts are contracts whose terms are recorded in a computer language instead of legal language. This is that they are a mini-program that requests a defined sets of inputs and will then automatically deliver an output.

Introduction to Blockchain and Digital Ledger Technology

Blockchains are a way of **ordering and verifying** transactions in a **distributed ledger**, where a network of computers **maintains and validates** a **record of consensus** of those transactions with a **cryptographic audit trail**

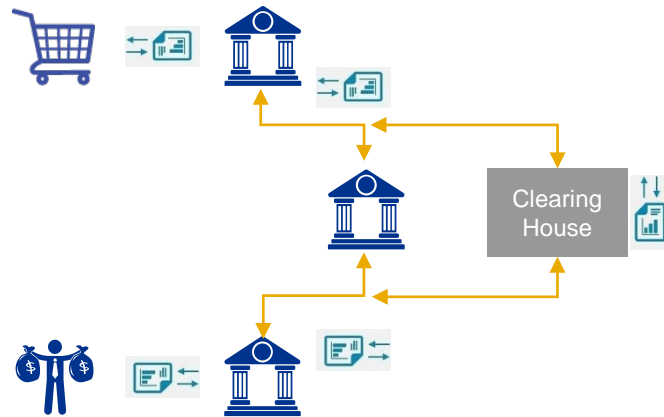


Why is it disruptive

The blockchain paradigm of decentralization is orthogonal to traditional banking as it introduces a near-real time distributed ledger with an almost instantaneous, cryptography based consensus between the counterparties.

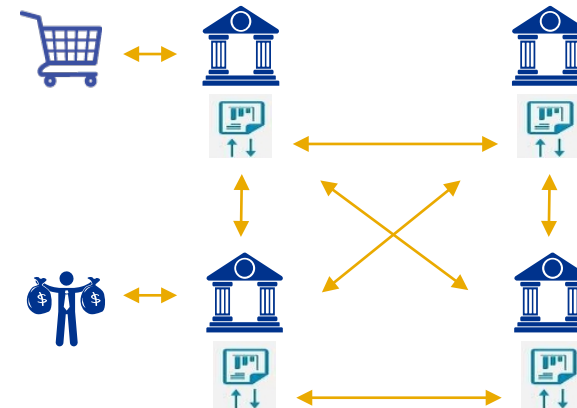
Transfers – Today

- The current traditional ledger structure relies on third custody parties owning transfer of an asset:
- Legacy infrastructure
- Slow clearing and settlement T+n
- Manually intensive
- Prone to errors



Transfers – with Blockchains

- The transfer of the asset ownership is carried out by the blockchain network:
- Shared infrastructure is shared
- Decentralized ledger
- Automated processing
- Cryptographically secured



Legend

Financial Institution Transaction Custodian Source Destination



MVP for an Open Account Trade Finance Platform

Open Account Trade Process on the Digital Ledger Value Exchange

Key Actors:



Buyer
An entity requesting a cross-border product/service



Buyers Bank
An FI that assumes risk on behalf of the buyer



3PL
The transport of goods by truck, train, ship or aircraft

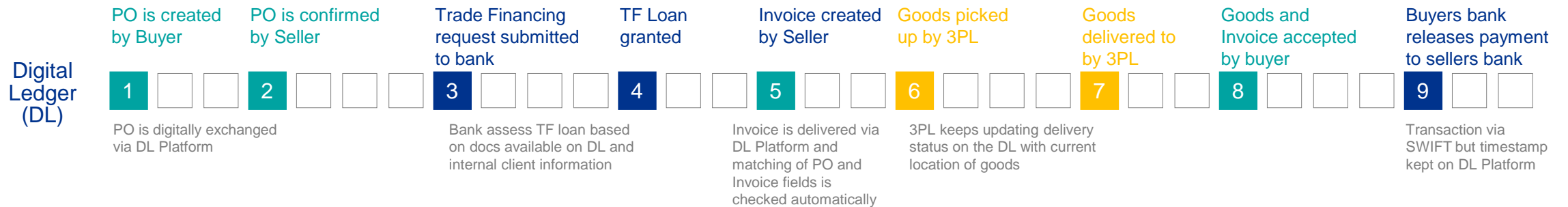


Seller
An entity providing the cross-border product/service

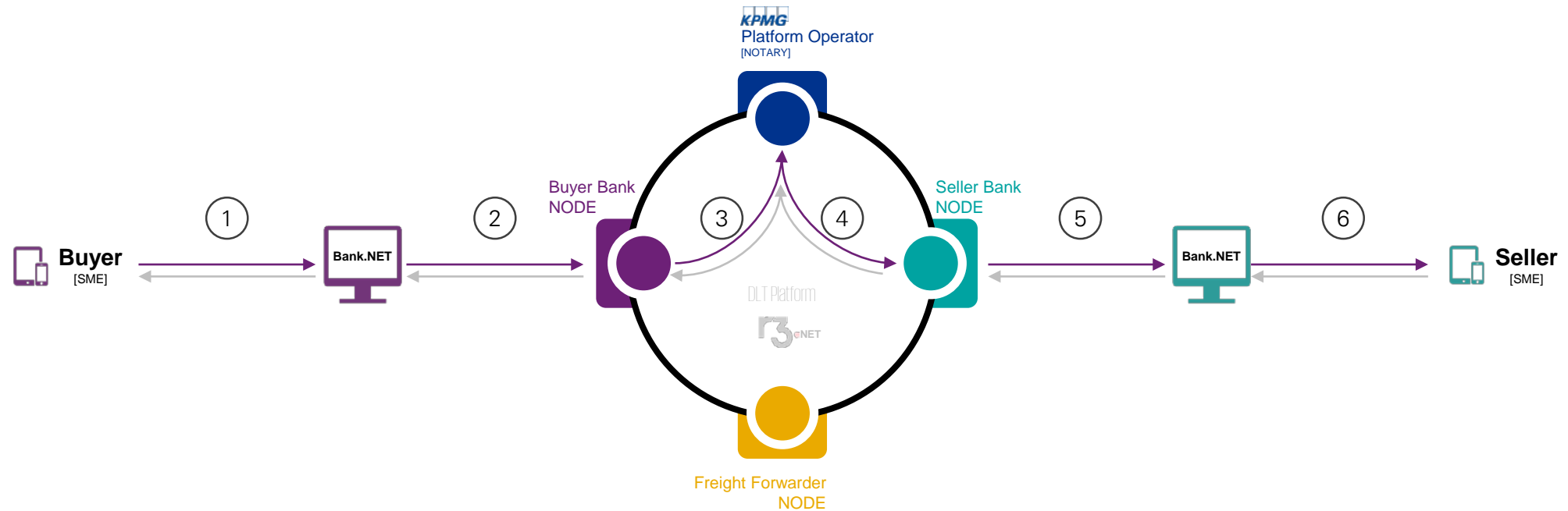


Sellers Bank
An FI that assumes risk on behalf of the seller

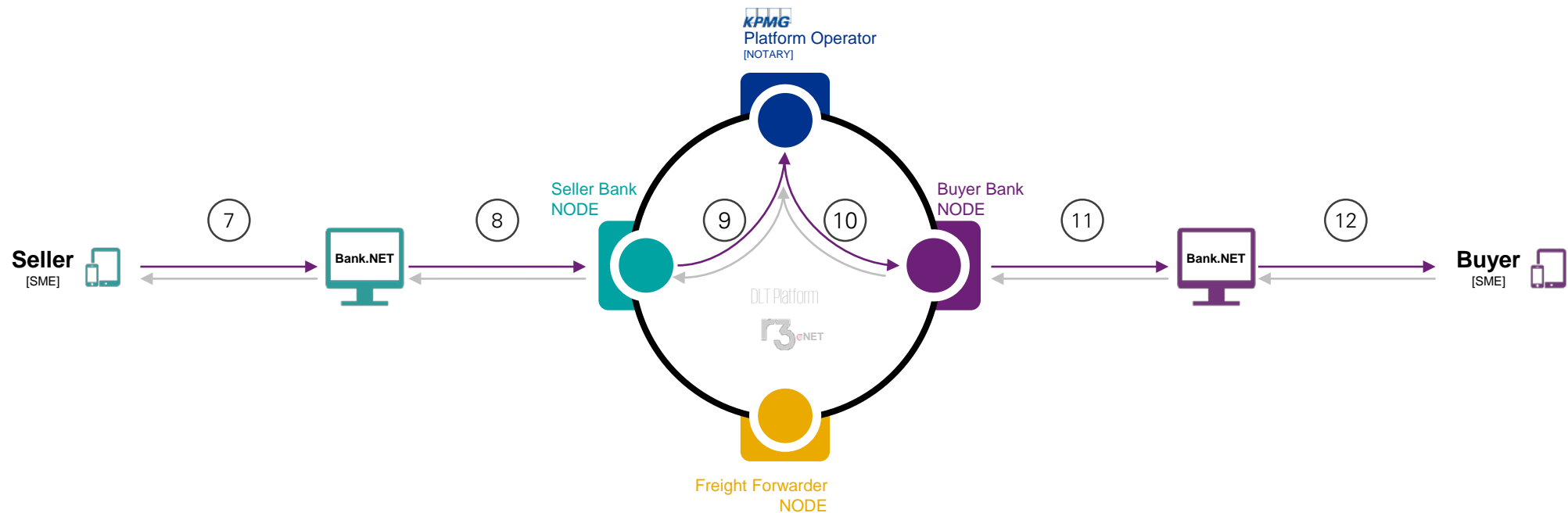
Trade Activities on the Digital Ledger:



Functional Description: Purchase Order



Functional Description: Invoicing



7 Seller sends Invoice

Seller creates the digital invoice in the banks customer portal based on the PO unique ID. One PO can have multiple invoices but no duplicate invoicing of goods.

8 Invoice to DLT

The bank system creates a unique identifier for the invoice linked to the unique PO ID and stores it on its node on the DLT platform

9 Perform Transaction notary

The invoice is sent to the notary node to ensure transaction uniqueness and matching to the PO based on selected fields

10 Send Invoice to Buyers Bank Node

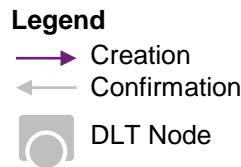
Once the notary confirms transaction uniqueness the invoice is forwarded to the seller's bank node

11 Send Invoice to Buyer

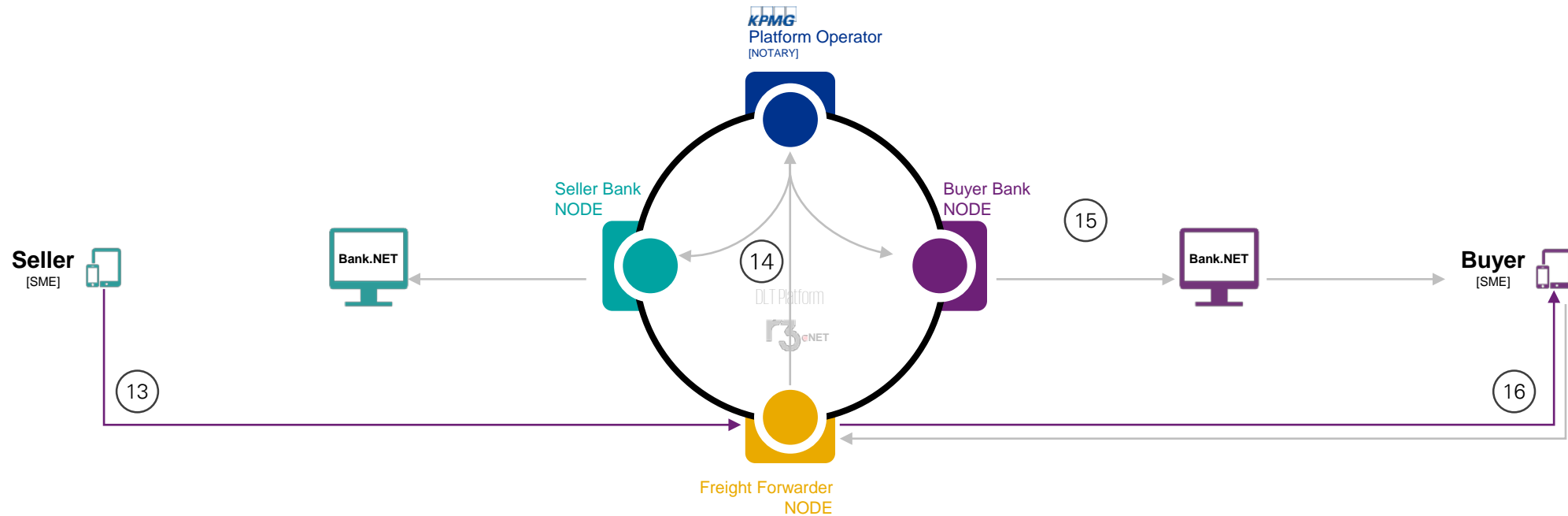
The buyer can access the invoice in the buyers bank's customer portal or can download it into its ERP system.

12 Buyer accepts Invoice

The buyer accepts the invoice upon receipt and can create a rejection case if necessary. The acceptance is reverted back to the seller through the DLT platform.



Functional Description: Track & Trace Goods



13 Pick-up by 3PL

Seller hands the goods to the Freight Forwarder (FF) who will then update the status on the DLT as "Picked-Up". The issued Bill of Lading can be scanned and uploaded to the platform.

14 Perform Transaction notary

The pick-up is validated by the platform notary and distributed to the related bank nodes. The copy of the BoL is stored in a central document repository.

15 Update tracking status

Via the platform portal, all trade involved stakeholders (buyer, seller, banks) can see the updated status of the goods in transit.

16 Goods Delivery

Once the goods are delivered to the Buyer, the FF will update the status as "Delivered" and the updates are shared within the platform.

Legend

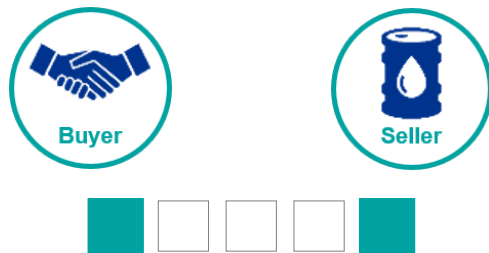
- Goods
- ← Information
- DLT Node

Benefits of a Digital Ledger Value Exchange Platform

Our approach to deliver a Value Exchange Platform is to use distributed ledger technology to enable a collaboration platform between industry participants, financial institutions, governments, regulators, in a cross jurisdictional sense

Digital, validated Trade Agreements

A Trade Platform will enable benefits within digital document exchange, digital source certification, asset on-boarding and continuous verification. Having all documentation in a digital format with tamper resistant traceability and standardised format would simplify and streamline the bilateral trade agreements.



Faster, more accurate Financing

Smart contracts on the Trade Platform compare metadata and make sure all parties are acting on the same information. These contracts can also confirm payments (triggers) and enable document matching (PO to Invoice). Hence they automate manual processes, greater accuracy and faster approval to streamline payments.



Real-time Tracking

Creating a real-time visibility and traceability of assets is the key to meet today's just-in-time supply chain requirements. Participants can automate processes in depending on the location and status of goods, e.g. alerts, release payments, buy/sell insurances etc.

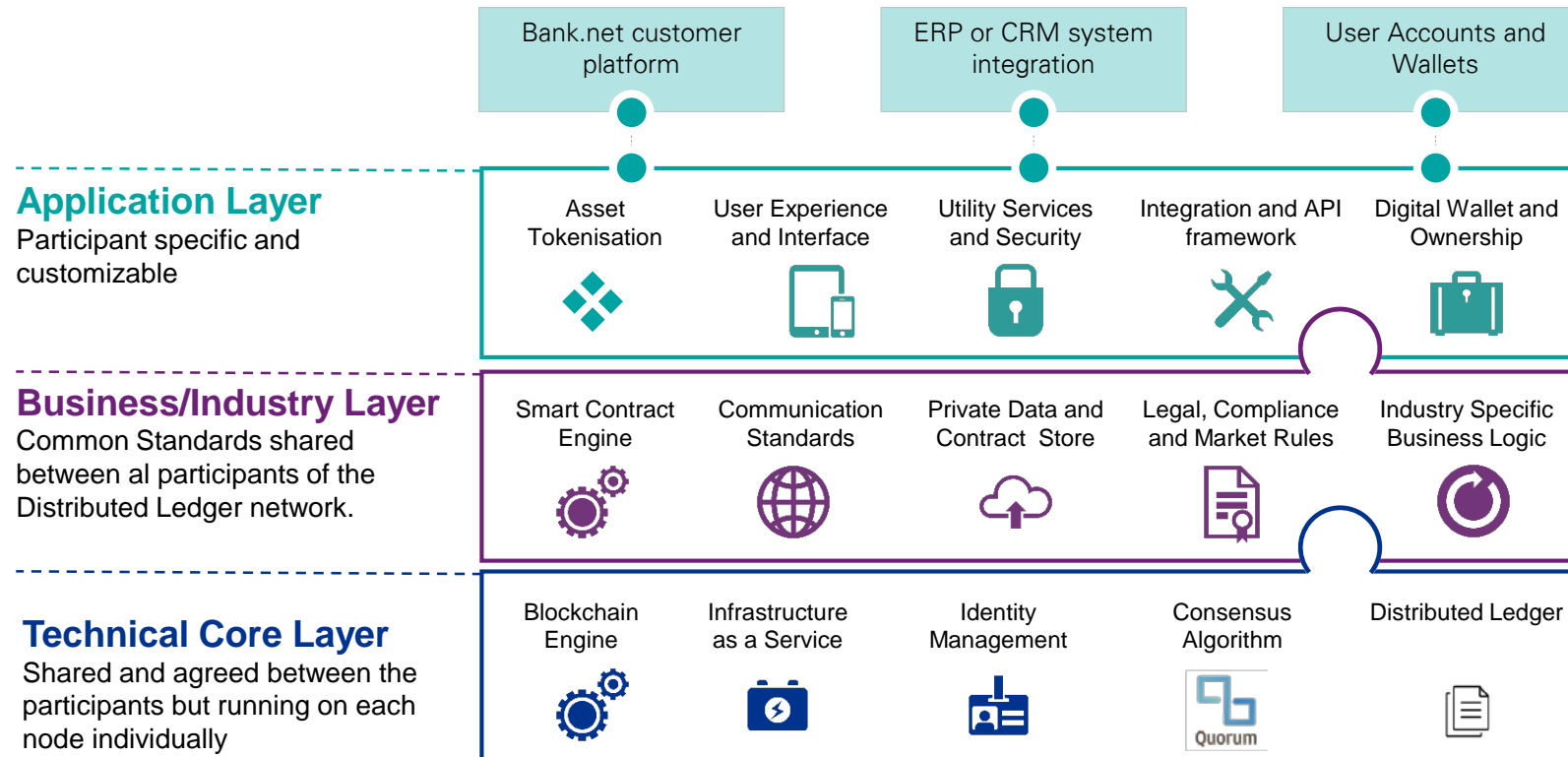


The long term benefits of a platform are in proving the authenticity of products, improving cross country and cross industry collaboration and optimising business processes along the supply chain to increase agility, predictability and speed.



Platform Architecture

Node Architecture

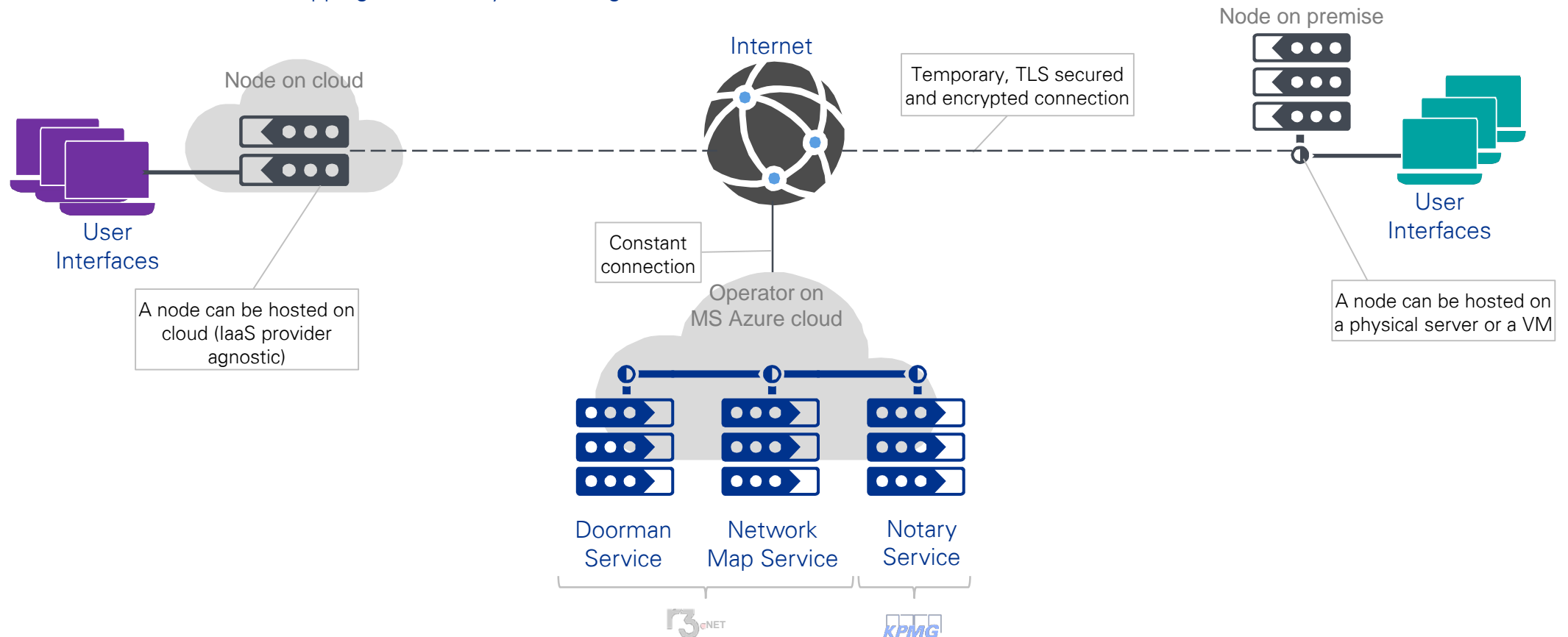


Source: KPMG Australia

Digital Ledger Network Architecture on R3.net

The below diagram depicts the network architecture of a distributed ledger network. The node hosting participants can choose to host a network node on premise or in the cloud. They can add as many user interfaces and applications on top of their node as they want to.

The Operator will host the Operators node on a cloud infrastructure and will at all times be reachable by the network participants to conduct the notary function as well as network mapping and security monitoring.





Our Vision for the Platform

Interoperability with other Distributed Ledger Platforms

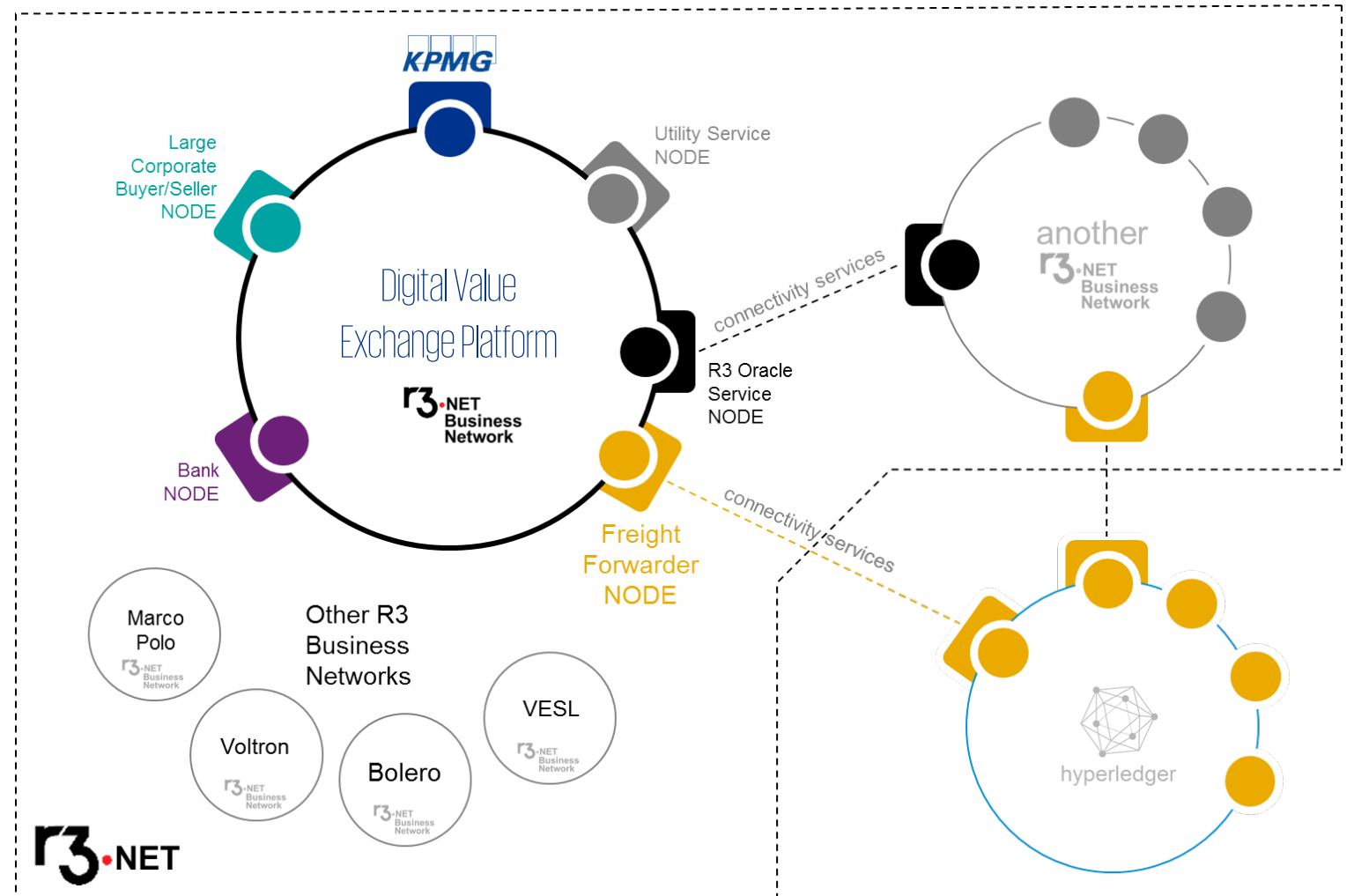
The selection of R3Net provides the flexibility to introduce new features that enable the platform to be extended with other platform via “Oracles”, nodes that can act like connectors between multiple platforms.

Oracle nodes are connectivity services between platforms of the same network type, for example between R3 Corda networks.

Moreover, we anticipate that there will be interaction with other ledgers and solutions from an application level and/or through the Inter-Ledger Protocol.

Examples here fore are projects and initiatives like the Marco Polo project, VESL or Bolero networks that can further deliver benefits in this new interconnected world.

Picture a world where every industry has a highly specialised platform but the platform connect and operate with each other to seamlessly hand over transaction value from one system to the next.



Cross-border Operations within the DVEx Platform

The by far largest volume of trade is cross-border between countries and continents. Therefore the KPMG Value Exchange Platform is best prepared to facilitate digital trade beyond all borders:

- 1 Digital Value Exchange Platform** created to connect cross jurisdictional stakeholders in order to facilitate trade and exchange of value carrying tokens.
Similar to the interbank network SWIFT, the platform will onboard participants through a standardized process agreed with the stakeholders of the platform.
- 2 Digital Ledger technology** ensures full transaction compliance and transparency for the stakeholders of a transaction and therefore reduces the need for additional risk-mitigation actors in cross border trade.
- 3 Participants are global trade actors** operating on open account terms like sellers (exporters) and buyers (importers), manufacturers, wholesalers, retailers and end consumers.
Other direct participants include parties who facilitate trade, like financiers, insurance companies, ports, transportation companies, supply chain logistics, warehousing, prospectors, brokers, trading houses etc.
- 4 Regulatory Participant** can be on boarded, such as customs, regulators, observers, taxation agents, certifiers etc.
These stakeholders could then consult and enforce the compliance with regional or country specific laws between the trade participants. Once again, the tractability and record validation makes it easy to define provenance, prices, tax payments etc.



Potential Future Actors and Services on the DVEx platform

The potential extension of a Trade Platform would see the involvement of additional stakeholders that that could be more closely involved and benefiting. These stakeholder would enable the development or new products and services that currently are not possible or cost prohibitive.



Insurance companies provide trade credit insurance for both importer and exporters, as well insuring assets during transition from the seller to the buyer.

The inclusion of insurance companies in a fully digital Trade Platform would enable opportunities in “real time insurance”, where insurers could excess new set of data points that will enable them to real time calculate their risk exposure and adjust premiums accordingly.



Inspectors will play a crucial role as they can provide digital certificated that verifies that the goods shipped match those on the purchase order.

These independent agencies would differentiate themselves in acquiring various international or national licenses that allows them to perform the role of a “trusted oracle”. The services provided by these actors will be crucial to reliably prove the provenance of traded assets.



Trading houses employ specialist financing largely as a means of risk mitigation for the financing institutions.

On-boarding these type of stakeholders onto a Trade Platform would enable new type of financial product to support trade, help financiers to better utilise their balance sheet with the benefit of full transparency and compliance.



Assurance can give rise to a PO backed security where POs of buyer and sellers would have known default rate based on historic PO success of the respective buyer or seller. This can help banks liquidate risk and manage risk.




KPMGs Value Proposition

Consortium Approach to develop and operate the platform

We have selected a consortium of partners based upon their relevance to the financial service and trade market, their expertise in the block chain field and their ability to scale with the project.

Modern business models have proven that one firm cannot do everything under one roof all of the time, especially in areas of emerging technologies and where traditional businesses are being disrupted. You need a panel of experts who know what to do, have the skills to do it and the scale to support.

Trade Platform

operated by 

Platform Governance

On-boarding process with compliance, permissions and configuration arrangements.



Application Layer

Integration APIs, UI Apps, configurations and other utility services.



Business/Industry Layer

The business logic written in smart contracts with industry specific business logic and market rules



Technical Core Layer

permissioned distributed ledger with associated rules.



Source: KPMG Australia

Consortium Partner Description



KPMG acts as the Trust Provider of the Ecosystem, the trusted, technology-agnostic middlemen between banks, traders, governments, and best-in-industry technology providers.



KPMG has strategic alliance with R3 in Asia and Europe. R3 is a distributed database technology company which leads a consortium of more than 70 of the world's biggest financial institutions. KPMG partners with R3 in research and development of Blockchain database usage for trade finance and other solutions.



KPMG works closely with Cegeka on the delivery in Asia and Europe to reinvent trade finance. Cegeka is an independent, European ICT service provider, which helps its clients with IT consultancy projects, integration of ICT infrastructure, development and implementation of applications and outsourcing.

The company, original Belgian, employs 4,000 people. In 2016 Cegeka Group achieved a revenue of 414 million euros, a growth of 12 per cent compared to 2015.



Microsoft and KPMG have been global alliance partners for years. KPMG has worked with Microsoft to provide industry insights, innovative thinking and excellence in delivering global projects. KPMG has also worked with Microsoft to provide tailored end-to-end solutions and sustainable use cases.

Microsoft has an optimised (2nd generation) Blockchain framework 'Coco Framework', it is an open-source system that enables high-scale, confidential Blockchain networks that meet all key enterprise requirements – providing a means to accelerate production enterprise adoption of Blockchain technology.

KPMG's Value Proposition



KPMG will act as an independent trust provider

From our perspective, in order for this initiative to be successful you need an independent intermediary facilitating the success of all parties



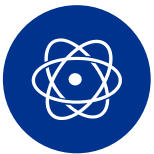
We understand how to operate the platform on a day-to-day basis

We will operate this platform in Hong Kong, with managed services support in China, in a way that does not privilege any specific technology or market participants two large-scale technology transformation hubs: one in Foshan and one in Nanjing, to deliver technology solutions for us and our clients



We have a long-term vision for how the platform growth

The long term vision needs to ultimately include multiple sorts of trade businesses, utilities, financial service providers and government agencies



We treats distributed ledger and trade digitisation as a holistic change

Our digital ledger services team underpins all of our business, not serving only as a technology service. We have infused thinking around distributed ledger and blockchain technology into our risk services, tax, audit, and compliance organisations, and will bring this broad perspective to the project.

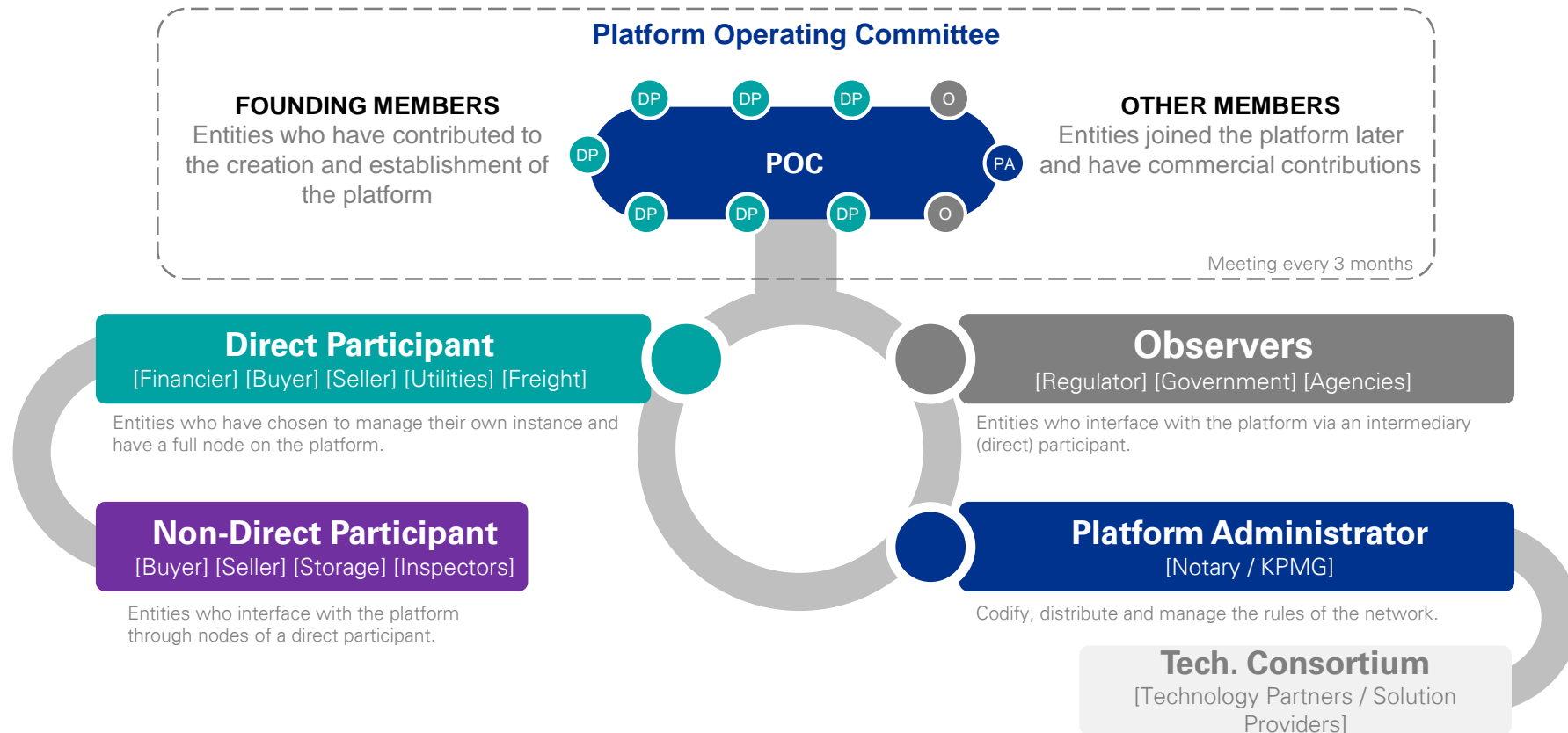


Platform Governance

Platform Governance Model

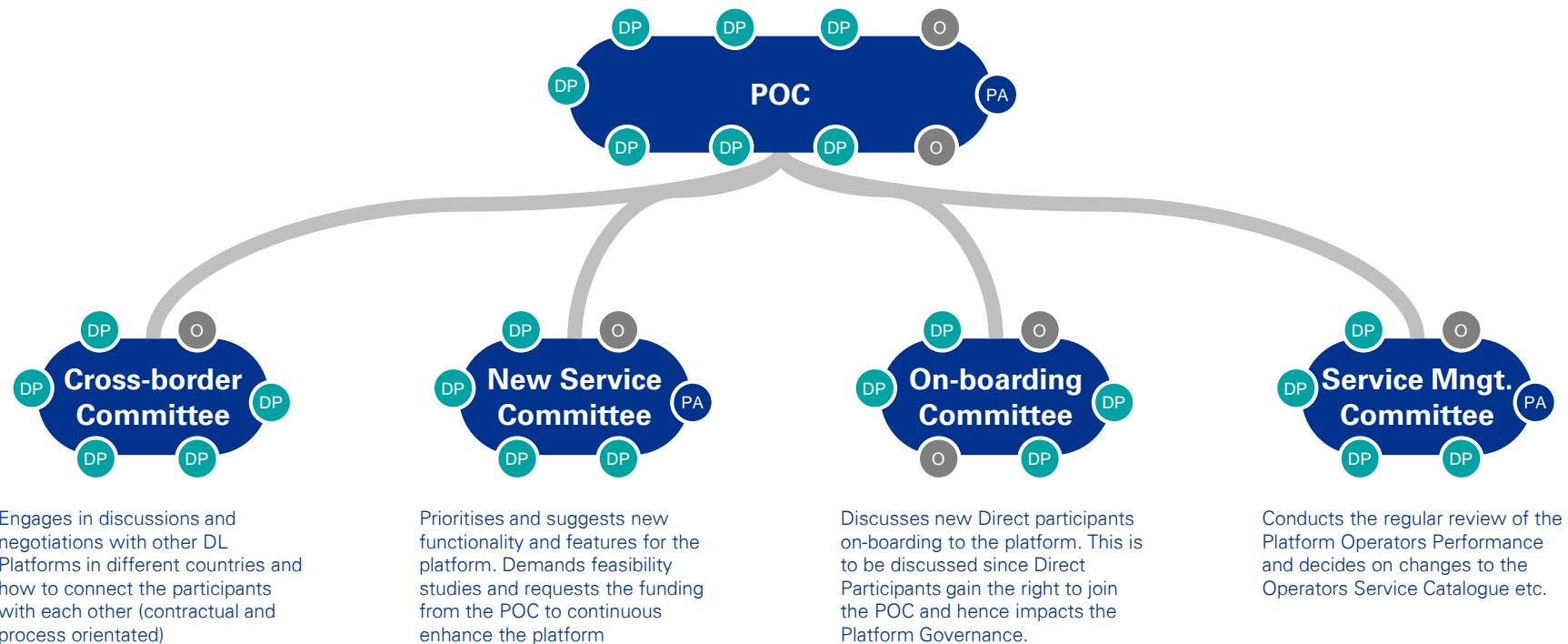
Delivering a platform to support the diverse set of stakeholders and business processes will involve the creation of an efficient market place. As with all efficient and orderly markets, good governance is paramount. Industry participants on such a platform will need to adhere to certain rules, including on-boarding protocols, permissions, participant's rights, compliance with standards and legal and dispute resolution aspects.

At KPMG we believe that a value exchange platform can only be governed within the group of Direct Participants that have vested interest in the functionality and growth of the platform.



Platform Governance Model

KPMG's objective is to facilitate a diverse set of stakeholders in the exchange of assets on a bilateral and global basis. In this role we will also support the establishment, running and enhancements of the governance structure, including sub-functions like reporting of the platform operations or preparing new platform features. Therefore we suggest the Platform Operating Committee to form Sub-Committees that are dedicated to singular work streams. A sample is provided below





KPMGs Support Model

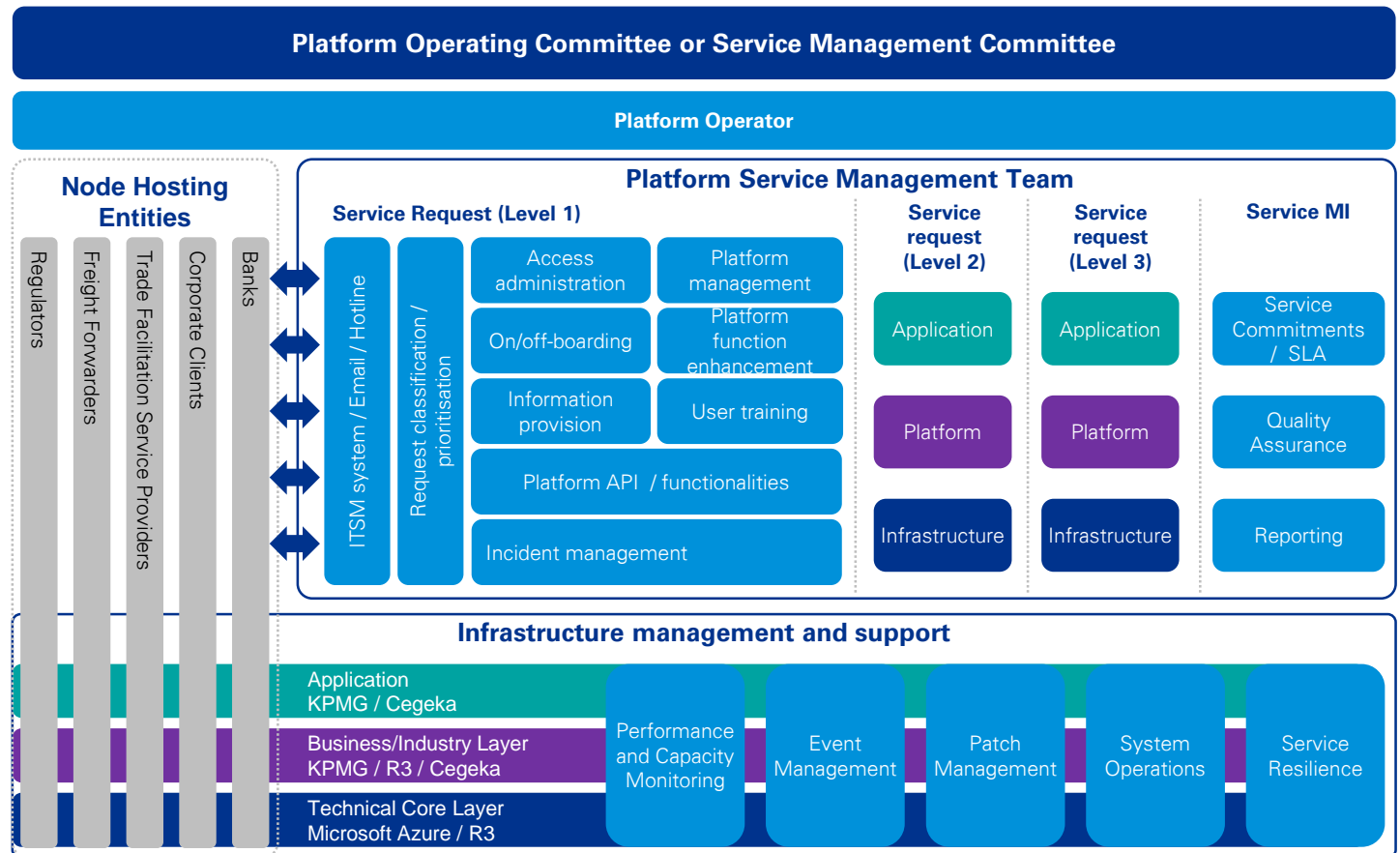
Support Model

Once the Value Exchange Platform is in “live” mode it is important to have a platform manager responsible for overseeing and ensuring that all so the platform services and technical functions are operating smoothly.

In order to achieve this, our proposed post-implementation support plan encompasses the following three types of support activities with an objective of providing a reliable, efficient and flexible service for Node Hosting entities and/or Non-hosting entities:

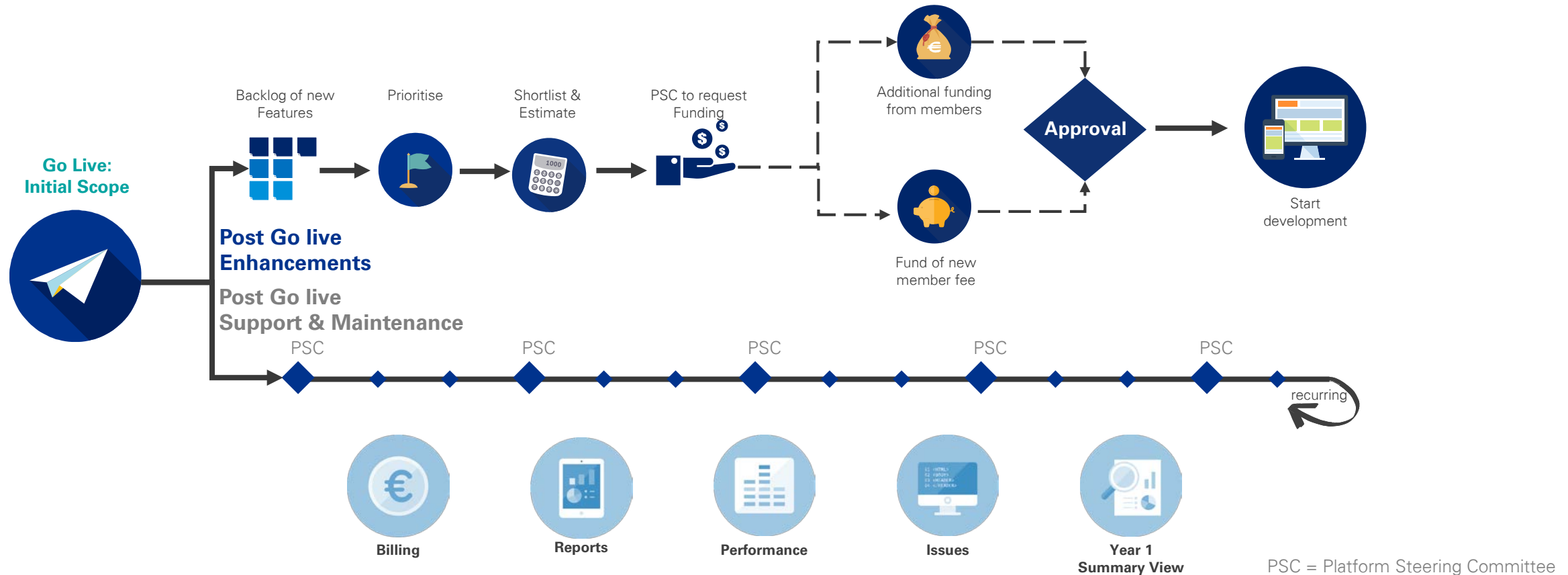
- A) Service Management
- B) Incident Response
- C) Infrastructure/Application Monitoring

Support Model Overview with Platform Operator as the Service Orchestrator:



Platform Support and Enhancement Process

The following process depicts the proposed split between Platform Maintenance and continuous enhancements. Support and Maintenance include recurring platform operations such as Billing, Reporting and Issue resolution while the Enhancement process is a governed approach to add new features to the platform.



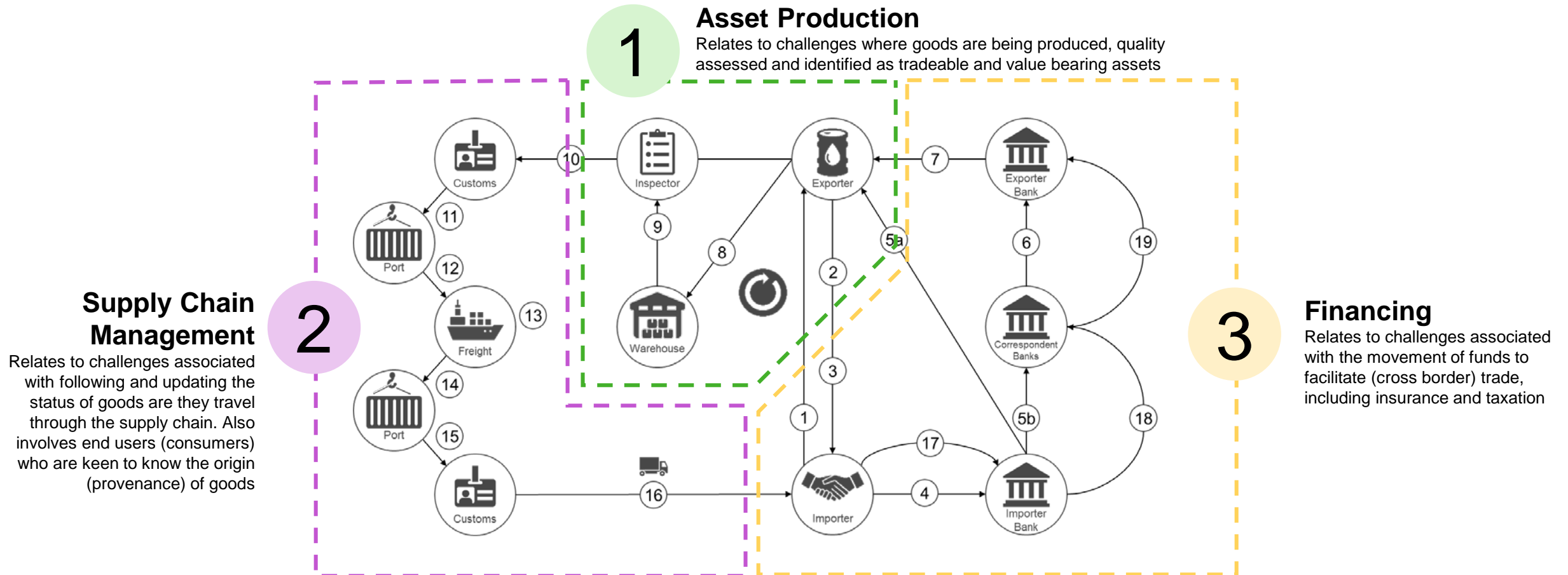


Appendix

Digital Ledger Technology - Business Canvas

Key Activities 	Key Partners 	Value Proposition 	Customer Relationships 	Customer Segments 
<ul style="list-style-type: none"> Build a Managed Services operating model for the platform support, maintenance and continuous enhancement Define the Governance Model for a multi-stakeholder platform Define a pricing model that is easy to understand and encourages continuous investment Design a Vision that builds on interoperability and the creation of an ecosystem for value-add services Create the Minimum Viable Solution for a Digital Trade Finance platform 	<ul style="list-style-type: none"> Cegeka, Implementation Partner Microsoft, Azure Infrastructure (cloud & on premise) R3, Corda DLT platform and R3.Net <div> Key Resources  <ul style="list-style-type: none"> KPMG Hong Kong CIOA HSBC Account Team KPMG Global DLT Team KPMG Lighthouse <ul style="list-style-type: none"> Laszlo Peter KDI Nanjing </div>	<ul style="list-style-type: none"> Independent Trust Provider for a Digital Ledger Value Exchange Orchestrating a consortium of global, experienced partners in Digital Ledger Technology Operating the platform with a secure, highly reliant and FI proven Managed Services model Local firm with strong investment and interest to secure Hong Kong's position as innovation city Strong vision to grow the platform by building corridors for interoperability and an ecosystem of value-add services Digital Ledger Team underpins all of our business, not serving only as a technology service 	<ul style="list-style-type: none"> HSBC Global Trade Finance Team HSBC Digital Ledger Innovation Team HKMA Fintech Facilitation Office Simmons & Simmons Attorneys <div> Channels  <p>Internal showcasing:</p> <ul style="list-style-type: none"> Lunch talks Talk books/Source Workshops <p>External showcasing:</p> <ul style="list-style-type: none"> Client meetings and workshops Belt & Road conferences Associations memberships </div>	<ul style="list-style-type: none"> Financial Industry <ul style="list-style-type: none"> Trade Finance DLT Strategy Green Finance Supply Chain <ul style="list-style-type: none"> 3PL Trace & Track Integrating e-Bill-of-Lading Trading & Manufacturing <ul style="list-style-type: none"> Goods Provenance Quality Control Digital Order Management Insurance <ul style="list-style-type: none"> Trade Finance Insurances PO-backed securities Real Estate <ul style="list-style-type: none"> Contract Management
Cost Structure 		Revenue Stream 		
<p>Cost sources:</p> <ul style="list-style-type: none"> Microsoft node setup costs Microsoft data volume cost, scaling with transaction volume R3 Platform license cost & support tickets KPMG Advisory team for platform build and initial setup KPMG Managed Service & Support Team in KDI 		<p>Three revenue streams for KPMG</p> <ol style="list-style-type: none"> Yearly fee for platform maintenance from all platform participants New client on-boarding fee to setup new nodes & client accounts Project based platform enhancements and new service integration <p>As platform operator we recommend two buckets: One stable bucket for support & maintenance work and another one for enhancements that is primarily filled by newly on-boarding parties or node owners chipping in resources to improve the platform.</p>		

The current Ecosystem of Trade



Other potential partes of the Trade Ecosystem



Exporter

An entity providing the cross-border product/service



Inspector

A company that verifies that the goods shipped match those on the invoice



Importer Bank

An FI that assumes risk on behalf of the importer



Exporter Bank

An FI that assumes risk on behalf of the exporter



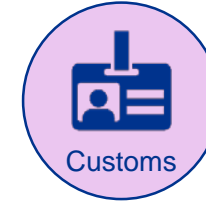
Correspondent Banks

An FI that provides services on behalf of import/export banks



Importer

An entity requesting a cross-border product/service



Customs

The country authority responsible for controlling the flow of goods



Freight

The transport of goods by truck, train, ship or aircraft



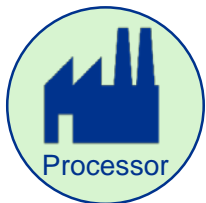
Consumer

End consumer that purchases the processed goods



Warehouse

A company that provides temporary storage for the goods in transit



Processor

A company that converts goods and makes it available for end customers



Insurance

Insurance companies provide trade credit insurance for both importer and exporters



Trading

Trading houses employ commodity financing largely as a means of risk mitigation



Port

A company that provides on and off loading services



Retailer

A company that distributes and sells goods to end consumers



Government Tax

Tax agencies enforce compliance with local government legislation

Asset Production

Financing

Supply Chain Management



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