



Advantages of Blockchain Technology in Supply Chain Management

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12-Sep-2025



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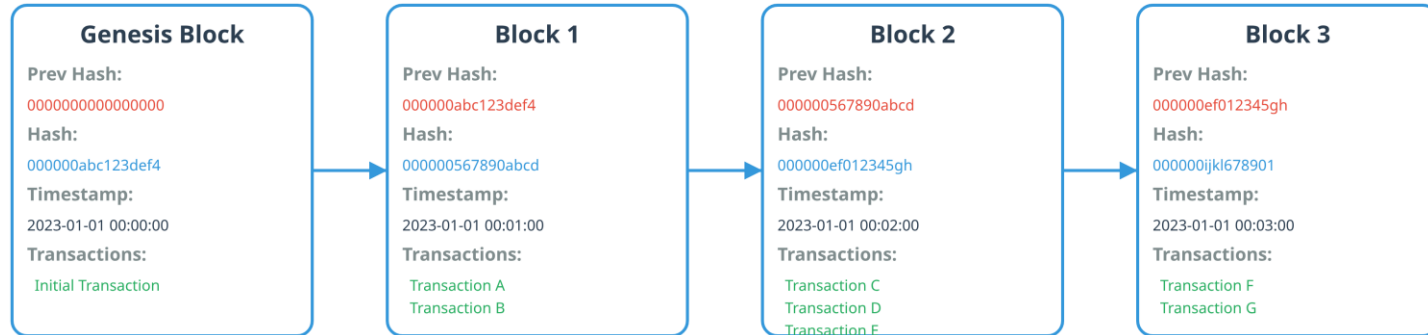
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Agenda

- Introduction to Blockchain technology
 - Blockchain technology
 - RWA
 - Stablecoin
- Use cases sharing

Blockchain Technical Basics: Core Components



Blocks

Data containers with transactions, timestamp, and previous block reference



Hash Function

Cryptographic algorithm creating unique digital fingerprints for data integrity



Distributed Ledger

Synchronized database replicated across multiple nodes for transparency



Cryptography

Public/private key pairs securing transactions and digital signatures

Blockchain Nodes

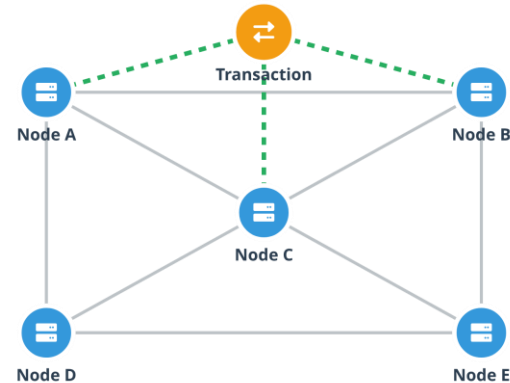
Blockchain Nodes

Nodes are individual computers that maintain copies of the blockchain ledger and participate in network operations. Each node validates transactions and helps secure the network.

Consensus Mechanisms

Consensus mechanisms ensure all nodes agree on the validity of transactions and the current state of the blockchain without requiring a central authority.

Blockchain Network Consensus Process






1. Transaction → 2. Validation → 3. Consensus → 4. Agreement → 5. Block Added

Consensus Mechanisms



Proof of Work (PoW)




Computational Competition

-  High energy consumption
-  Strong security
-  Limited business scalability



Proof of Stake (PoS)




Economic Stake

-  Energy efficient
-  Higher transaction throughput
-  Growing enterprise adoption

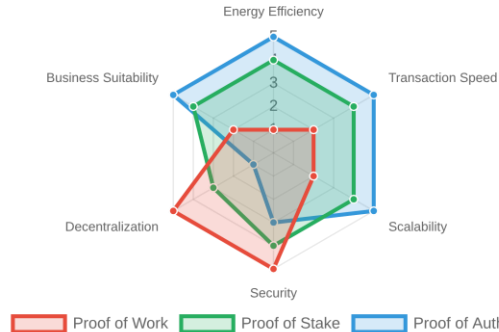


Proof of Authority (PoA)

Identity as Stake

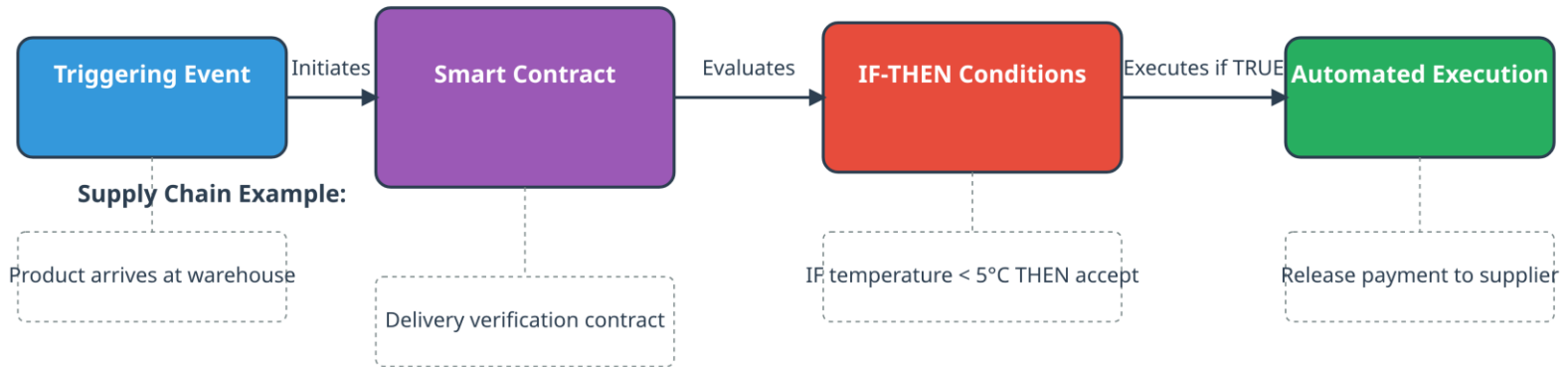
-  High performance
-  Ideal for business consortiums
-  Permissioned access control

Consensus Mechanism Comparison (Scale: 1-5)



Smart Contracts

"Smart contracts are self-executing contracts with the terms directly written into code. They automatically execute actions when predetermined conditions are met."



Blockchain Advantages



Transparency

Provides real-time visibility of transactions to all authorized participants, creating a single source of truth



Immutability

Creates permanent, tamper-proof records that cannot be altered once written to the blockchain



Security

Cryptographic protection ensures data integrity and reduces fraud risk through distributed verification



Efficiency

Automates processes through smart contracts, reducing manual intervention and administrative overhead



Trust

Enables trustworthy transactions between parties without requiring intermediaries or central authorities

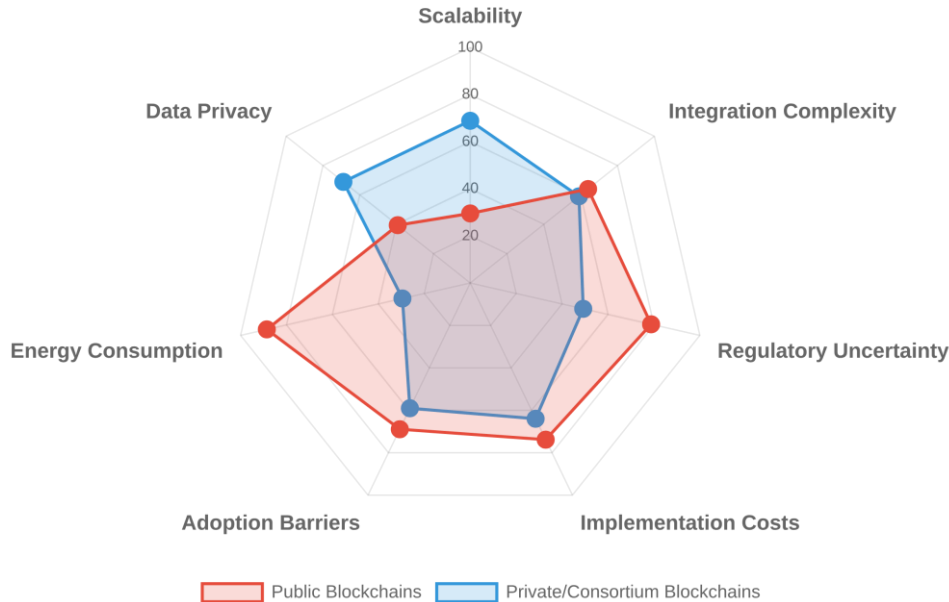


Decentralization

Distributes control across network participants, eliminating single points of failure and enhancing resilience

Blockchain Limitations

Blockchain Limitations by Type



Higher values indicate greater limitation severity

🚧 Scalability Challenges

Transaction throughput limitations (7-15 TPS for Bitcoin, 15-30 TPS for Ethereum) compared to traditional systems (1,700+ TPS for Visa)

🔌 Integration Complexity

Connecting blockchain with legacy ERP systems requires significant technical expertise and custom middleware development

⚖️ Regulatory Uncertainty

Evolving legal frameworks across jurisdictions create compliance challenges, particularly for cross-border supply chains

💰 Implementation Costs

High initial investment for infrastructure, development, and organizational change management, with long ROI

👥 Adoption Barriers

Requires participation from multiple supply chain partners, creating network effect challenges and resistance to change

Blockchain Evolution: ICO, NFT & RWA



Initial Coin Offerings (ICO)

Fundraising mechanism where new projects sell their underlying crypto tokens in exchange for bitcoin and ether, democratizing startup funding.

- Enabled global crowdfunding for blockchain projects
- Led to regulatory frameworks and security token offerings



Non-Fungible Tokens (NFT)

Unique digital assets that represent ownership of specific items, creating new models for digital ownership and authenticity verification.

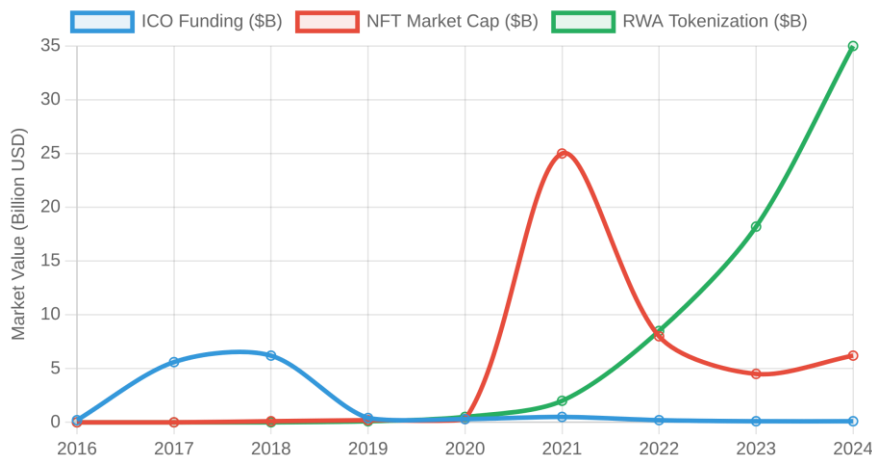
- Supply chain applications for product authenticity
- Luxury goods certification and anti-counterfeiting



Real-World Assets (RWA)

Tokenization of physical and traditional financial assets on blockchain, bridging traditional finance with decentralized finance.

Blockchain Innovation Waves: Market Value Over Time



What are RWAs (Real World Assets)?

RWAs represent the tokenization of tangible or financial assets on blockchain, converting them into digital tokens for easier trading, ownership, and management. This process bridges physical assets (e.g., real estate) with blockchain's efficiency.

RWA Category	Examples	Tokenization Benefits	Potential Challenges
Real Estate	Property shares, commercial buildings	Fractional ownership, global liquidity	Title verification, local laws
Financial Instruments	Bonds, equities, invoices	Faster settlement, reduced costs	Market volatility, counterparty risks
Commodities	Gold, oil	Easy trading, hedging	Physical storage, supply chain issues
Collectibles	Art, intellectual property	Accessibility for smaller investors	Valuation disputes, authenticity

Tokenization Process

- 1.Asset Selection: Choose an asset like property or bonds.
- 2.Legal Structuring: Use Special Purpose Vehicles (SPVs) for compliance.
- 3.Blockchain Integration: Mint tokens on networks like Ethereum, using oracles (e.g., Chainlink) for off-chain data verification.
- 4.Issuance and Trading: Deploy smart contracts for fractional ownership.

Benefits: Tokenization can turn illiquid assets into capital, e.g., tokenizing invoices for quick funding. Global market access expands investor pools, particularly useful in Hong Kong's international trade ecosystem.

Introduction to Stablecoins

Stablecoins are cryptocurrencies engineered to minimize price volatility by pegging their value to stable external references, such as fiat currencies (e.g., USD), commodities, or algorithms. Unlike volatile assets like Bitcoin, they provide a reliable medium for transactions, bridging traditional finance and blockchain.

Common uses:

- *Settlement of crypto trading*
- *Cross-border payments*
- *Emerging-market reserve currency*



	Legacy payment rails	Stablecoin
Speed	<ul style="list-style-type: none">• 1–5 business days	<ul style="list-style-type: none">• Nearly instant settlement
Cost	<ul style="list-style-type: none">• International wire: \$15–\$50 per transaction• Automated clearing house: \$0.2–\$1.5 per transaction• Credit card: 1.5%–3.5% of transaction	<ul style="list-style-type: none">• <\$0.1 per transaction
Cross-border	<ul style="list-style-type: none">• Relies on correspondent or domestic banking system; additional foreign transaction (FX) fees	<ul style="list-style-type: none">• Borderless, minimal, or nonexistent FX fees
Automation and programmability	<ul style="list-style-type: none">• Manual interventions, settlement frictions• Limited API and programmability capabilities	<ul style="list-style-type: none">• Fully digital, smart-contract-enabled programmability
Security	<ul style="list-style-type: none">• Established banking standards• Employs technology to mitigate fraud risk	<ul style="list-style-type: none">• Cryptographically secure and irreversible but catastrophically vulnerable to wallet or key theft risks
Transparency	<ul style="list-style-type: none">• Limited visibility into transaction steps	<ul style="list-style-type: none">• Fully transparent transaction reporting on blockchain
Settlement risks	<ul style="list-style-type: none">• Intermediary or correspondent dependency risks	<ul style="list-style-type: none">• Peer-to-peer, with no intermediary risks
Availability	<ul style="list-style-type: none">• Banking hours or days constraints	<ul style="list-style-type: none">• Fully operational 24/7/365

Supply Chain Challenges



Limited Visibility

lack end-to-end supply chain visibility, creating blind spots in product journeys and inventory management



Manual Documentation

Paper-based processes create inefficiencies attributed to administrative overhead and document handling



Counterfeit Products

Global trade in counterfeit goods increases annually, with limited ability to verify product authenticity



Trust Issues

Reliance on intermediaries and third-party verification increases costs and delays in multi-party transactions



Settlement Delays

Payment processing and reconciliation can take 30-90 days in cross-border trade, creating cash flow challenges



Use cases

1. Enhance document integrity by blockchain
2. Track and Trace and Product Authentication
3. Healthcare Community Support System
4. Digitalization of Paper Forms
5. Insurance Chain
6. Digital Credential Hub
7. Cross-boundary Logistics with Blockchain
8. ESG Reporting
9. Trusted Data Collection Infrastructure for Industrial Digital Finance



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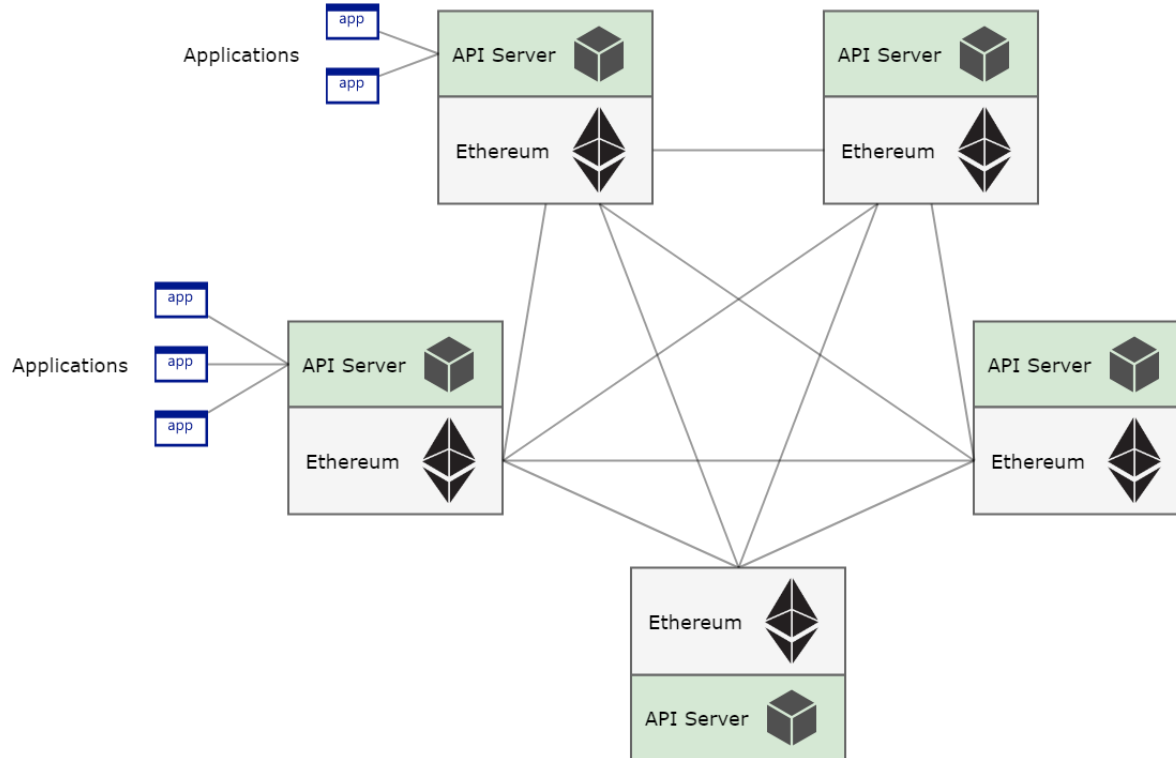
Use case

Enhance document integrity by blockchain

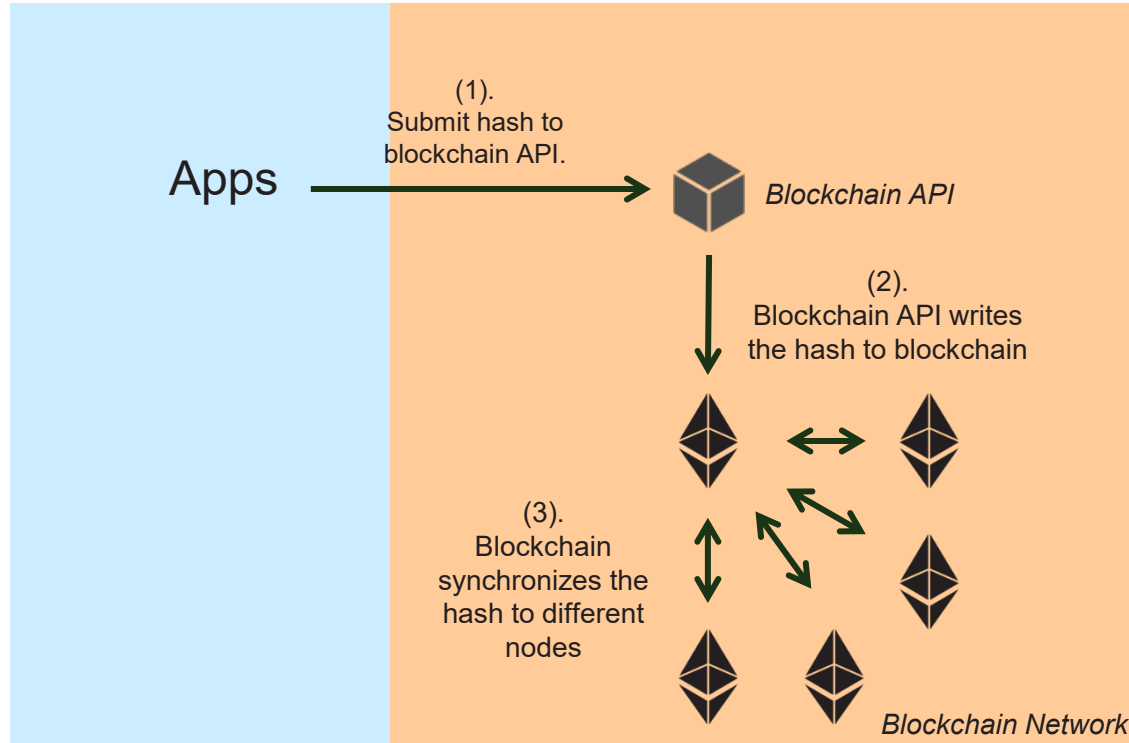
Enhance document integrity by blockchain

- Blockchain being decentralized & data being immutable
 - Even if document is manipulated, the hash in blockchain cannot be altered
- Blockchain data being signed
 - Non-repudiation of documents
- Keeping document hash in blockchain to reduce the storage

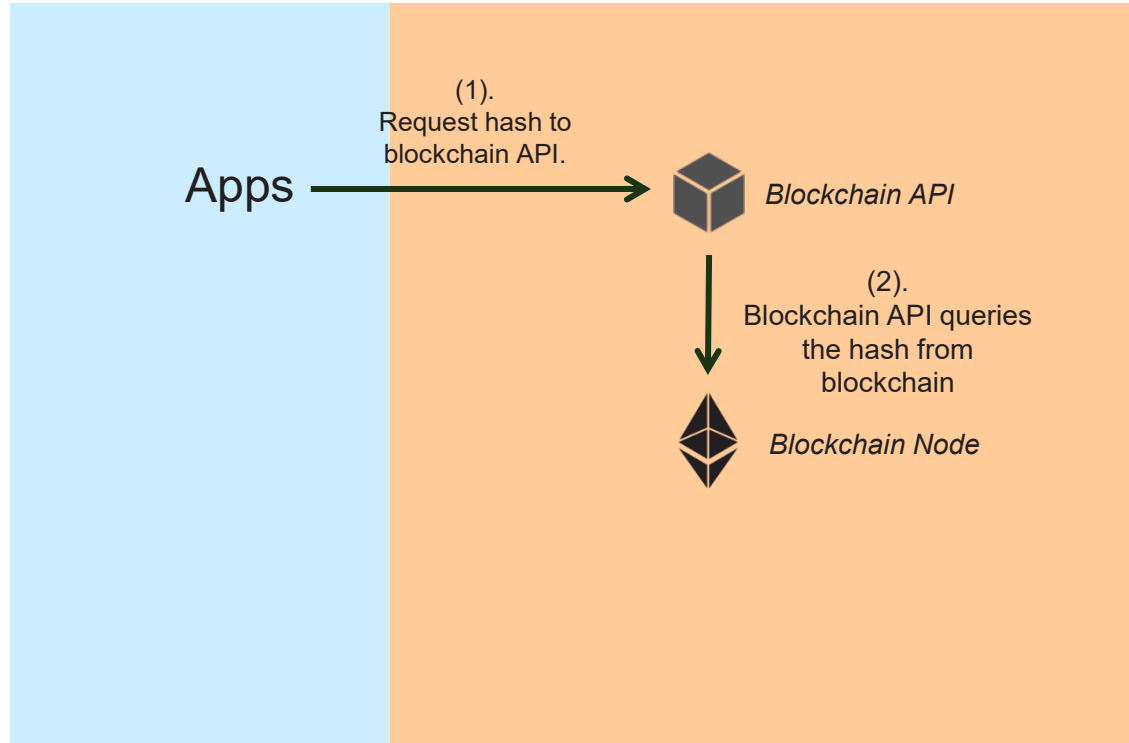
Blockchain Architecture



Save hash to blockchain



Get hash for verification





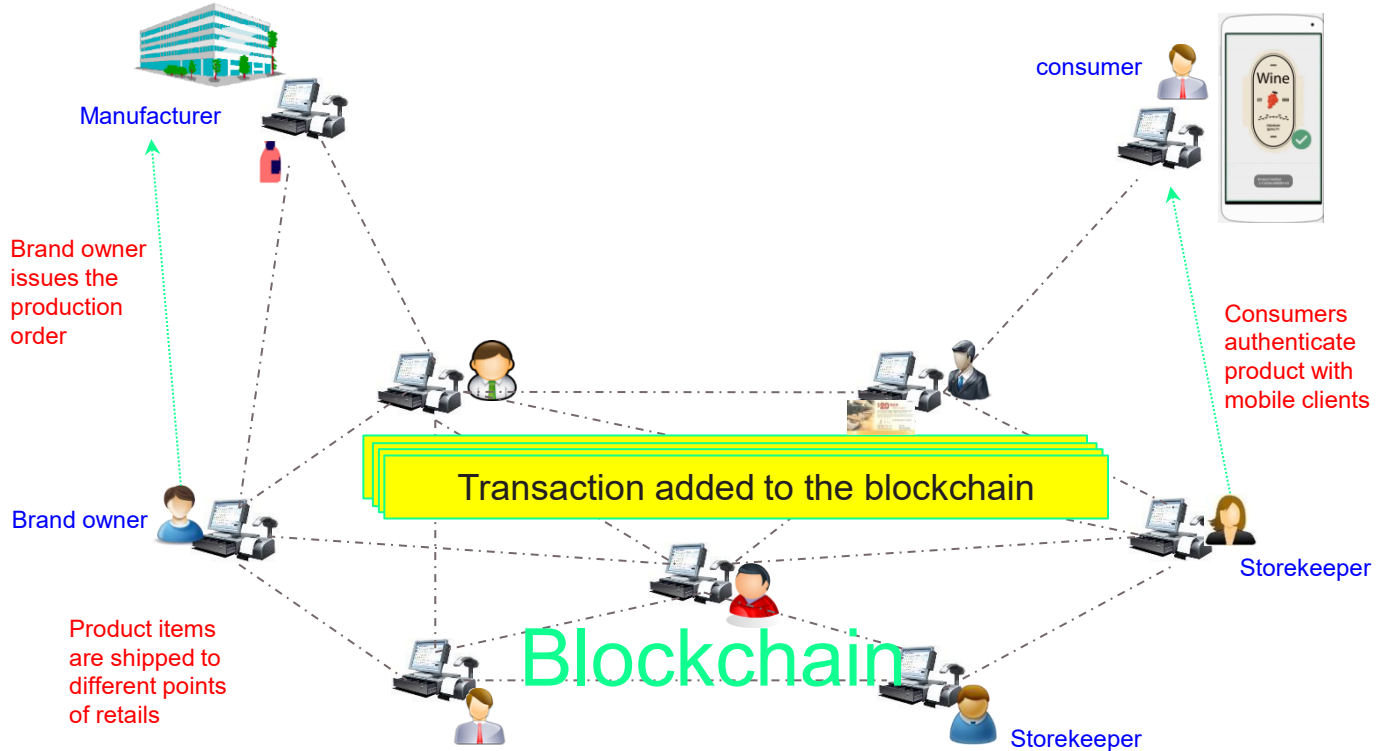
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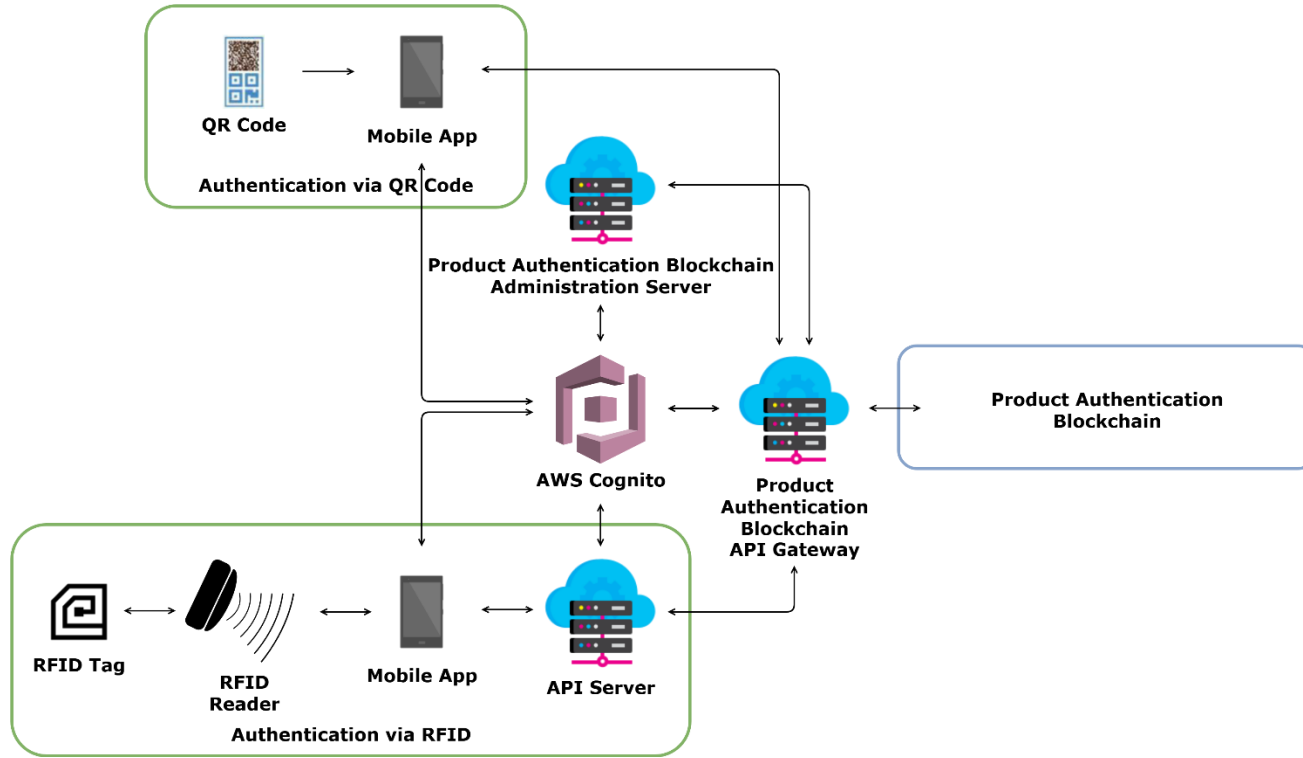
Use case

Track and Trace and Product Authentication

Tack and Trace on Supply Chain Flow



Work Flow – Product Authentication





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Use case

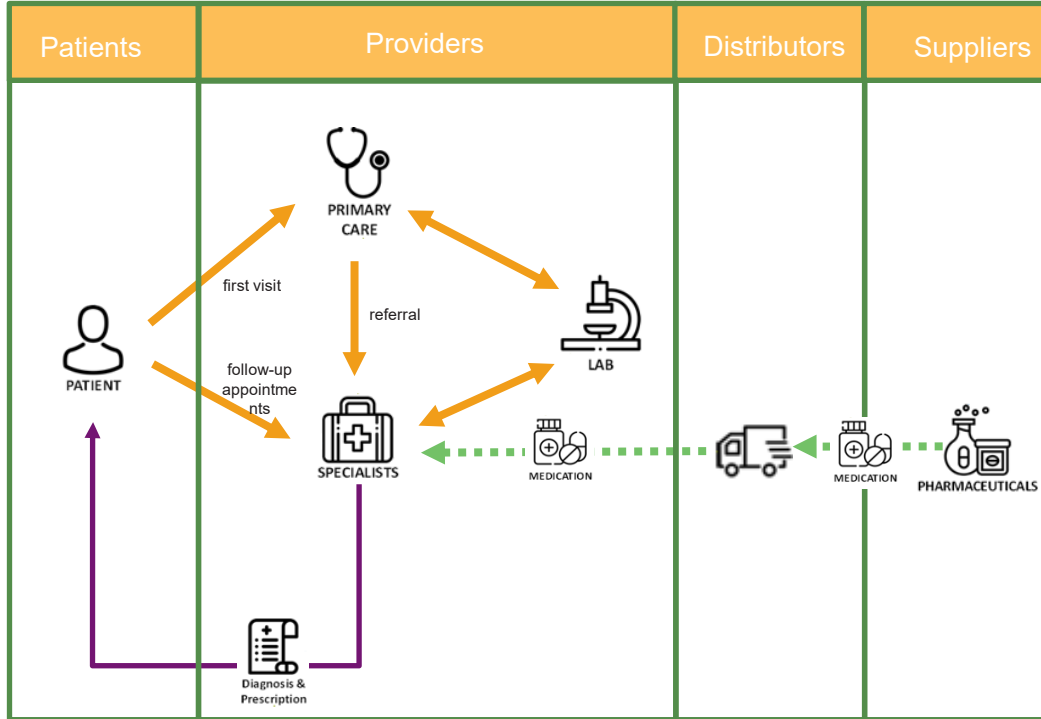
Healthcare Community Support System

Current Healthcare Ecology

- Patient shares health conditions with doctor during consultation.
- Information are not shared with other parties
 - Other doctors, specialists of the same patient
 - Relevant pharmaceuticals
- No up-to-date dissemination of relevant medication information to patient
- Hinder the development of ***personalized healthcare***

Community support services require multiple parties to collaborate on supporting an individual in the society.

Pilot Case Today's Patient Journey

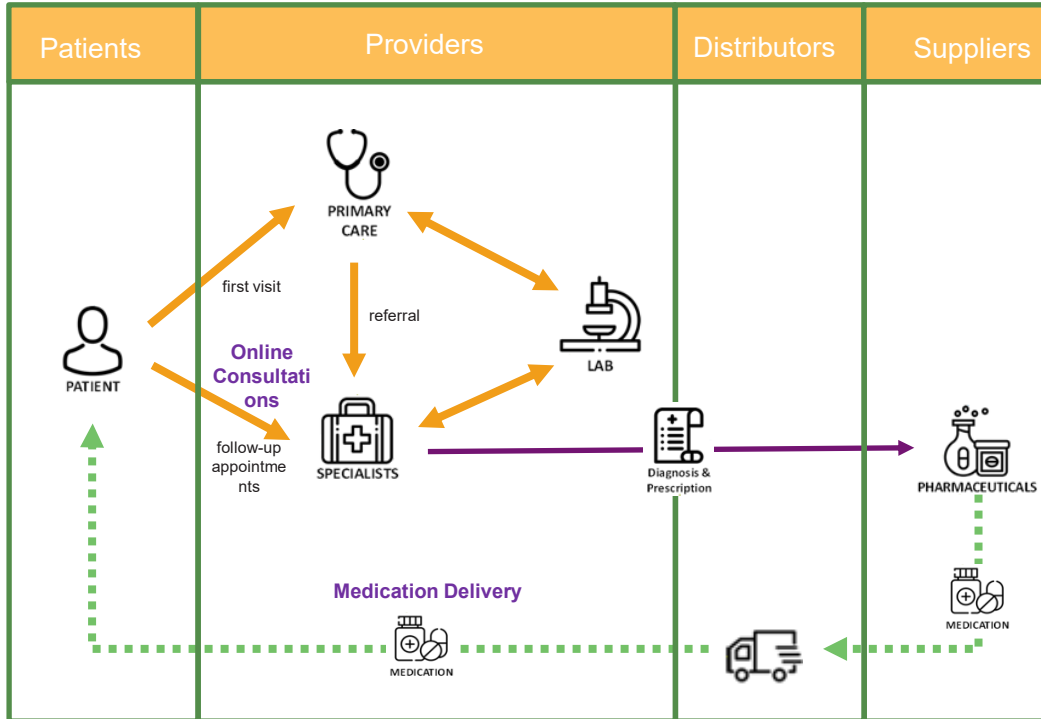


← Patient Journey

← Logistic Flow

← Data Flow

End-to-End Healthcare Community Support System

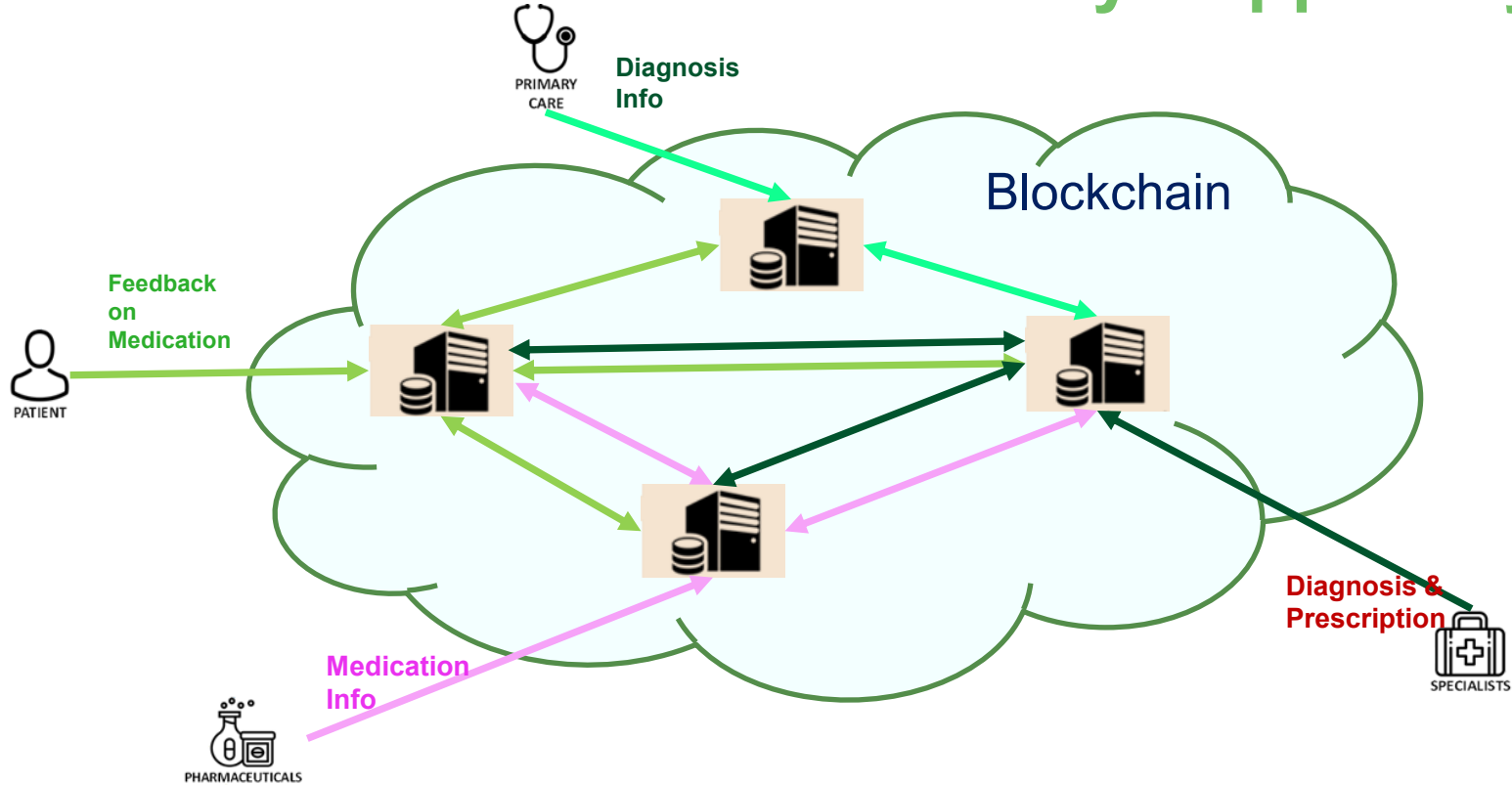


← Patient Journey

← Logistic Flow

← Data Flow

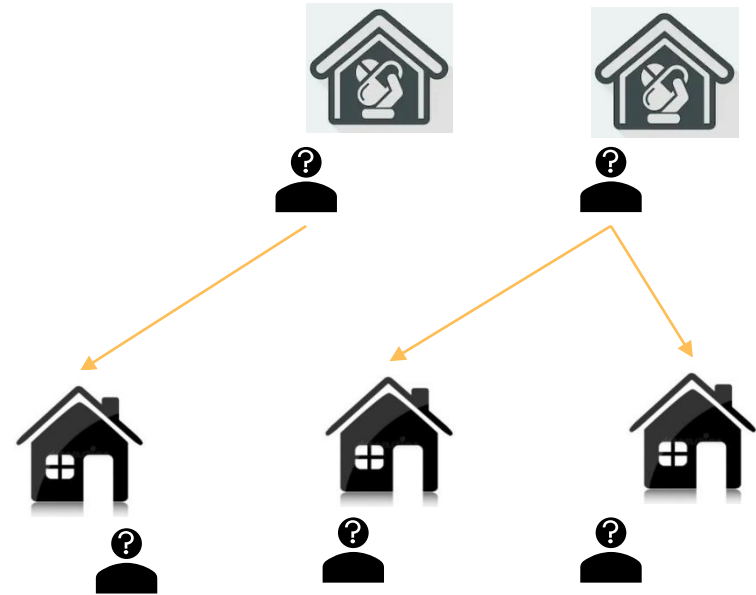
End-to-End Healthcare Community Support System



Medication Fulfillment in Pilot Case

Leverage Privacy Research on Supply Chain Blockchain

- Use fresh blockchain account address for each new blockchain transaction
 - Anonymity & unlinkability for account address
 - Hierarchical deterministic wallet for easier key management





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Use case

Digitalization of Paper Forms

Digital Transformation of Paper Form Samples

Contract No. HY2011/03
 Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road - Section Between Scenic Hill and Hong Kong Boundary Crossing Facilities
REQUEST FOR INSPECTION (WITNESSING) / SURVEY CHECK* FORM (RISCF)
 Ref. No.: RISCF/ TWU 143075 / A
Abbreviation Sequential Number Revision

To Supervising Officer's Representative,
 (Attention: K.C. LAM)
 The following work is expected to be ready for your inspection / testing / survey check / witnessing:
SH7 Tool cabinet slab CH 1863-1364
 (e.g. portion, location, chainage, level)

Reinforcement
 (e.g. foundation, reinforcement, formwork) 10 JUL 2013 10:00AM

at 9:00 on 24/6/2016 before proceeding to the next operation of
(time) (date)
 steel fixing concreting backfilling pipelaying covering up
 (others)

which is scheduled for _____ (time) _____ (date) using the following plant:
 Details of plant: _____

Issued 14:00 16/7/2014 by [Redacted] AG
(time) (date) (Name) (Designation) (Signature)

Received 16:00 18/7/2014 by [Redacted] BZ
(time) (date) (Name) (Designation) (Signature)

To Project Manager
 (Attention: [Redacted])
 The work has been witnessed.
 There is no objection to you proceeding with the work.
 The following deficiencies have been noted: _____

Please advise me when these deficiencies have been made good.

Issued 11:00 18/7/2014 by [Redacted] BZ
(time) (date) (Name) (Designation) (Signature)

Received 11:00 18/7/2014 by [Redacted] SA
(time) (date) (Name) (Designation) (Signature)

Work re-inspected/surveyed, no objection to you proceeding.

Issued _____ (time) _____ (date) by _____ (Name) _____ (Designation) _____ (Signature)

The giving of this information and this inspection shall not relieve the Contractor of any liabilities or obligations under the Contract.
 Abbreviation: BAW - Building/Architectural Works BRW - Bridge Works TLUW - Tunneling Works GEO - Geotechnical Works
 RDU - Road, Drain & Utilities Works MAW - Marine Works LPW - Landscaping Works SUW - Surveying Works
 EAM - Electrical & Mechanical GEN - General Works OTH - Other Works

Two copies retained by SOR (White - original + Blue) Yellow - retained by CSHK Pink - returned to CSHK
 *Delete as appropriate

Item 1 - Location	
Before	After
	
Emergency Contact no. should be updated.	Emergency Contact no. was updated.
Item 2 - Location	
Before	After
	
LRO contact info should be displayed.	LRO contact info was displayed.
Item 3 - Location	
Before	After
	
Material should be stored properly and safe access should be provided.	Material was removed and safe access was provided.

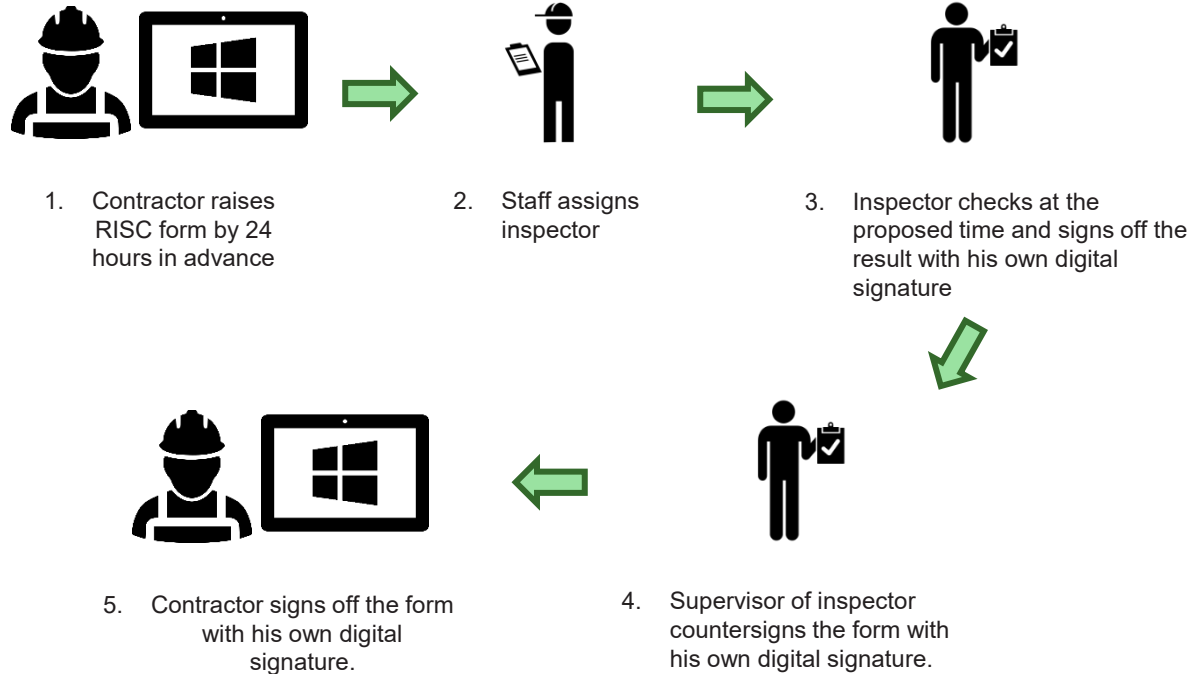
Pain Points

- Projects involve a lot of workflow processes with different parties.
- All current workflow processes are all handled manually.
- Different workflow processes involve many different forms and reports.
- All forms and reports are in paper form with no digitization.

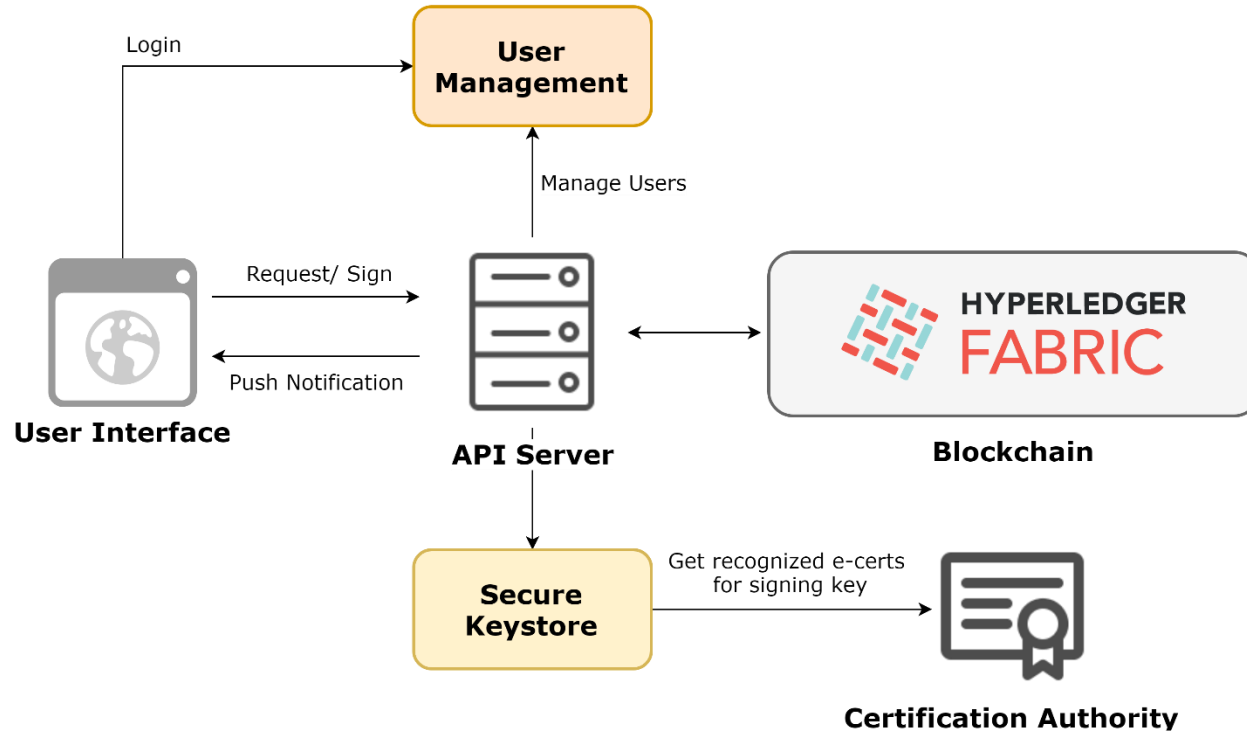
Issues

- Inefficiency in manual workflow processes on circulating paper forms to different parties along the workflows.
- Progress opacity from offsite management.
- Keeping and archiving paper forms subject to loss and damage.
- Paper records are not immutable.

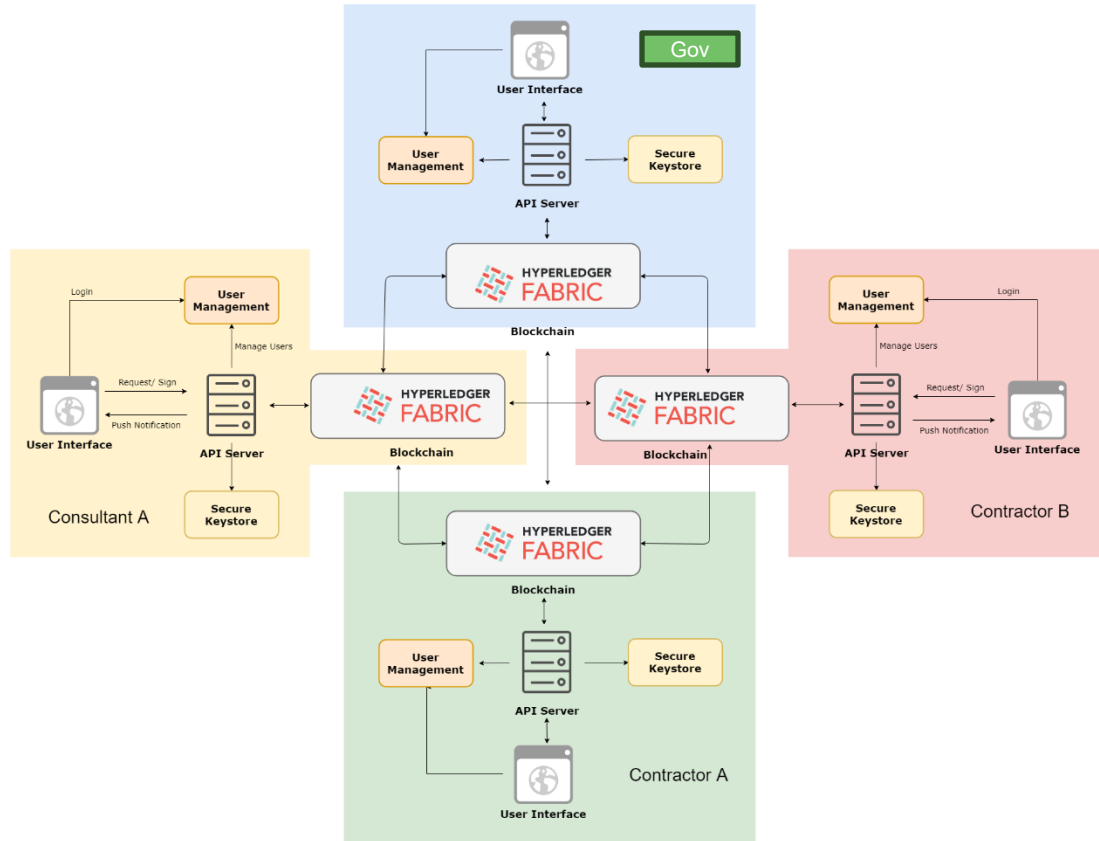
Workflow



Architecture within an organization



Architecture for Multiple Organizations



Benefits

- Data are kept online **securely** and are being stored at **multiple locations** instead of a centralized location which **reduce the risk of data loss**.
- Blockchain technologies provide **immutable audit history** with timestamp for reports.
- Involved parties can now access reports online instead of passing the hardcopy papers form which improve the **efficiency** of the whole process.
- Management staff offsite can now be able to check the reports online anytime which helps better **management** of the work.
- Users can now have view access and backup copies for those contracts managed by consultant companies which improves the **transparency** of the process.
- Having the data digitized online opens up the **possibility** of future usage for different purposes.



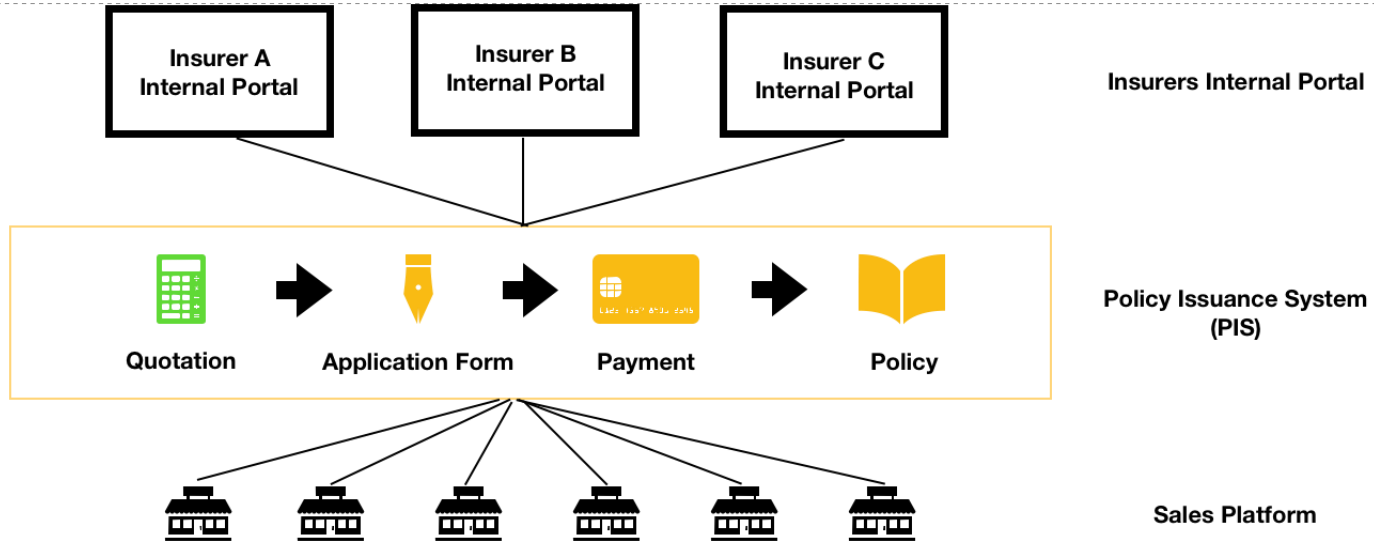
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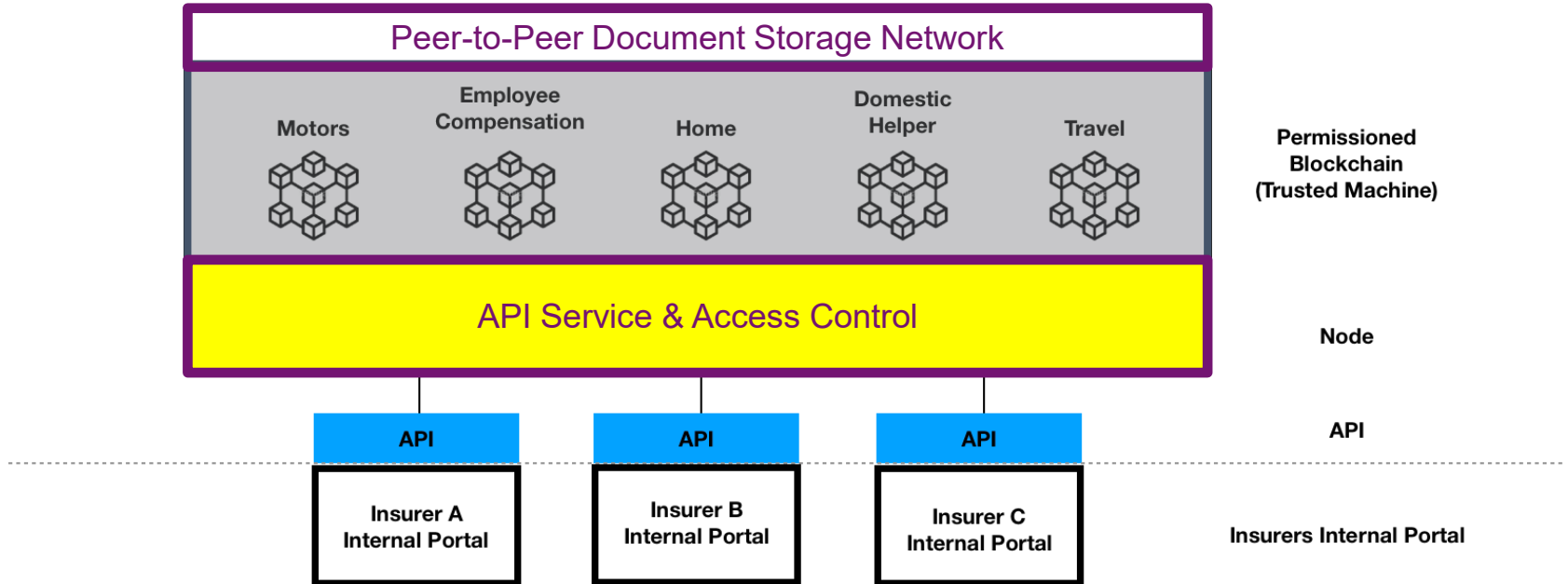
Use case

Insurance Chain

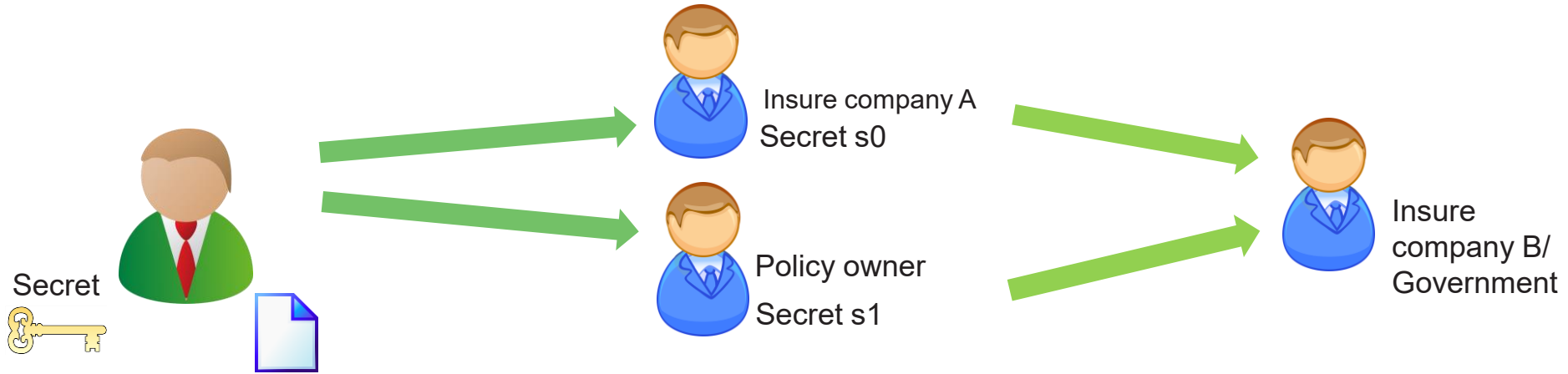
Insurance Sales Workflow



Architecture of Insurance Chain



Threshold Encryption for Access Control



Insurance Blockchain

How this technology benefit the market



Instant access of insurance history
 Instant checking of clients' claim records and NCB



Instant validation of insurance policy
 Trusted machine to reveal counterfeit contracts



Claims handling
 Sharing among insurance companies of claim history

Improve Market Efficiency



Accurate Pricing
 With the detail insured history, insurance company can price the risk more precisely



Eliminate unlicensed selling
 Traceable sale channel for every issued policy



Reduce Operational Cost & Credit Risk
 Less resource is required for policy admin and less credit period required



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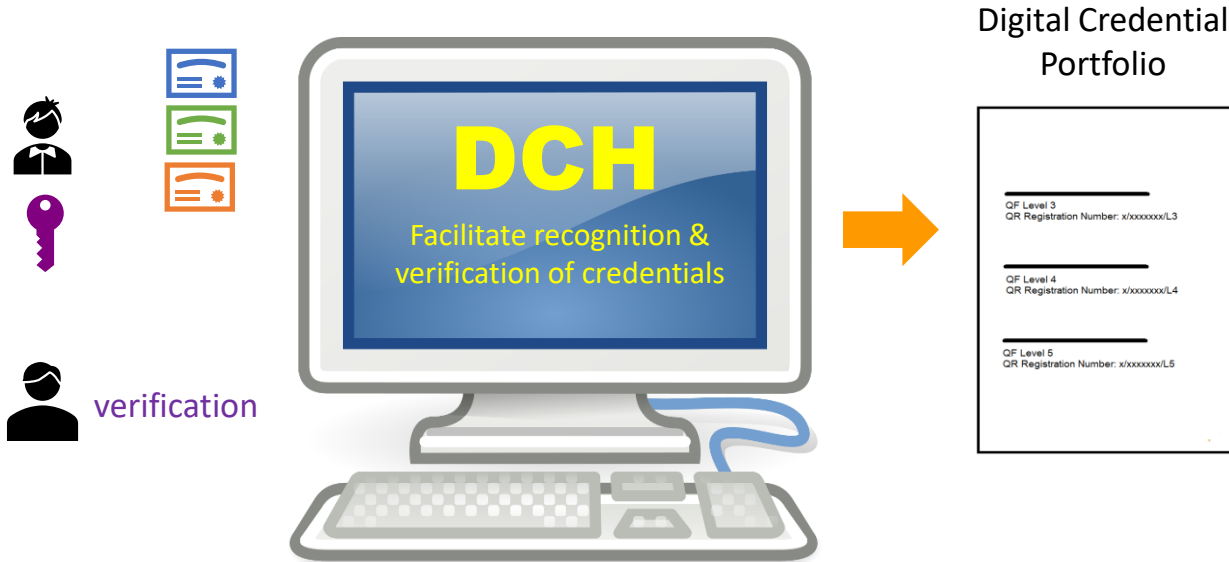
Use case

Digital Credential Hub

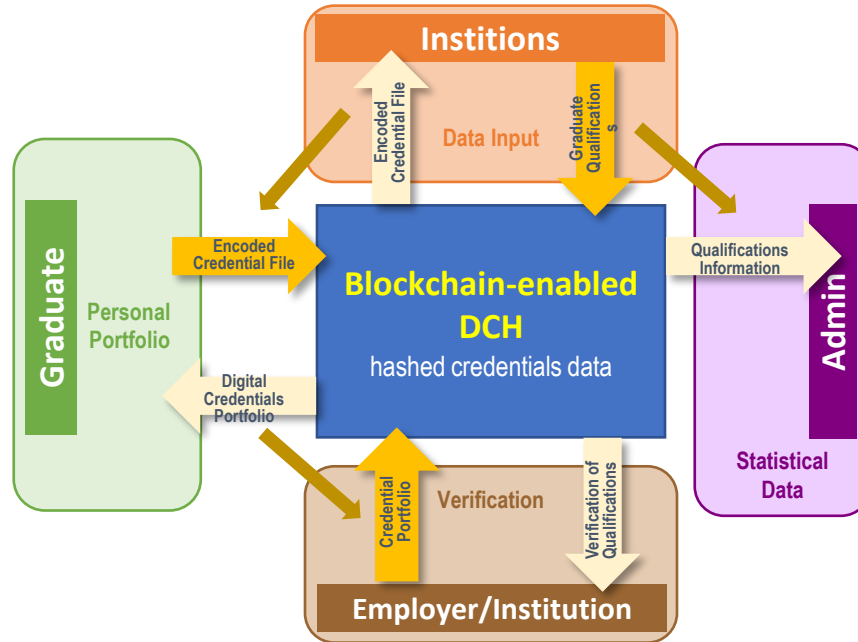
Verify of Certificate Authenticity

- Frequent enquiries about the recognition of qualifications from both local and overseas institutions and agencies
- Verification of qualifications submitted by applicants is a time-consuming manual process
- Looking for solution to facilitate:
 - Qualification verification by students and companies
 - Prevent fake qualification
 - Facilitate students to manage qualification portfolio
 - Enhance privacy protection of students
 - Provide statistics of graduation information

Digital Credentials Hub (DCH)



Authentication of Digital Credential





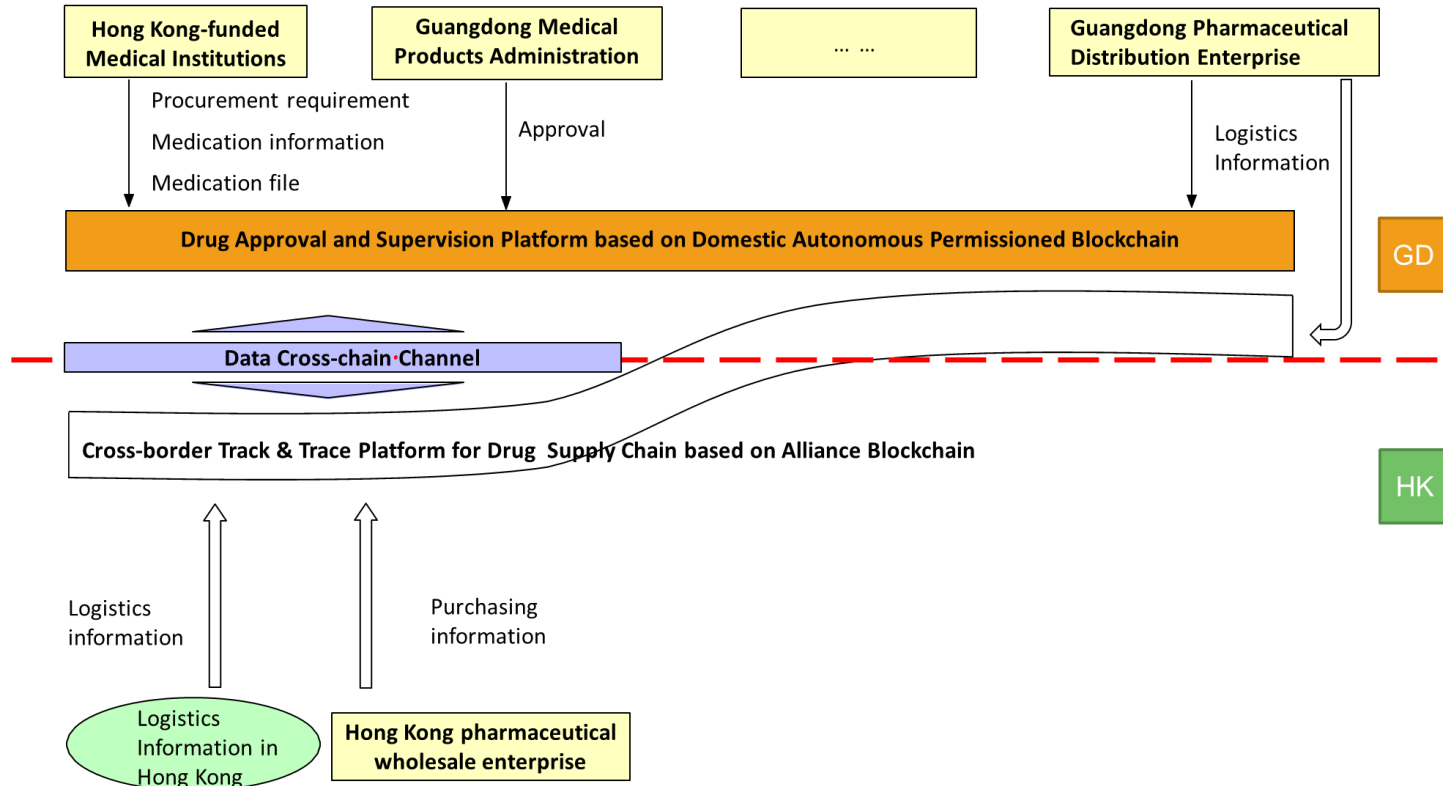
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Use case

Cross-boundary Logistics with Blockchain

Blockchain-enabled Application Scenario





Benefits

1. This project provides medical convenience for Hong Kong residents living in the Greater Bay Area, which improves their medical services quality.
2. Hong Kong faces severe aging challenges. If the project successfully helps to introduce Hong Kong medicines into the Mainland, it will provide some convenience for Hong Kong elderly people in the Greater Bay.
3. It will help promote the interconnection of the medical systems of the Greater Bay Area, open the mainland market for Hong Kong medical institutions, and bring opportunities for them develop the mainland market. It will also help attract more Hong Kong people to work and live in the Greater Bay Area.



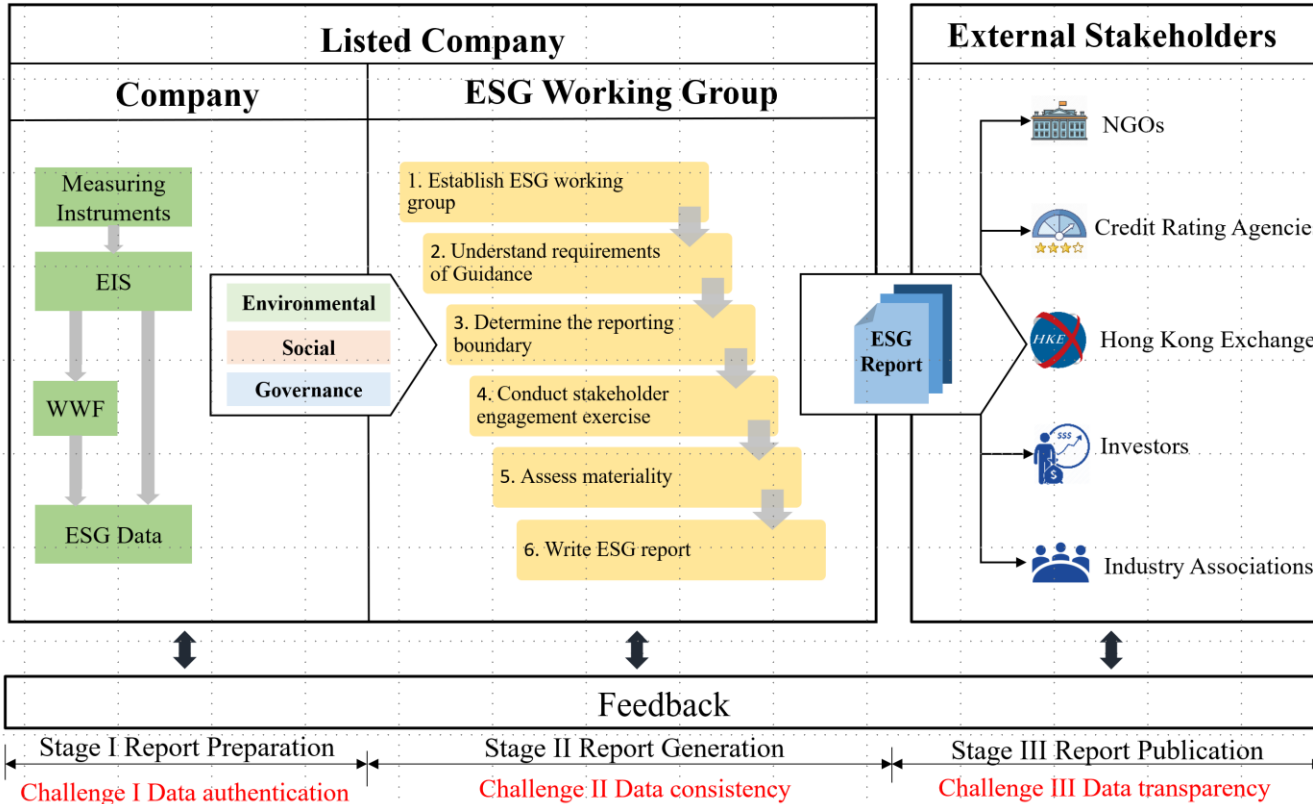
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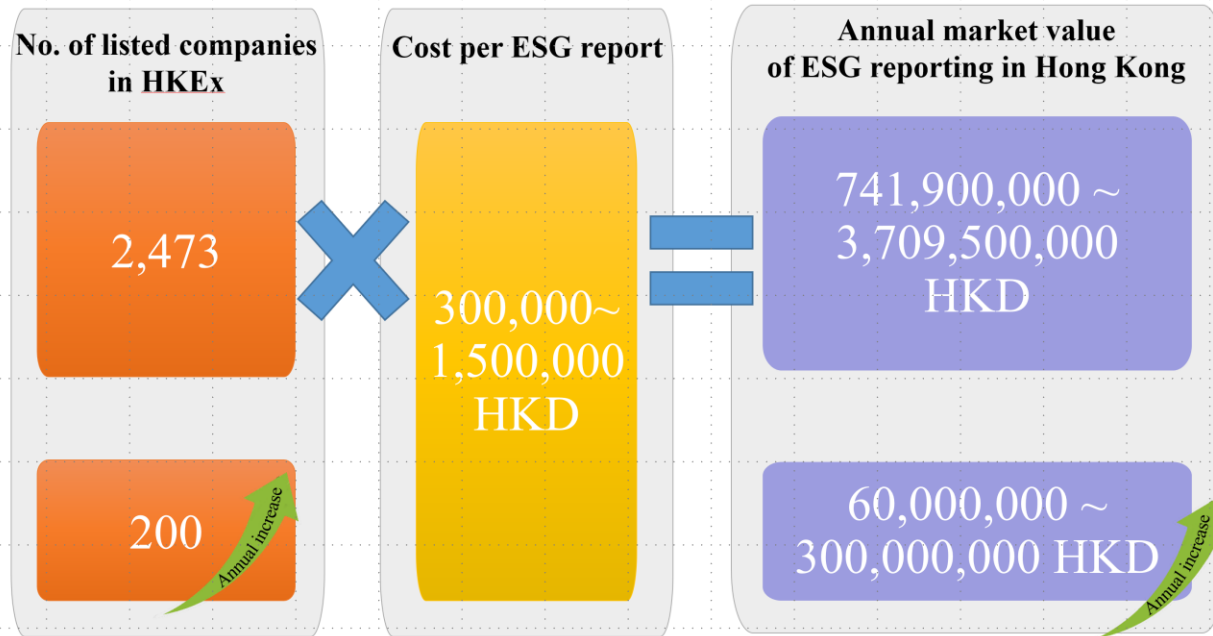
Use case

ESG Reporting

ESG Reporting Scenarios

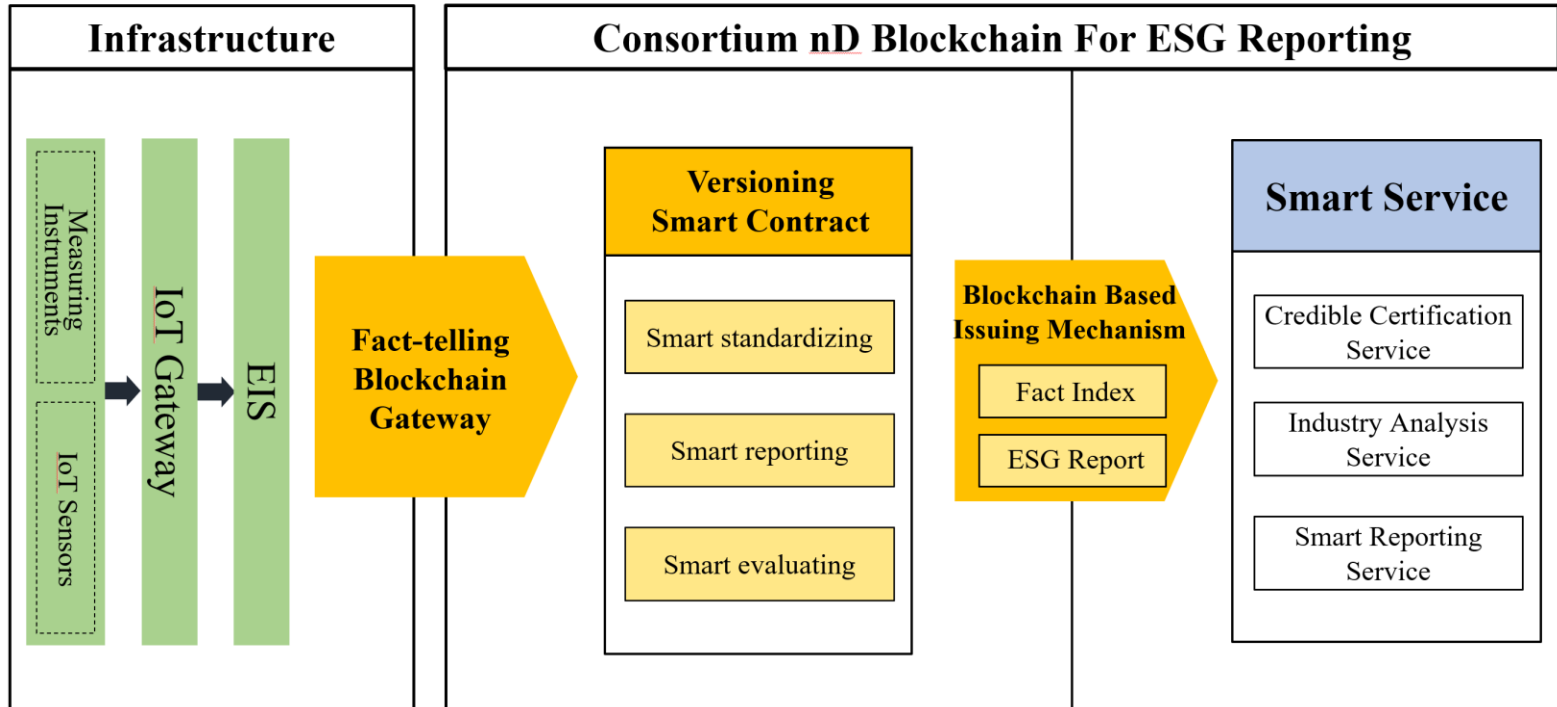


ESG Reporting Scenarios



Ref: https://www.hkex.com.hk/Market-Data/Statistics/Consolidated-Reports/Monthly-Bulletin?sc_lang=zh-HK#select1=0&select2=0

Blockchain for ESG Reporting



Before and After

Comparisons	Before	After
ESG report		
Report preparation	<ul style="list-style-type: none"> • Unreliable data collection; • Untrusted data processing; • Lack of accessibility of raw data 	<ul style="list-style-type: none"> • IoT-based smart perception; • Token-based fact evaluation; • Transparency with privacy
Report generation	<ul style="list-style-type: none"> • Disunified ESG data format; • Lack of independent assurance; • Inconsistent report issuing 	<ul style="list-style-type: none"> • Versioning smart contract-enabled ESG data standardization; • nD blockchain-enabled ESG data sharing; • Versioning smart contract-enabled ESG report consistency evaluation
Report publication	<ul style="list-style-type: none"> • Untrusted ESG reporting; • Lack of reporting traceability; • Inefficient report feedback 	<ul style="list-style-type: none"> • Highly transparent ESG reporting lifecycle; • nD blockchain-enabled reporting traceability; • Smart services



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Use case

Trusted Data Collection Infrastructure for Industrial Digital Finance

Data collection Infrastructure for RWA

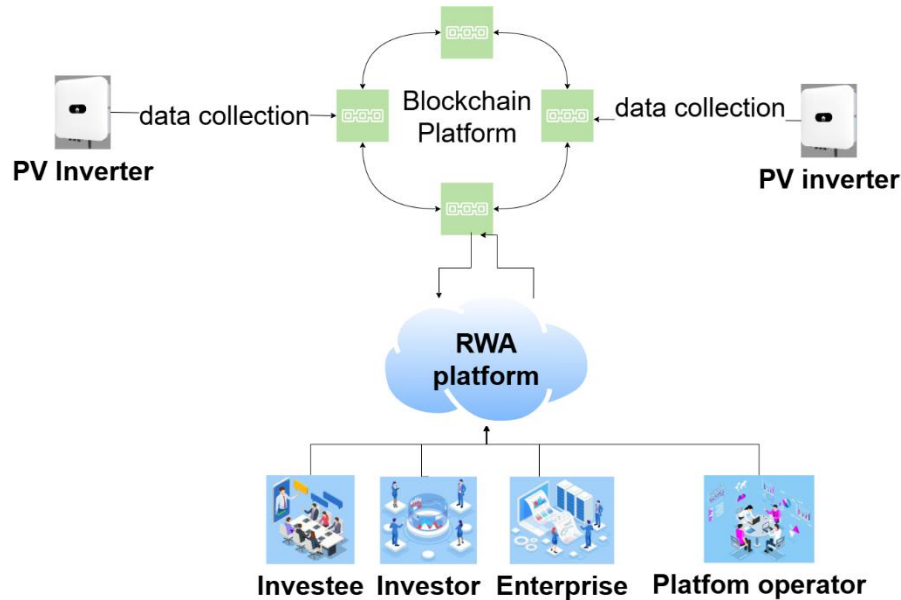
Insufficient Asset Data Credibility

When companies seek investment, investors often question the **authenticity of assets** and return calculations, needs **trusted data collection methods** to collect industrial data for accurate market valuation.

However, current data collection methods have drawbacks below:

1. Lack of IoT devices that can collect raw data in real time
2. Collected data lack of transparency and trust
3. Data transmission lacks security considerations and has the risk of leakage

Data collection Infrastructure for RWA

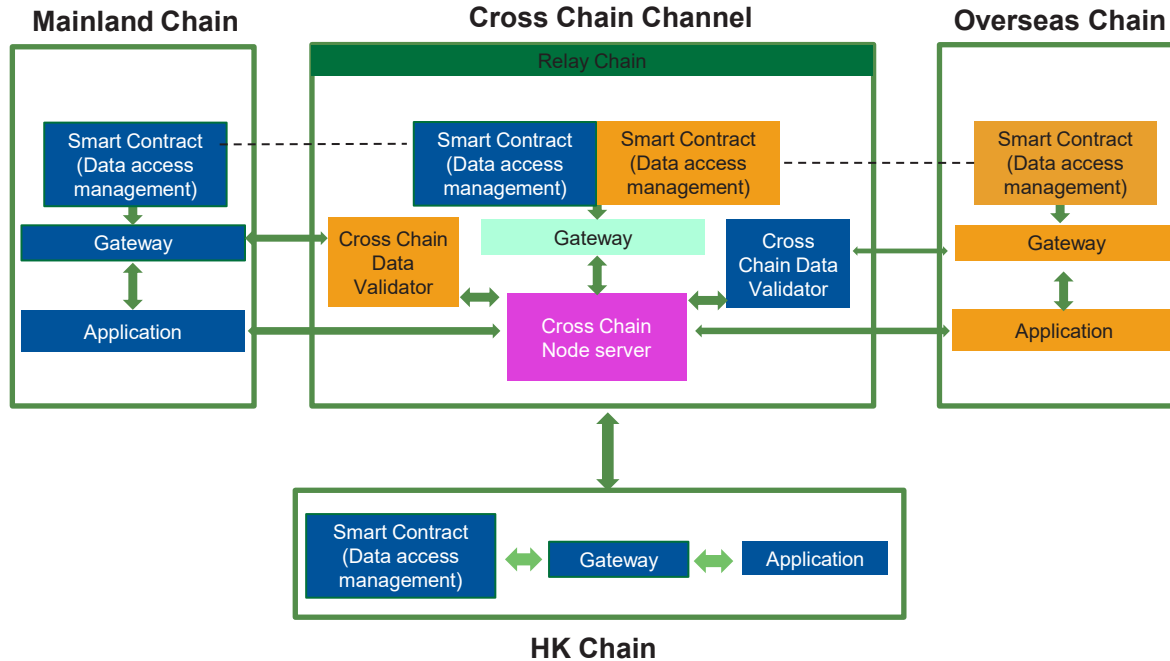


Challenges

- a) Light weight deployed blockchain to meet with different needs in mainland and overseas
 - Since domestic blockchain may not be accepted by outside of China, so need an international popular blockchain

- b) Cross chain protocol
 - Cross chain protocol between the International popular blockchain and other blockchains

Cross-chain Data Exchange Channel Architecture





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