

TRW AND BLOCKCHAIN

THE REAL WORLD (TRW) AND BLOCKCHAIN

WHAT ARE THE REAL-WORLD USE CASES? WHY DO WE THINK THIS IS THE BIGGEST TECHNOLOGY REVOLUTION DRIVEN BY SOFTWARE SINCE TRANSMISSION CONTROL PROTOCOL AND THE INTERNET PROTOCOL (TCP/IP)?

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Recently, we have emphasized our belief that distributed ledger technology adoption will drive the next technology revolution. Today when we talk about “blockchain,” people first think about “cryptocurrencies,” “coins” and “tokens” but do not focus on the software. Cryptocurrencies hog the spotlight, but blockchain’s biggest innovations are below the surface, potentially saving billions each year for the world’s largest companies. We believe that distributed ledger technology software or blockchain as, it is often referred to, is the key to changing how the world does business. As we “preach” the blockchain gospel it is almost a guarantee that someone says, “yeah but tell me what the practical use cases are and who is utilizing the technology.” This paper will focus on Hyperledger a blockchain technology that is currently being adopted by businesses but does not get the headlines of bitcoin, ethereum or other blockchain software.

We believe Hyperledger, an open source project from the Linux Foundation, is the modular blockchain framework and de facto standard for enterprise blockchain platforms. Intended as a foundation for developing enterprise-grade applications and industry solutions, the open, modular architecture uses plug-and-play components to accommodate a wide range of use cases.

With more than 120,000 contributing organizations and more than 15,000 engineer contributors working together, we believe Hyperledger offers a unique approach to consensus that enables performance at scale while also preserving the data privacy enterprises demand.

Hyperledger is an open, proven, enterprise-grade, distributed ledger platform. We believe it has advanced privacy controls that only the data enterprises want shared among the “permissioned” (known) network participants.

Most cryptocurrencies use permissionless blockchains where anyone can join and have full rights to use it. For example, anyone can buy Bitcoin or Ether because those use wide-open, permissionless blockchains. On the other hand, business blockchains tend to be permissioned. This means a person needs to meet certain requirements to perform certain actions on the blockchain. Some permissioned blockchains restrict access to pre-verified users who have already proven they are who they say they are. Others allow anyone to join, but only let trusted identities verify transactions on the blockchain.

We believe the use of smart contracts on top of the Hyperledger blockchain allow businesses to document the business processes that they want to automate with self-executing terms between the parties written into lines of code. The code and the agreements contained therein exist across the distributed, decentralized blockchain network. Transactions are trackable and irreversible, creating trust between organizations. This enables businesses to make more informed decisions with less friction thus saving time, reducing costs, and reducing risks.

A smart contract is essentially business logic running on a blockchain. Smart contracts can be as simple as a data update, or as complex as executing a contract with conditions attached. For example, a smart contract can update an account balance, with validation to ensure that enough money is in an account before doing a debit. A more complex smart contract can be written to stipulate that the cost of shipping an item depends on when it arrives. With the terms agreed by both parties and written to the ledger, the appropriate funds change hands automatically when the item is received.

There are two different types of smart contracts:

1. Installed smart contracts install business logic on the validators in the network before the network is launched.
2. On-chain smart contracts deploy business logic as a transaction committed to the blockchain and then called by subsequent transactions. With on-chain smart contracts, the code that defines the business logic becomes part of the ledger.

We believe Hyperledger was designed for enterprise use. Hyperledger is intended as a foundation for developing applications or solutions with a modular architecture. We believe its modular and versatile design satisfies a broad range of industry use cases.

Blockchains use various types of consensus systems to make sure the information in the database is always correct. Consensus is the process by which a network of nodes provides a guaranteed ordering of transactions and validates the block of transactions. We believe consensus must provide the following core functionality:

1. Confirms the correctness of all transactions in a proposed block, according to endorsement and consensus policies.
2. Agrees on order and correctness and hence on results of execution (implies agreement on global state).
3. Interfaces and depends on smart contract layer to verify correctness of an ordered set of transactions in a block.

Consensus systems take many different forms with different names. For instance, Bitcoin uses a proof-of-work consensus, where the participants' computers solve difficult math problems. Other types of consensus are called proof of elapsed time and proof of stake. Many permissioned blockchains use something called Byzantine Fault Tolerant consensus algorithms. We believe Hyperledger offers a unique approach to consensus that enables performance at scale while preserving privacy.

As we will always emphasize, the adoption of distributed ledger technology, including nonfungible tokens and digital assets is simply about software and making transaction involving any type of asset, property or information frictionless, trusted, irreversible and trackable.

All Hyperledger buildouts follow a design philosophy that includes a modular extensible approach, interoperability, an emphasis on highly secure solutions, a token-agnostic approach with no native cryptocurrency, and the development of a rich and easy to use Application Programming Interface (API). We believe the Hyperledger architecture is differentiated by the following business blockchain components:

1. Consensus Layer - Responsible for generating an agreement on the order and confirming the correctness of the set of transactions that constitute a block.
2. Smart Contract Layer - Responsible for processing transaction requests and determining if transactions are valid by executing business logic.
3. Communication Layer - Responsible for peer-to-peer message transport between the nodes that participate in a shared ledger instance.
4. Data Store Abstraction - Allows different data-stores to be used by other modules.
5. Crypto Abstraction - Allows different crypto algorithms or modules to be swapped out without affecting other modules.
6. Identity Services - Enables the establishment of a root of trust during setup of a blockchain instance, the enrollment and registration of identities or system entities during network operation, and the management of changes like drops, adds, and revocations. Also, provides authentication and authorization.
7. Policy Services - Responsible for policy management of various policies specified in the system, such as the endorsement policy, consensus policy, or group management policy. It interfaces and depends on other modules to enforce the various policies.

8. APIs - Enables clients and applications to interface to blockchains.
9. Interoperation - Supports the interoperation between different blockchain instances.

Examples of Industry Use Cases for Hyperledger

Supply Chain

Supply chains are global, distributed webs of suppliers, manufacturers, and retailers. Hyperledger Fabric networks can improve supply chain processes by increasing transparency and traceability of transactions within the network. On a Fabric network, companies with access to the ledger can view the same immutable data, which enforces accountability and reduces the risk for counterfeiting. In addition, production updates are added to the ledger in real time, which makes tracking provenance faster and simpler during events like product recalls or food contamination outbreaks.

Trading and Asset Transfer

Trading requires many organizations such as importers, exporters, banks, shipping companies, and customs departments, to work with one another. Using Hyperledger Fabric, financial and trading consortiums can easily create a blockchain network where all parties can transact and process trade-related paperwork electronically, without the need for a central trusted authority. Unlike other processes that require trade-related paperwork to go back and forth between the stakeholders, taking 5-10 days to complete, transactions in a Hyperledger Fabric network built using Managed Blockchain can process instantly.

Insurance

Insurance fraud costs the insurance industry billions of dollars a year, but with Hyperledger Fabric, insurance companies can reference transaction data stored on the ledger to identify duplicate or falsified claims. Blockchain can also make multi-party subrogation claims processing faster by using smart contracts to automate repayment from the at-fault party back to the insurance company. In addition, insurers can use Hyperledger Fabric to streamline Know Your Customer (KYC) processes by storing customer data on a distributed ledger and automating the verification of their identity documents with smart contracts.

The following company specific Hyperledger use cases were sourced from the "Forbes Blockchain 50 2022" February 8th 2022.

The companies mentioned below are a subset of companies listed in the original article. These companies were selected to show a variety of business applications using distributed ledger technology and are listed for general discussion purposes. Please see the original article for the full list of companies. Emerald does not recommend their purchase or sale.

Allianz

MUNICH, GERMANY

The insurance giant (\$164 billion, 12-month sales) uses blockchain to streamline cross-border auto insurance claims in Europe. Different teams and incompatible databases used to mean many back-and-forth emails. Claims could take months to settle. Now there is a single source record of each claim. Processing time has been reduced to minutes, and costs have fallen 10%. So far, it is being used by 25 Allianz subsidiaries to settle 850,000 claims.

Anthem

INDIANAPOLIS, INDIANA

The \$137 billion (sales) Blue Cross Blue Shield licensee is testing the blockchain to try to speed up an arcane administrative process known as “coordination of benefits,” which determines one’s primary insurer. It usually requires a series of faxes (yes! faxes!) and phone calls and can take up to three months. Through a shared ledger with Chicago-based Health Care Service Corporation, Medicaid members in Texas, the companies now make this determination in minutes or hours. Anthem’s blockchain program processes around 3,000 to 5,000 verifications a month.

A.P. Moller—Maersk

COPENHAGEN, DENMARK

The world’s second-largest container shipper (\$54.5 billion trailing 12 months) now counts 250 ports and 20 ocean carriers using its proprietary TradeLens blockchain, which cuts time and reams of paperwork out of tracking containers as they move through global seaports. Sportswear giant Puma, which ships out of northern Germany, can now track a specific container in seconds rather than hours, according to Maersk. TradeLens, which Maersk co-developed with IBM in 2018, has tracked more than 55 million container shipments and is now being used by other shipping giants such as Germany’s Hapag-Lloyd and Singapore’s Ocean Network Express.

BHP

MELBOURNE, AUSTRALIA

In 2020 BHP, the \$61 billion (sales) Anglo-Australian multinational mining company sold its first “paperless” shipment of Australian iron ore to China. That evolved in 2021 to trading cargoes of copper concentrate to China, with all documents, assays and emissions data enshrined on its MineHub blockchain platform. BHP has since adopted blockchain-based traceability to ensure there is no “dilution” of the nickel it sells to Tesla’s Shanghai battery factory and to track the carbon emissions of the copper it sends from Chile to electric cable maker Southwire in Carrollton, Georgia. BHP is now in talks with suppliers to use blockchain to guarantee that the rubber in the 6,000 giant truck tires it uses each year was produced without slave labor or illegal deforestation.

Boeing

CHICAGO

Boeing is collaborating with Canada’s TrustFlight and developer RaceRocks to build a so-called digital aircraft record system that helps airlines keep up with required maintenance. This expands on Boeing’s earlier blockchain initiative with Honeywell’s GoDirect Trade platform, which in 2020 securely sold \$1 billion in Boeing aircraft parts. In time, they envision a global airworthiness records platform, which could save 25% in maintenance costs—worth billions annually across the industry.

Depository Trust & Clearing Corporation

JERSEY CITY, NEW JERSEY

If you bought or sold a security in the U.S. last year, odds are that the clearing and settlement services were provided by DTCC, by far the largest post-services firm in the world. In September DTCC, which processed \$2.3 quadrillion in 2020 trades (total face value of the securities; trailing 12-month sales \$2 billion), successfully completed a six-month test on a blockchain project that will reduce errors and cut settlement times from two days to less than one. DTCC’s main business remains

publicly listed securities, but its new Digital Securities Management application is targeting pre-IPO companies with privately traded shares.

Fujitsu

TOKYO

The \$32 billion (12-month sales) telecommunications and computer hardware company runs a blockchain innovation lab in Brussels with more than 40 clients— from a rice-trading startup to giant brewer Anheuser-Busch. The companies use the lab to test fresh ideas, backed by Fujitsu's technical expertise. In November, for example, water purification firm Botanical Water Technologies started building a trading platform using Fujitsu's in-house distributed ledger technology, which will allow sugar mills, distilleries and cola makers to sell or reuse the water they would normally discard during production. The platform, launching in April, will trace the water as it is purified, sold and delivered, and give companies the option to donate a portion of their purified water to water-scarce communities.

Oracle

AUSTIN, TEXAS

By 2030, some 40% of all new cars will be electric. Demand for cobalt, used in EV batteries, is soaring. Nearly two-thirds of the world's cobalt supply is mined in the Democratic Republic of Congo, a war-torn country where child labor and other human rights abuses are common. Oracle and British startup Circular, a raw-materials supply-chain tracking company, have built a blockchain-enabled platform to trace the provenance of high-risk, conflict-area raw materials such as cobalt. Many of the world's largest EV manufacturers, including Volvo, Mercedes-Benz and Polestar, have signed on for the service, which is built on Oracle's blockchain.

Renault

BOULOGNE-BILLANCOURT, FRANCE

In response to European regulators' ever-growing technical requirements, the French automaker (\$53 billion 12-month sales) launched blockchain platform Xceed in April to track thousands of car parts going into every vehicle manufactured in 16 factories across Europe. If any characteristics, such as the size of a screw or a headrest's positioning, are not up to standard, the manufacturer is automatically alerted and can then notify suppliers with the push of a button, saving weeks of time on audits. Partners include top suppliers like Faurecia, one of the world's largest makers of automotive interiors, with \$18 billion in annual revenue. By 2024, Renault hopes to enlist 3,500 suppliers in a bid to track every one of its 6,000-plus regulated car parts and features. Renault has also started 20 other in-house blockchain initiatives tackling everything from car-buying transactions to supply-chain traceability.

Tech Mahindra

PUNE, INDIA

The technology arm of Indian conglomerate Mahindra Group (2021 revenue: \$5.1 billion) has developed more than 60 blockchain-based products spanning telecom, media and entertainment, manufacturing, retail and energy. One of the most interesting: VaccineLedger, which was developed in collaboration with a startup funded by UNICEF and Gavi, the vaccine alliance that oversees a worldwide Covid-19 vaccine database with the World Health Organization. The blockchain helps prevent counterfeiting and reduces the number of vaccines that go to waste by tracing the shots from manufacturer to

recipient. It records data related to custody, temperature, location and purchase orders for each vial. VaccineLedger already operates in two states in India, with plans to expand globally.

Tencent

SHENZHEN, CHINA

Over the past decade, Tencent has built a Chinese “super app,” used by more than 1 billion people for everything from gaming and social media to messaging and shopping. Now it is developing a one-stop blockchain platform, Tencent Cloud Blockchain. Ten provinces and cities including Hainan, Guangdong and Beijing already use it to issue electronic bills for things like health care and transportation. As August 2021, Tencent’s blockchain had processed more than 15 million transactions in one city alone.

Walmart

BENTONVILLE, ARKANSAS

After hundreds of listeria, salmonella and E. coli infections last year, and millions of pounds of recalled food, the FDA is getting more serious about food safety. It announced in September 2020 that manufacturers and retailers would henceforth be responsible for tracking more than a dozen types of risky foods such as romaine lettuce, soft cheeses and fish at every point along the supply chain in order to identify and toss contaminated items more rapidly. The retailer is already tracking 1,500 items on the blockchain; triple that of a year ago. Its food safety initiatives are becoming more visible to shoppers: A recent Sam’s Club pilot in China let shoppers scan a QR code to gain information about where the produce was grown and when it was harvested.

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