Unlock Opportunities with CORD Network

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This paper presents CORD, a decentralised infrastructure advancing the quality and utility of identification systems. CORD represents a reliable, secure, portable and extensible system of identification that could unlock significant gains for both consumers and institutions. The cryptographically secure, tamper-proof distributed ledger and Decentralised Identifiers (DID), Verifiable Credentials (VC) and content-addressed storage offer near-frictionless cooperation between these entities that may not necessarily have a pre-existing trust relationship. Its ability to provide disintermediation, improve transparency, and increase auditability can significantly reduce transaction costs, introduce efficiency into existing value chains, challenge revenue models, and open new markets.

Technology will continue to evolve over the coming years, and for that reason, this overview should be considered as the start of the conversation on how we can all work together to reimagine industries, rebuild financial processes, and build markets once considered improbable or unprofitable. Together, we can drive the long-term development and adoption of the technology and capitalise on the tremendous economic and social opportunities it offers.

Preamble

We live in a digital age, where consumers expect to connect with services and products every day, online and instantly. Being able to prove who we are determines our opportunities to establish trust with each other and carry out meaningful interactions faster, given our current environment of a data-driven economy. But the reality is that our existing identity models are inadequate in the context of this new era – one can reasonably say archaic, insecure, insufficient privacy protection, add friction into interactions, and are largely inaccessible for over a billion people.

Whether applying for a credit card, purchasing a mobile phone plan, enquiring about their electricity utility or interacting with government services, we need to prove or verify our identity, eligibility and ownership several times to carry out transactions. It's frustrating and time-consuming – and it fails to resolve the growing incidence of fraud for businesses and the government.

So, what if we could build a system that will allow us to own and control our identity, reputation, data, and digital assets; securely and selectively disclose our data to counterparties; access digital services; digitally sign claims, transactions, and documents; and to prove who we are with any provider – online, on the phone or in-person?

This is the frictionless future we are helping enable - an environment in which identification and credentials are more manageable for everyone to work with, data can be easily shared across systems where trust in data is not brokered by intermediaries—as has been the case until now—but is embodied algorithmically in the data itself. Individuals and organisations can take back ownership of their data and control the flow of information as regards — who sees it, what they see, and when.

We all want to be in control of our identity and manage who has access to specific information about us.

A context-driven, auditable, traceable and verifiable digital identity created from our credentials can be used in physical and digital interactions. It will be

universally recognised and trusted by others to prove who you are. It's reusable, secure, and provides controlled access through various authentication methods. And we could consent, on a transaction-by-transaction basis, to give specific businesses or government agencies access to our data.

At Dhiway, we are focused on our mission to advance identification systems combining blockchain with the themes of distributed authority, decentralised governance, self-sovereign identity, and data privacy. It gives people control over their identity and allows organisations to create and innovate their digital products and services, relying on the network capability to access highly assured consumer identities.

Dhiway

Dhiway's vision is to advance the quality and utility of identification systems to strengthen the transparency, efficiency, and effectiveness of services for both individuals and businesses globally. Our initiative is very large and wide in terms of coverage and impact, with potential use by large and small entities, governments, world health organisations, credit unions, small businesses, and even peer-to-peer transactions.

Trust, which is a very subjective concept can be modelled within a system through the means of attributes. These lead us to the idea that trust is directional, context-based and specific to the entities engaged in the transaction. Anticipating this need to create a substantial body of knowledge about digital trust Dhiway has been a founding member of the Trust over IP Foundation (ToIP). Along with three hundred-odd members of the Foundation, Dhiway has contributed to the design and development of principles that help implementations transform the concept of trust into real, verifiable digital interactions. In 2021, ToIP has produced guides and white papers related to assessment and management of risk in digital ecosystems; developed design principles that networks can adapt and measure against and produced recommendations for real-world use cases such as digital health passes.

Dhiway is a first-mover in the market to create a universal identification system that satisfies the principles of portability, persistence, privacy, owner-control and offers near-frictionless cooperation between entities that may not necessarily have a pre-existing trust relationship. The universal identification system will improve the way Internet services work. Reliance on outdated, silo-based identity models will fall away, along with the high costs of maintaining them. Existing services will evolve rapidly to take advantage of this new public utility for identification, and new services and markets will develop which could never have existed before.

We are working with various network participants and innovation partners, alongside government, corporate, and consumer-focused collaborators, to create a network that serves their interests and their customer's needs. This will lead to the creation of a two-sided market of enablers (issuers) and consumers (relying parties) designed to work across the economy under the control and direction of the user (identity owner/holder) with higher integrity, lower cost, and improved customer experience for businesses.

The two-sided market creation and acceptance are backed with a threefold growth strategy: SaaS applications, Enablers First, and the Entire Ecosystem. MARK Studio is an exemplar of an application leveraging CORD. It was made generally available in April 2021 and has since then been adopted by over a thousand organisations. The application enables organisations to rapidly include verifiable information into their business workflows.

The initial developers and organisations using CORD/MARK Studio will create islands of functionality around specific use cases. Some will be small, some will involve millions of people, and some might not even leverage identification as a headline feature. As more organisations come on board, more islands will be created, grow in size, and begin to overlap. As this happens, individuals will realise that the verifiable identity credential they are using with one organisation can be used seamlessly with another, and another, and another, with complete control and confidence, thus unlocking the network's full potential.

The most forward-thinking organisations will already realise how beneficial it will be for them to be recognised as a CORD Network Participant that gives their customers the ability to use their credentials in other places. They will also see CORD's potential to substantially improve their customers' experiences, stripping away decades of inefficiency, substandard security, and lack of privacy. We at Dhiway are excited about the road ahead.

We have identified and squarely placed ourselves at the intersection of a critical market problem and opportunity. Our approach in addressing the opportunity will positively impact institutional roles in market regulation, permit issuance, identity management, financial inclusion, crisis response, resource conservation, public health, climate change, and many more.

In the evolving digital identity and security landscape, what makes our model unique and its likely success are two key factors: *a scalable technology platform and a scalable adoption model.*

CORD - The Layer 1 Network

CORD is a purpose-built decentralised infrastructure designed from the ground up to be a global public utility and enable a trust framework. It provides a stable, trustworthy network for institutions and developers to explore new global coordination and collective decision-making methods. CORD creates new possibilities in addressing trust gaps, managing the authenticity of transactions, and exchanging value at scale.

We recognise that nearly any use case for CORD can also be implemented using a centralised system. And by most objective technical metrics—speed, throughput, cost, ease of update—a centralised system deployed today will be superior to using the decentralised network to store and share the same data. But the unstated assumption in any such comparison is that a centralised system can be trusted, that it can be operated by an organisation or human beyond reproach, perfect in their ability to resist the temptation to adjust the data or provide access in unequal ways. The key reason to use CORD with distributed authority is to avoid the dependency on single organisations or individuals to keep the system of record honest and accountable. This is

especially important within a business context, where participants are likely to be highly competitive and constantly looking for arbitrage opportunities that centralisation brings.

CORD is designed to simplify the management of information, making it easier for owners to control; agencies and businesses to discover, access and use data to deliver networked public services. It provides a transparent history of information and protects it from unauthorised tampering from within or without the system.

While sharing information securely among interested parties within an ecosystem has always been possible, CORD offers an enticing path toward more efficient operations, more responsive service, and enhanced data security among a group of participants that may not necessarily have a pre-existing trust relationship. The cryptographically secure, tamper-proof ledger along with Decentralised Identifiers (DID), Verifiable Credentials (VC) and content-addressed storage creates a higher level of assurance for the information streams. This model enables data availability, discovery, consent receipts, integration, security, and compliance to ensure the right information is delivered to the right resource at the right time — and ensure the information is being used for the right reason

Today, transactions are recorded in multiple organisational systems. Each one captures at best a moment in time and reflects the information held by a single party: Bank X purchased or sold a mortgage, for example. They don't record what happens next, what came before, or the role of others – partners, suppliers, consumers – in the transaction. Moreover, they're prone to human error and vulnerable to tampering.

By contrast, CORD shifts the lens from information held by an individual owner to the cross-entity history of an asset or transaction. Transaction or asset details are shared and updated in near real-time across a group of participants. Every transaction becomes part of the permanent record with a unique identifier and can be verified by those that have permission – and relevant information can be shared with others based on their roles and access privileges.

By adopting privacy by design approaches, the applications using CORD to create records are also compliant with the jurisdiction's data protection and data governance requirements. CORD does not store personally identifiable information (PII) or the business data linked to the transaction on the chain. Digital transformation initiatives are augmented through the combination of verifiable digital identities linked with verifiable claims. The individuals who are the holders of the data records can now receive, manage and share the records based on requests from verifiable sources and determine when and how to fulfil the request.

The use of the CORD network would reduce the risk of unauthorised access (through strong encryption) and data manipulation (through tamper-proof audit trails). Indeed, public services could become truly networked without infringing unduly on privacy rights. Individuals and companies would no longer need to spend a lot of time filling in forms with the information they had already provided and tailor their services to meet individuals' needs rather than deploying a one-size-fits-all approach.

Developers and enterprises can use the CORD network services to create applications that run on top of the network. The network supports the potential to catalyse exceptional levels of innovation in both existing and emerging industries-from conducting transactions and maintaining records, across many sectors of the economy such as finance, trade, health, energy, water, resources, agriculture and credentials.

CORD Network enables businesses and governments to rely on a standards-driven value exchange protocol that is owned by everyone participating and not the monopoly of a single company.

The social costs and security risks implied with centralised systems in social networking, ride-hailing, food delivery, e-commerce, and other applications become increasingly clear every day. Meanwhile, the collective trust in institutions, corporations, and governments to operate efficiently and in the interests of citizens is declining globally, as per the Edelman Trust Barometer. CORD cannot solve this by itself, but its appropriate application by the public

sector and private enterprise has the potential for a substantial positive impact.

Digital Identity and Reputation

Our identity is increasingly multi-faceted, digital, distributed and a deciding factor of the opportunities and rights available to us every day. As the use of online services increases, we are faced with the growth of a complex, inconsistent, tangled, and insecure web of digital identity practices. As the number of identity breaches grows, we are observing the increased awareness of implications associated with the existing digital management approaches and their shortcomings. These observations bolstered with domain-specific research has helped us to build, test and refine secure and privacy-preserving methods to digital identification systems.

A digital identity is not simply a matter of usernames and passwords – it is a growing and evolving set of attributes about us, based on the context and the history of our activities. Each of these attributes has different, uniquely identifiable characteristics. The combination of these attributes makes up who we are online and offline, although we might perceive that differently.

An effective, trustworthy digital identity must meet several design criteria. First and foremost, it must be secure. Second, it must be reliable and verifiable. Third, the owner to whom it pertains must be in control—often referred to as self-sovereignty. The core principle of self-sovereign identity (SSI) is the ability to own and control attributes that give others confidence in our assertions of who we claim to be.

Along with attributes, reputation is a potent driver of behaviour. The CORD Network enables organisations and individuals to establish, maintain, enhance and communicate their reputations in new and innovative ways.

As an individual's or organisation's digital identity builds up over time, so does their reputation. Stepping up from a low to a higher trust level happens seamlessly as the identity owner accumulates more verified attributes and attestations. This reputation becomes a non-fungible asset of the identity

owner. For example, an individual mayreveal their reputation score to others to establish and reinforce trust, or an organisation may publish its reputation score as a badge of honour.

CORD provides a mechanism for identity owners to publicly or privately share their "reputation scores", the integrity of which can be verified cryptographically. Unlike the current models based on social media activity, CORD reputation scores will be based on verifiable attributes and claims owned by the identity owner. This produces a virtuous network effect. Organisations that are trusted by other organisations as providers of verified claims automatically enhance their reputations. The more individuals and organisations that rely on our claims, the higher our reputation. Reputation scores are not part of the initial release of CORD but will be introduced as the network evolves and gains further traction.

For businesses, verifiable identities with reputation scores create new markets and business lines, better customer experiences, improved data and a tool against fraud. For governments, they offer a new way to deliver services, a more engaged citizenry and a tool against corruption. For individuals, they open up (or close off) the digital world, with its jobs, education, financial services, healthcare and more. Self-sovereign identity is a paradigm shift from today's identity system, and it will drastically change how organisations are able to deal with customer data.

Under the identification system enabled by CORD, each individual or entity controls its identity and associated data using a personal data agent (PDA). PDA is a software program or process acting on behalf of an Identity owner to facilitate interactions with other agents or the CORD Network. If not self-hosted, a PDA is hosted by a service provider. A PDA may or may not have a publicly accessible service endpoint and may or may not store public keys, private keys, public data, or private data.

A PDA provides a persistent addressable endpoint by which an identity owner can send and receive notifications, messages and other transactions to and from other identity owners. Service Providers can also offer anonymised endpoint services for maintaining the privacy and accountable pseudonymity.

As a result, access to information managed by PDA will require the individual's or entity's consent/permission. Additionally, the individual or entity can place conditions on the information shared, for example, making it time-limited, restricting reuse, revoking its use based on "breach of terms," etc. The introduction of the concept of a personal data agent enables a framework of data governance and exchange which honours the notice/consent receipt mechanism required by data regulatory authorities.

In addition to placing restrictions on use or reuse, entities and individuals will be able to fine-tune control over how information is disseminated to third parties. This is also a form of selective disclosure. This capability enables entities to share only the minimum amount of information required (i.e., verifiable claims) for the transaction. Alternatively, selective disclosure can be set to bar specific third parties from any access.

Self-sovereign identity does not mean yet another identity. It is a model that allows users to build a just-in-time identity using a set of signed attributes that best approximates the fluidity and granularity within a context. It is a natural extension of the current identity models, enabling individuals to express only specific facets of their identity, depending on the parties they wish to interact with. Composable identity models built on existing verifiable attributes enable limited data exposure while encouraging a service ecosystem that is consciously designed to seek and exchange minimal required information.

While the identity owner controls their identity elements, those can be verified by the employer, the bank, etc. The identity owner benefits from verification because it will lead to broader acceptance of the particular identity aspect being shared for a given purpose (e.g., age to purchase alcohol, salary for a bank loan). For example, a credential could prove an individual's age to gain access to an age-restricted product without turning over a foundational ID or driver's license with full name, birthdate, address, and the like. Another example is applying for a loan, where the applicant could create and share a zero-knowledge-proof derived from a payslip issued by the employer to confirm that they earn more than a given amount without disclosing the exact compensation—and do it in a seamless, paperless way that reduces friction

and lowers cost. Or licensure information could be shared securely and instantly, eliminating lengthy delays waiting for proof.

Taken together, the combination of CORD, self-sovereign identity (SSI), Decentralised Identifiers (DID), Verifiable Credentials (VC) and content-addressed storage can create an identity layer in both the physical and digital world that verifies an entity's identity and reputation, that all actions and information are recorded accurately, and that each entity has full control over its data. The identity layer thus creates a trust layer. This is very different from the current model in which identities can be easily 'spoofed' (one entity masquerading as another), falsified accounts (often bots) disperse false information and fake news, and identity theft is commonplace.

The decentralisation of trust, creation of just-in-time identity and trust layers will have significant benefits. As users take control of their data, businesses will gradually store only the information most relevant to their operations. Over time, centralised data stores will be reduced, potentially leading to a decrease in significant data breaches. The adoption of CORD will enable businesses to more efficiently and readily share information about many aspects of their businesses, such as customers, suppliers, partners, and products.

This will have significant implications in industries such as healthcare, especially in combination with the identity model enabled by CORD. Patients will now be able to aggregate their medical records and share them with providers to improve healthcare outcomes, even though they use different identifiers to connect with services.

Digital Ecosystems

A vital function of the digital ecosystems—networks of businesses, agencies, consumers, customers, and others that interact to create mutual value—is to maintain trusted sources of information, enable discovery, access and conduct transactions across many sectors of the economy. Managing and using these information elements are complicated today. Individual organisations tend to build silos of data and information-management protocols, which preclude other parts of the ecosystem from using them to the

fullest possible extent. For markets to thrive, participants need to verify efficiently, and audit transaction attributes, including, for example, the credentials and reputation of the parties involved, characteristics of assets exchanged, and external events and information that has implications for contractual arrangements.

Today, outside the boundaries of an organisation, data collection and verification is typically completed by relying on intermediaries. In exchange for their services, intermediaries charge fees and capitalise on their ability to monitor all transactions taking place within the marketplaces. This informational advantage combined with network effects and economies of scale gives them substantial market power and control over market participants. The consequences of market power include higher prices, user lock-in and high switching costs, the presence of single points of failure, risk of censorship, barriers to innovation, and reduced privacy.

By reducing the costs of running decentralised networks of exchange, Blockchain technology allows for the creation of ecosystems where the benefits from network effects and shared digital infrastructure do not come at the cost of increased market power and data access by platform operators. This reduction in the cost of networking has profound consequences for market structure. It allows open-source projects and startups to directly compete with entrenched incumbents through the design of platforms where the rents from direct and indirect network effects are shared more widely among participants, and no single entity has complete control over the network.

Today individuals, institutions, governments, and things interact in a manner that requires streamlining the data harmonisation process. New services can be created continuously and ensure compliance with specific goals regarding sustainability and inclusion. When managed, governed, and deployed collaboratively, these services will be the advances that will boost growth and improve living standards.

Estonia is an example of how blockchain can be used to provide integrated services to citizens across multiple programs. Similarly, the Dubai government

has announced a comprehensive blockchain strategy to help its agencies run more efficiently, intending to save up to 5.5 billion dirhams per year.

Because of the absence of a central clearinghouse or market maker, decentralised networks like CORD exhibit low barriers to entry and innovation; as long as applications are compatible with the rules of the protocol, they can be deployed and compete for market share. Decentralised networks like CORD with distributed authority reduce the expropriation risk developers face when building on top of traditional platforms. Furthermore, since contributors can participate in the governance of CORD it can democratically evolve to accommodate changes beneficial to the majority of its constituents.

Although the term blockchain is often associated with cryptocurrencies such as Bitcoin its potential reaches beyond financial technologies to applications or use cases requiring authenticated distributed records, including title and property records, identity authentication, supply chains, and more.

The technological innovations of CORD around mutable data capture and immutable state; verifiable data attributes and auditable history; and consent are pivotal to raising the level of trust in data exchanged over the internet. This unique structure-a comprehensive stack with tiered technical and governance levels-can serve multiple classes of applications for any form of registry, inventory system, and transaction platform for recording, tracking, monitoring, and transferring rights to different asset classes.

The integrity of dynamic data streams enables an increase of trust in such digital ecosystems. At a large scale, the ability to have context-based directional trust results in faster processing of transactions and reduces the cost of transactions. Additionally, it enforces auditability and transparency, which forms the evidence in case of any contestations, disputes and redressal of grievances.

As we live through the digital equivalent of the Cambrian Explosion, it is becoming increasingly clear that today's information technology infrastructure needs new paradigms for interaction. The disintermediation and decentralisation enabled by CORD, coupled with increased transparency and

auditability, provides for improved efficiency, speed, and cost reduction (such as in Know-Your-Customer verification).

Governance

The on-chain Governance Model of CORD is based on a tricameral approach. It is designed to enable stakeholders to determine the direction of development and sustainability of the network. This goal is brought to fruition through the creation of a defined set of roles and responsibilities; on-chain voting mechanisms and the presence of a governance structure that is fair, transparent and establishes accountability.

CORD uses a governance mechanism that allows it to evolve gracefully over time at the behest of its stakeholders. To do this, we use various novel mechanisms, including an amorphous state-transition function stored on-chain and several on-chain voting mechanisms such as referenda with adaptive super-majority thresholds and batch approval voting. All changes to the network must be agreed upon by the weighted referenda.

Use Cases and Applications

CORD is a decentralised infrastructure with tiered technical levels and multiple classes of applications. CORD can serve as a registry, inventory system, and transaction platform for recording, tracking, monitoring, and transferring rights to different asset classes, including intellectual property, votes, digital identity, health data, and real estate. Information about the origin of goods, identity credentials, and digital rights can be securely stored and traced with CORD. It can be integrated with existing systems and workflows in a way that complements and upgrades current practices. The potential this creates for new business models is endless. Here are a few application areas for enterprises, institutions, and governments to start the journey.

Registries

Governments and regulatory agencies serve as the primary source of truth on everything from land titles, marital status, business licensing, accreditation

details, property transfers, criminal records, and more. Some records exist only in paper form, and if changes need to be made, citizens often must appear in person to do so. Managing these registries is a complex proposition that, using legacy tools, results in corruption, fraud, high costs, and slow processing.

Managing registries with CORD provides the needed transparency to eliminate fraud and corruption while simultaneously offering the potential for real-time updates. It simplifies the management of records, making it easier for government agencies to allow individuals and organisations to access the information while maintaining security. Ensuring that individuals have immediate access to their information and the ability to confirm its authenticity is critical for speeding up slow processes like land title transfer. For instance, in the Republic of Georgia, which was the first nation to implement blockchain-based land registries, the now 1.5 million registered land titles in the distributed ledger can, with the correct multiparty digital signatures, be legally transferred in a matter of minutes. This kind of functionality can lower the time and cost to completion for secured home loans, meaning real-estate deals can be completed in days rather than months.

Also, the administration of government-managed programs ranging from pension systems to healthcare, education, and defense often requires coordination between disparate parties and almost always involves sensitive data that must be protected.

CORD integrated administration systems enable real-time coordination between wide-ranging participants while also providing the needed transparency.

Know Your Customer (KYC)

Know Your Customer (KYC) processes are the backbone of financial institutions' anti-money laundering (AML) efforts. According to current estimates, in excess of US$25 billion is spent each year on financial crime risk management in the banking sector, the majority of which is due to KYC.

However, despite the critical importance of these processes, KYC at many financial institutions is extremely inefficient, mired with time-consuming and labour-intensive manual processes, duplication of effort and risk of error. It is estimated that up to 80% of the effort associated with KYC is dedicated to information gathering and processing, and only 20% to assessing and monitoring that information for critical insights. At the same time, the tiresome process, repetitive questioning and long processing times create a frustrating experience for customers.

While centralized solutions may alleviate some of the KYC challenges, CORD provides a reusable KYC architecture using verifiable attributes. In the reusable KYC model, a user completing the KYC process will receive a verifiable KYC credential (valid for a certain period) from the institution that completed the process. They could then share that credential with any institution that required it instantly - without going through the entire process again.

The reusable KYC credential model is the ultimate solution to onboarding hurdles currently faced by both customers and businesses. It is a great way of providing a seamless experience that bonds all of the users' attributes into one that they can fully control.

Vital Records

Vital records, or government-issued documents that catalogue life events, are used to validate the identity of a person in order to provide access to a benefit or service such as applying for credit, obtaining a passport, receiving a driver's license, receiving benefits, enrolling a child in school, and more. The three most common types of vital records are birth certificates, marriage certificates and death certificates.

Current vital record management models across institutions vary from country to country. In many instances, this information is kept in silos, and some institutions rely solely on paper filing systems. CORD can promote access and protection of records, security, privacy, transparency and overall efficiency in managing vital records.

Health Records

Health records of good quality foster more tailored and personalised care, bolstering patient engagement and empowerment. Electronic health records (EHRs) were conceived to weave a complete health context for patients, yet their promise is not realised. Health data remains fragmented and incomplete because the system has not achieved the interoperability needed to bring disparate data sets together to deliver a unified context for patients. From a health data perspective, the patient or healthcare consumer remains at the fringe of the data continuum, with limited control and less agency in their health journeys.

Centralised digital systems aggregate essential information regarding patient health, financial status, and identity, creating honeypots attractive to cybercriminals. Unfortunately, poor security protocols in the health sector leave health records increasingly vulnerable to crippling data breaches like ransomware with high financial loss. Healthcare CIOs have broadly declared security to be one of the most challenging and financially devastating issues in healthcare.

Fragmented data silos and insecure storage systems also complicate reliable and comprehensive care. The patient bears the burden of establishing a continuous and cohesive health record, an arduous process of requesting copies of health records from multiple providers and finding a way to keep these records together, easily accessible and secure. In terms of their own health identity, individuals lack actual ownership or control over health data.

The adoption of CORD, combined with other advanced technologies such as artificial intelligence (AI), machine learning (ML) and Internet of Things (IoT), could help to construct a modern, personalised healthcare system. A convergence of these technologies will put the individual at the centre of the care continuum, with control over a complete health record that is selectively shared with healthcare providers to improve outcomes and care that transcend the health life cycle of an individual from records archival and recall to Insurance.

Supply Chain

Globalisation has made supply chains significantly more complex, involving multiple players worldwide and a great deal of coordination. This increases the cost of operating these global networks with goods and services channelled acrossemerging and advanced economies. Imagine the complexity of a product sourced in Ethiopia or Indonesia, assembled in China, and sold in the United States.

The cost of operating supply chains makes up two-thirds of the final cost of traded goods. According to the Global Alliance for Trade Facilitation, 7% of the global value of trade is absorbed in documentation costs alone. Faced with a dynamic and volatile environment, companies are increasingly turning to technological innovation to make their supply chains more cost-effective, resilient, and responsive to potential market disruptions.

In today's supply chain systems, there is often no simple way to track provenance and authenticity. Current approaches rely on centralised authorities and databases, which are fundamentally insecure since they have single points of failure that make them susceptible to cyberattacks and insider fraud.

Another critical aspect of the supply chain is process transparency, or precisely what happens at each point. It often takes a lot of effort since data is fragmented and siloed across the actors in the chain. Most supply chain members are only familiar with activities that are directly connected to their organisation. Because no comprehensive system captures all transactions and makes them accessible across the chain, each part of the supply chain must be contacted directly to understand the entire path that a product takes to reach a retailer.

Supply chain systems integrated with CORD Network can provide an accurate and immutable record of all transactions across the supply chain. These systems assign a unique identifier that tracks the product at the batch or lot number.

The unique identifier allows a product to be tracked to its origin (traceability) and through every step of the supply chain (authenticity). Provenance takes authenticity one step further by providing information about product history through the supply chain, such as location history, custody history, and environmental conditions during the journey. Such information, including GPS coordinates, temperature data, and accelerometer information (for damage assessment), is typically captured by sensors or IoT (Internet of Things) devices.

Food safety is a specific case that has gained significant traction globally, but the same approach can be applied to any product within a supply chain. Traceability is an essential step in determining product authenticity.

CORD can make the supply chain workflows leaner, simpler, and more cost-effective by integrating know-your-customer, inventory management, and traditional legacy systems to work seamlessly with existing supply-chain systems. It reduces the participation and verification costs, which leads to more widespread industry adoption, and makes checking product authenticity and provenance more commonplace. It can also identify where the goods came from and who paid for them. This can help avert fraud, such as the Qingdao scandal in 2014, where volumes of copper, alumina, steel, and other metals were used as collateral for multiple loans. With CORD Network, all actors along the supply chain are visible and accountable.

Pharmaceuticals

The global pharmaceuticals industry is big business, valued annually at $1.2 trillion. Pharmaceutical companies spend tens of billions of dollars and go through an arduous process to produce and commercialise prescription drugs. According to the World Health Organization, the counterfeit prescription drug trade is 10% of the global market.

The main concerns with pharmaceutical supply chains are compliance, traceability, and early detection of contamination, adulteration, honest reporting of drug manufacturing processes or issues with drug shipments. Going beyond traceability for controlled substances, many pharma

companies and their partners, such as distributors and retail pharmacies, are already exploring new technology solutions focused on drug traceability, provenance, and safety.

Pharmaceutical supply chain workflows combined with serialisation, smart sensors, and CORD can enable end-to-end transparency for drug production and distribution, including visibility into every stage of the supply chain. The integration not only improves the traceability of prescription drugs in the supply chain, but it can also ensure that international standards are upheld, such as GDP (Good Distribution Practices), ensuring the integrity and quality of the medication for the end-user. Additionally, it will be much more difficult for bad actors to market fraudulent products.

Trade Finance

Trade finance is the lifeline of global trade. The International Chamber of Commerce estimates that the worldwide trade financing gap is around $1.6 trillion, with dire consequences for small and medium-sized businesses and growth in emerging markets. In this segment, financial institutions bridge the gap between exporters,

who need the guarantee of payment before they can ship, and importers, who require data on whether goods have been delivered. Roughly $18 trillion of annual trade involves some form of finance, be it credit, insurance or guarantee. The size of the trade finance market itself exceeds $10 trillion per year.

The supply chain system supporting the global trade is cumbersome and time-consuming, creating potential risks for the parties involved, where Anti-Money Laundering and authenticity issues weigh heavily. Parties use different platforms, raising the odds of miscommunication, fraud, and problems with version compatibility. Multiple checkpoints delay payment and slow the shipment of goods.

Applications leveraging CORD can positively transform the ecosystem by introducing transparency, traceability, and immutability to their supply chains and building new products for alternative financing, securitization of trade

obligations, and downstream factoring. Using CORD to store and exchange details can prevent documentary fraud, facilitate the real-time approval of financial documents, unlock capital tied up in the process of waiting for clearance, reduce counterparty risk, and enable faster settlement.

With CORD, the information is accessible across various participating entities, and the approval process does not need to be sequential. Since each participant on the network quickly updates the network to reflect the latest transaction, it removes the need for exchanging copies of the same document of information stored on numerous databases. This model also allows all parties to conduct diligence for credit adjudication, check for anti-money laundering and trace the location and ownership of goods. Banks no longer need intermediaries to assume risk, and compliance officials can enforce anti-money laundering and customs activities without delay.

Education and Workforce

Education and workforce records are integral to a dynamic labour ecosystem. Individuals engaged in lifelong learning deserve to have a way to translate their entire education, training, and work experience into a verifiable record of skills that will open the doors to better career opportunities.

Current credentialing systems do not comprehensively reflect the skills of individuals. A liberal arts degree from a four-year institution, for example, is often considered a proxy for an individual's ability to reason and complete work. Yet, the same individual may gain skills on the job that is unrelated to or unrepresented bytheir degree. Notably, individuals who do not complete formal educational degrees have highly-valuable skills and experiences gained through employment or independent study but may not easily demonstrate these qualifications.

With the ever-increasing pace of change in the labour market, individuals seeking to retrain or gain new skills now have multiple options beyond enrolling in formal degree programs. A broader-based credentials ecosystem powered by blockchain could enable more skills-based hiring and aid workers in navigating a changing labour market.

Most employers conduct background checks on applicants, verifying previous employment, past performance, and educational credentials. Once employed, people often need to share their working credentials with others to obtain loans or join professional organisations.

Verifying these credentials is often a time-consuming, paper-based process. While generating employment and salary verification letters has increasingly become digitised, usually, a paper letter is still required to alleviate concerns about fraud and misrepresentation. Without adequate security and verification, electronic credentials are seen as too easily forged and thus unreliable. The result is a time-consuming system that adds friction in the hiring process, slows down bank loans and other transactions, and is so complex that businesses turn to intermediaries such as background check companies to compile the information.

With CORD, the frictions are removed by transforming credential attributes using 'cryptographic superpowers' that make them tamper-proof, secure, and verifiable. This transformation enables the secure exchange of information the business environment and across the business stakeholder ecosystem. The relying party, who receives the credential can verify:

- The credential issuing entity (the source of the data)

- It was issued to the entity presenting it (the subject of the data)

- It hasn't been tampered with (the integrity of the data)

- Whether the issuer revoked the credential as of a particular point in time (the
status/state of the data)

MARK Studio, a credentialing application built on CORD, enables institutions with easy to use interfaces to manage tamper-proof credentials through their lifecycle across different professional, cultural and geographical contexts.

Sustainable Development Goals (SDGs)

Achieving most, if not all of the UN's 17 sustainable development goals (SDGs) will require the use of data from multiple public and private sources. In this sense, the SDGs are the embodiment of what we call "data mega-use-cases": complex problems and opportunities affecting many different individuals, companies, organisations, and governments.

The scope of these initiatives is broad, covering multiple sectors. However, Identification is a crucial enabler of SDG goals and targets, such as financial and economic inclusion, social protection, healthcare and education, gender equality, child protection, agriculture, good governance, and safe and orderly migration.

The extensible identification model of CORD is based on a system of attestations, claims, credentials, and permissions. It can enable individuals to generate context-driven identities that give others confidence in assertions of who they claim to be or their right to interact with or use a service.

Summary

CORD is an essential building block of Web 3.0 with its ability to reimagine real-world interactions that best fit a particular purpose, balancing security and control with the convenience and opportunity of sharing data between institutions and individuals. The potential this creates for new business models is endless.

In business, trust is incredibly hard to engineer and impossible to guarantee. Until now, we've relied on instruments and institutions to be surrogates for our trust. With CORD, trust can be embodied in the transaction itself using verifiable attributes. Depending on the role of the participant and the particular transaction, individuals and institutions can be deemed as trusted, semi-trusted or untrusted. A financial institution could trust an overseas partner to do X but not Y, for example. Third parties that were once necessary to broker trust will be disintermediated. This codification of trust optimises

transactional relationships, making business interactions across ecosystems far more efficient.

Today, online rankings and ratings are proxies for trust. With CORD, the reputation scores generated from verifiable attributes for a given context will serve as the record of an organization's or individual's behaviour. Ledgers, once the system of record for business, become a robust record of trust – for business and government alike.

The technology will continue to evolve over the coming years, and for that reason, this overview should be considered as the start of the conversation on how we can all work together to reimagine industries, rebuild financial processes, and build markets once considered improbable or unprofitable. Together, we can drive the long-term development and adoption of the technology and capitalise on the economic and social opportunities it offers.