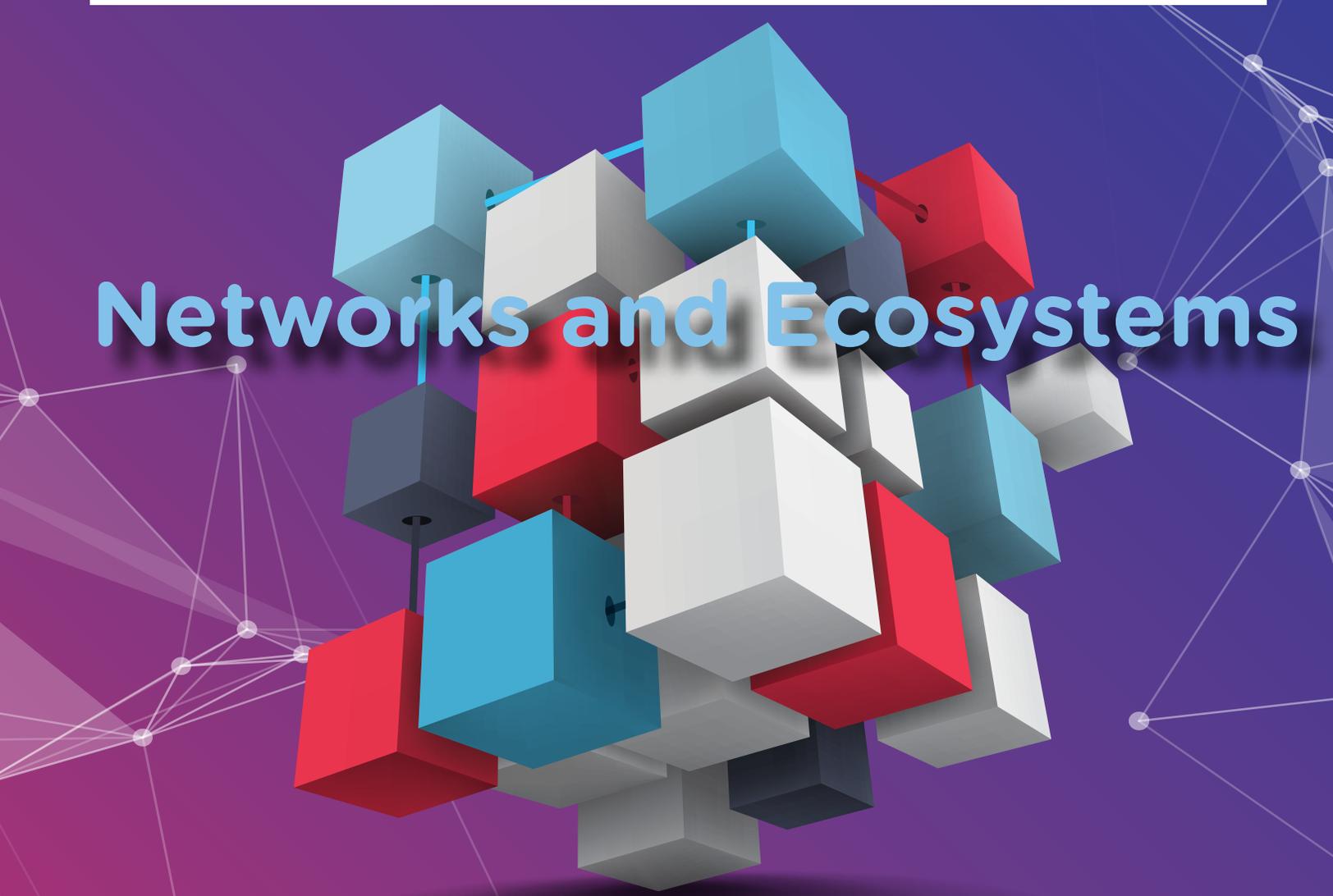


QUARTZ

In this special supplement:

- How blockchain accelerates the value of economic network effects
- The massive implications of blockchain for the global financial system and information management
- The need for financial institutions to become blockchain-ready
- Using Quartz Gateway to connect any core solution with any blockchain ecosystem; the benefits of blockchain-enabled TCS BaNCS; and the possibilities enabled by The BaNCS Network.

Networks and Ecosystems





By R Vivekanand, Co-Head of TCS Financial Solutions

The more people connect to a network, the more valuable it becomes.

That's the Economics 101 idea of "network effects." For example, whenever anyone gets a telephone for the first time, the value of your own telephone increases by an infinitesimal degree. Even if it's unlikely that you will ever do so, you may call or message that person directly, which accrues positive economic value to you and to every person with a telephone.

The same principle applies for any other networks, whether social networks or interbank networks such as closed-loop payments, clearing and settlement networks, credit card networks, or SWIFT. Each new member increases the value of the network to all participants.

Yet there's an important distinction to be made between **messaging networks** and **information-sharing networks**. It's the difference between asking for someone's phone number and sending a friend request through a social network. If you have someone's phone number, you can call or text. If you connect through a social network, you can find out everything that person has ever shared, including photos, how far they've walked today, and what they've had for dinner. These networks may coexist and complement one another, but they have very different usage patterns.

In a **messaging network**, each node acts as the repository of its own information, which implies that messaging is the core activity on the network. If you want information about another node, you must send a request and wait for a reply.

In an **information-sharing network**, each node contributes information in a standardized format to a repository, in advance of any requests made from other nodes. This reduces the need for node-to-node messaging, while amplifying the power created by the ecosystem.

Blockchain technology is a step from messaging networks like SWIFT toward highly-effective information-sharing networks that have embedded algorithms in the form of smart contracts.

Blockchain amplifies the value of network effects. With blockchain, each new additional node on the network represents not just another endpoint that may be reached, but also the promise of a continued flow of new data into a shared distributed ledger. As participants contribute their own information into a distributed shared ledger, other network participants gain near-instantaneous access to a single version of the truth, replicated within their own environments for their own use.

Blockchain curtails the need to exchange messages. For the most frequently-asked questions, the answers will already exist in your own environment. Messages become less frequent, tending toward higher-value discussions.

Messaging is the main driver of complexity for financial institutions seeking to drive operational efficiency with straight-through processing (STP). IT specialists must anticipate every possible outcome for every message exchange, and organizations must establish extensive operational procedures to deal with the inevitable exceptions. Lacking a single source of information, messages must be carefully exchanged simply to validate whether the data on hand is correct, and then to reconcile any errors that arise during the data duplication process.

Messaging itself takes time. When you send someone a message, there's no built-in guarantee as to when you'll receive a response, if at all. Organizations cope with this through quality-of-service (QoS) guarantees and other network management practices, but this adds cost and complexity, and increases settlement times.

Blockchain technology eliminates the need for back-and-forth messages. Once the data you require is automatically included in your local copy of a distributed ledger, you no longer need to wait for responses from counterparties. You can also

be assured that data will be in the correct format, with nothing out of date relative to what everyone else on the network sees. With blockchain as a foundation, you can redesign processes to amplify automation and raise STP to new levels.

The potential of blockchain to optimize processes and increase automation is being discovered not only by the financial services industry, but also by other industry sectors from transportation and logistics to government and life sciences. A private, permission-based blockchain network opens new opportunities that are just starting to come to fruition, and financial institutions will be among the first to take advantage of these opportunities.

What happens when the global financial system transitions from a messaging network into an information-sharing network?

The envisioned end state:

■ Legacy core systems will shrink in scope and functionality given the availability of shared ledgers that contain a more accurate, timely version of the financial information within a marketplace.

■ Message traffic will dry up for entire categories of requests and acknowledgements, given the availability of that required information in a locally-stored copy of a distributed ledger.

■ Data will be in one place, with one version of the truth, so that statements need not be broadcasted to multiple participants in a network, or balances held in various Nostro accounts.

■ Reconciliation will be automatic for entire classes of transactions for entities using the same ledger.

Granted, this won't happen immediately, and in some markets, it may only happen partially, if at all. Yet given the economic benefits unlocked by the technology, we should expect massive changes to manifest in the years to come.

In the legacy financial system, banks differentiated themselves based on how well they maintained and protected their own separate ledgers. The new, blockchain-based financial

system will bring about entirely new ecosystems with immense opportunities for technology-aware organizations that can manage the transition.

New ecosystems will bring together participants, business partners, and other stakeholders across the value chain for entire industries.

Here are some possibilities for how these ecosystems may emerge.

■ A central bank creates a payments ecosystem within a country, with institutions each having a subaccount on a shared ledger. A new ecosystem would emerge to support the settlement and cash management needs of enterprises. By extension, this could even extend to accounts for individuals, with the ecosystem supporting the financial planning needs of consumers.

■ Government entities build blockchain ledgers for information about ownership of assets such as real estate and insurance contracts. A new ecosystem would enable rapid closing on home purchases and better management of mortgage assets for collateral, with involvement from the banks for buyer and seller, realtors, title company, insurance company, and government agencies.

■ Banks involved in international remittances create accounts on a shared ledger to facilitate faster exchange of funds. As a result, they could offer in-network remittance services at lower cost and with better foreign exchange rates.

■ Vehicle data stored efficiently in a single registry would simplify processing of vehicle-related insurance claims and better protect against fraud.

■ Outside the financial industry, other applications may include digital identity systems, social services, clinical trials, and many others.

To participate in these ecosystems, your financial institution will need to be blockchain-ready.

One approach would be to develop blockchain interfaces for each specific network as it emerges, participating only in selected ecosystems.

The problem with this approach is that doesn't scale across marketplaces, regions, or business areas. As blockchain gains acceptance, there will be too many emerging ecosystems for an organization to respond effectively in a timely manner, and the need to embark upon an IT project for each initiative will create a significant barrier to entry.

Our recommendation is to prepare now for the blockchain-enabled future. To that end, TCS has taken several steps to ensure the continued success of our customers.

1. Quartz Gateway connects your existing systems to blockchain networks.

The design principles of Quartz — coexistence, integration, and interoperability — enable any financial institution to access multiple distributed ledgers from any existing core banking solution. This lowers the barrier to participation, enabling financial institutions to take advantage of new opportunities as they arise.

For example, if a central bank creates a blockchain-based payments ecosystem in a country within your bank's footprint, you can deploy Quartz Gateway to ensure that you can participate fully from the outset, without having to engage in the full complexity of working with blockchain technology.

Moreover, you can redeploy Quartz Gateway for every other blockchain-based ecosystem, whether sponsored by governments, bank consortia, industry-led partnerships outside of financial services, or entities such as Ripple.

With Quartz Gateway, you can scale your participation as the technology gains adoption.

2. Every single solution and component on TCS BaNCS will be blockchain-enabled.

For TCS BaNCS customers, the benefits of Quartz will be embedded into the core products. This will ensure that any information made available through a shared ledger can propagate quickly throughout all functions of a bank, from

back-office processing to middle-office risk management, and then to all front-end channels.

Although organizations using Quartz Gateway will also have access to information on the distributed ledger from within their internal systems, TCS BaNCS customers will have the advantage of having the entire solution optimized, front to back, for integration with distributed ledger data without the need for further modification.

3. The BaNCS Network will connect all TCS BaNCS customers in a single ecosystem

TCS BaNCS customers will be able to conduct transactions with one another through a blockchain-based network. Participants in the network will be able to exchange information and even conduct transactions through a trusted, private, permissioned blockchain ledger. In this way, The BaNCS Network offers an alternate routing mechanism solely for the use of TCS BaNCS customers.

Already, participants have used The BaNCS Network to test the initiation of cross-border transactions in Africa, which is just one example of the exciting services being developed by our customers working with one another.

Another way to benefit from The BaNCS Network is to experiment with blockchain technologies in a sandboxed environment. TCS BaNCS customers are evaluating technologies, piloting projects, and trying out transactions using example datasets that can be simulated with real-world conditions.

Our investments in blockchain technology will give TCS BaNCS customers an inherent edge in the ecosystems that are emerging from the accelerating adoption of information-sharing networks.

At TCS, we are investing in the technology and business strategies to ensure that TCS BaNCS customers will be at the forefront as the blockchain-powered future unfolds.

