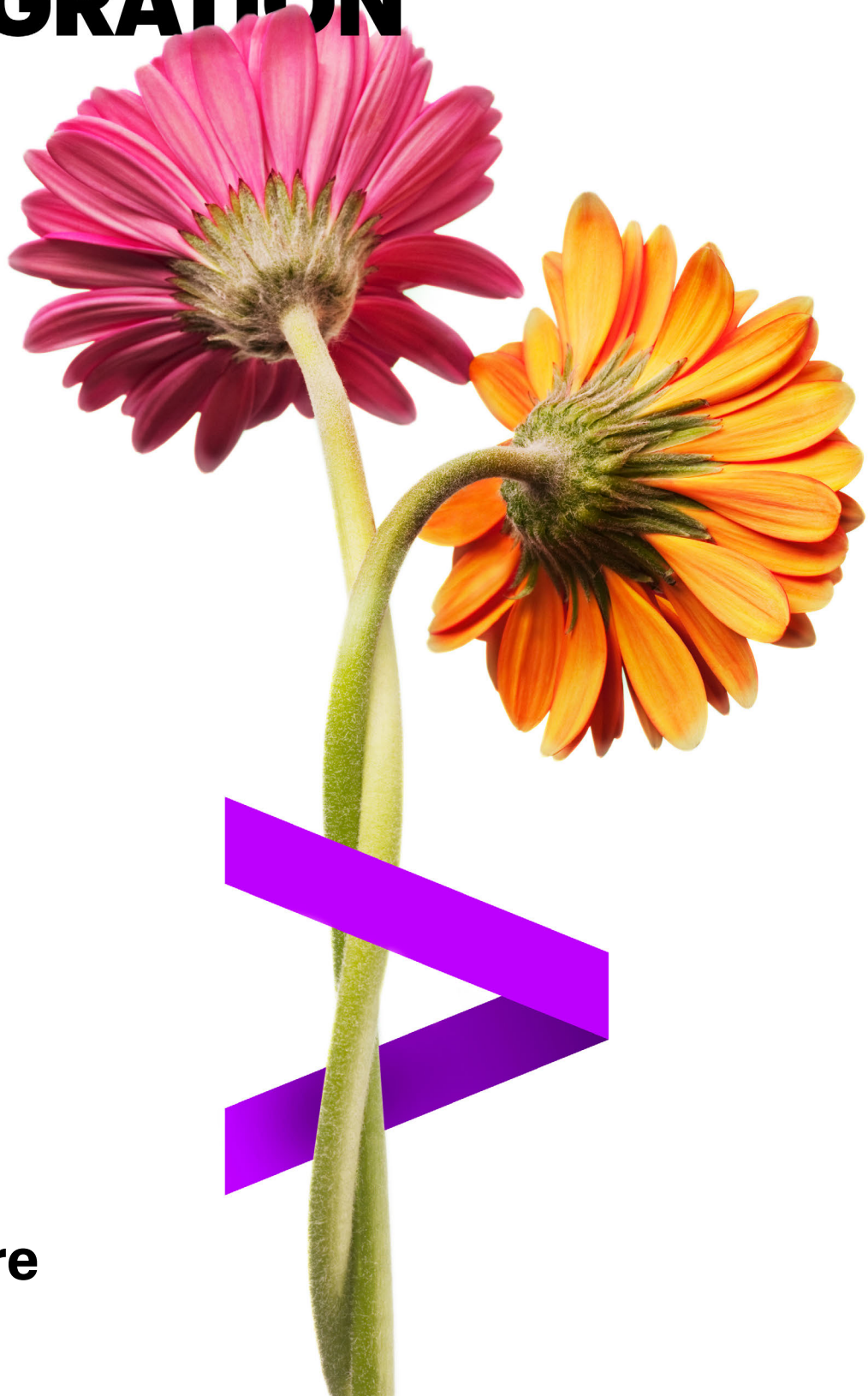


CONNECTING ECOSYSTEMS: BLOCKCHAIN INTEGRATION



As ecosystems develop around competing blockchain platforms, it is clear that interaction between these platforms is essential for success.

Early efforts to solve integration challenges have ventured towards cooperative standards incorporated into each codebase or messaging, which undermines the core benefits of blockchain. Accenture developed an approach that enables two or more DLT systems to work together without changes to the DLT platforms or introducing messaging. We completed the first working prototypes and continue to refine solutions that enable interaction between ecosystems while maximizing the benefits of distributed ledgers.

PLATFORM GROWTH DRIVES INNOVATION

Innovation around distributed ledger (and specifically blockchain) technology has undoubtedly benefited from competing platforms. Development and engagement on platforms from Bitcoin, Ethereum, Hyperledger, Digital Asset, R3 Corda and more, have resulted in decentralized, vibrant innovation ecosystems delivering rapid development and implementation.

This innovation and platform growth is showing no signs of slowing down. Gartner has estimated the number of platforms at more than 70, and suggests a period of competition and consolidation will ultimately narrow the field to five primary providers.¹ Further, if blockchain evolves like other technology, some of these dominant platforms may not yet even exist. As this market of blockchain vendors continues to increase, and ecosystems around those platforms continue to grow, interactions between platforms will be essential.

Consider a distributed ledger technology (DLT)-enabled supply chain. Distributed ledger technology can simplify, streamline, and integrate the end-to-end data associated with moving physical goods in a supply chain. Each participant—from mining to refinement, manufacturing to shipping, and wholesalers to retailers--will benefit from access to a single source of truth as goods move

through the chain. But the banks that finance trade and the insurance companies that insure the goods are also important players in an end-to-end supply chain transaction. Each build systems that establish letters of credit, transfer funds or initiate a claim, all established and triggered by the movements of goods tracked by the supply chain.

Several consortia are already working to put these processes on a distributed ledger. The goal is to reduce the amount of documentation and back-and-forth messaging so that the processes can be more efficient, risk can be managed more effectively, and capital can be freed up.

With an industry as interlinked and wide spanning as supply chain, these solutions cannot exist in a vacuum. The ability to link and interact in an end-to-end, seamless solution is required if companies hope to reap the full value of DLT.

WHAT IS BLOCKCHAIN INTEGRATION

The ability to transfer an asset between two or more DLT platforms with the confidence that its uniqueness and state are kept consistent.

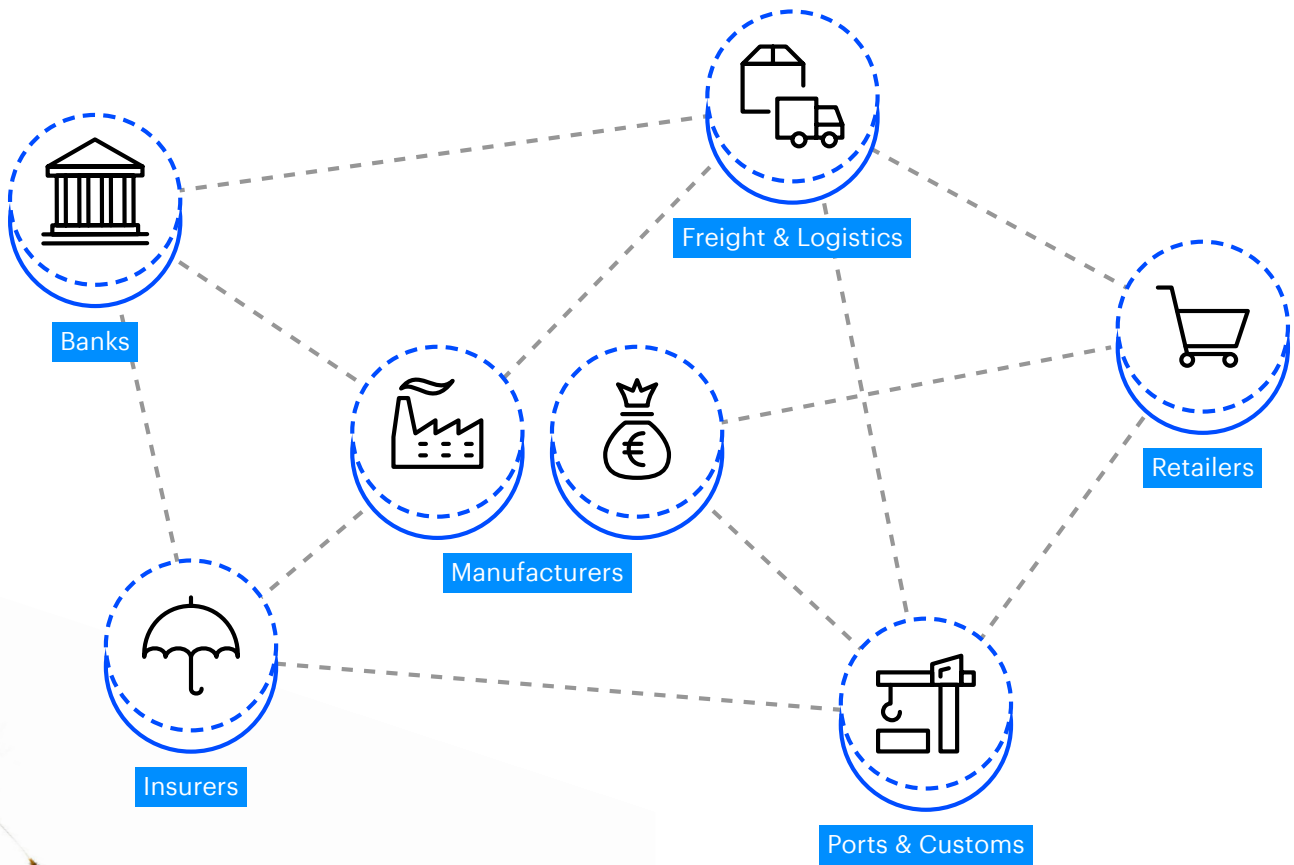
The ability to maintain a consistent state of a data element on two or more DLT systems simultaneously; 'I see what you see' across different DLT ecosystems.



BLOCKCHAIN PLATFORMS ARE GROWING WITH THEIR ABILITY TO UNLOCK BUSINESS VALUE

Blockchain maturity and innovation are accelerating. Looking beyond a one size fits all platform has sparked new possibilities. It may lead to platform innovations we can't yet imagine. But as ecosystems develop around platforms, they must also interact. If they can't blockchain won't achieve its full potential.

For further innovation and implementation, we must establish the ability for current and future platforms to interoperate without adding complexity or compromising blockchain's unique attributes.



Solving for integration between platforms may seem simple. One platform need only communicate with another the status of a particular data object and/or pass control.

But that apparently simple suggestion reintroduces the need for messaging and data reconciliation—the very thing that blockchain so valuably eliminates. It is possible for leading platforms to work together to develop a common standard against which each platform’s engineers could design and code compatible components. However, early interest in resolving this problem collaboratively between platform providers have been stymied by two primary challenges:

- First, the competitive dynamic of the respective DLT platform providers and their focus on getting to or moving beyond the first versions of their platforms makes their imminent productive collaboration unlikely.
- Second, even if that collaboration were to happen, the resulting harmonization could limit further innovation.

There have been a few early attempts to sidestep the competitive issues outlined above and move toward a DLT network that can span ecosystems. R3 developed a system that allows applications built on its platform to be able to interact seamlessly. While this resolves communication between distinct ecosystems, it focused on ecosystems built on R3’s platform.

Looking to the future, full integration between different blockchain platforms will be necessary to maximize benefits of distributed ledger technology.

For two or more platforms to truly interoperate in a way that preserves and extends the core value and principles of blockchain, there can be no messaging.

The state of a data object must be certain and consistent in both platforms simultaneously. Passing control of a data element from one DLT platform to another must come with the confidence that its uniqueness and state are kept consistent. The ability to audit, trace, and verify data elements across their full lifecycle over ‘in network’ DLT platforms must be preserved across all platforms.

While some forms of interaction and communication are possible today, no best practice has yet emerged that achieves ‘interoperability’ such that we can maintain the efficiencies and simplicity that drives blockchain value.



ACHIEVING BLOCKCHAIN INTEGRATION

So how do we establish the ability for current and future DLT platforms to integrate without compromising the technology's benefits or miring it in complexity? Accenture determined that a novel approach was needed, one that would allow:



The ability for the state of an asset or data value to be consistent on two or more DLT platforms simultaneously



The ability to audit, trace, and verify data elements across their full lifecycle and across DLT platforms



Data element control to be transferable from one DLT platform to another with the confidence that its uniqueness and state are kept consistent



Avoid the necessity of structural changes to the DLT systems that are to be included in the integrating networks

For context, the scope of our approach is limited to permissioned DLT systems¹ with the necessary governance and policy/rules by which the two or more DLT systems participants will work together.

¹ Accenture has developed a derivative approach that could be applied for public/permission-less systems, but that is not the focus of this POV nor the vast majority of our client work.

ATTAIN INTEGRATION BY ESTABLISHING AN INTEROPERABILITY NODE

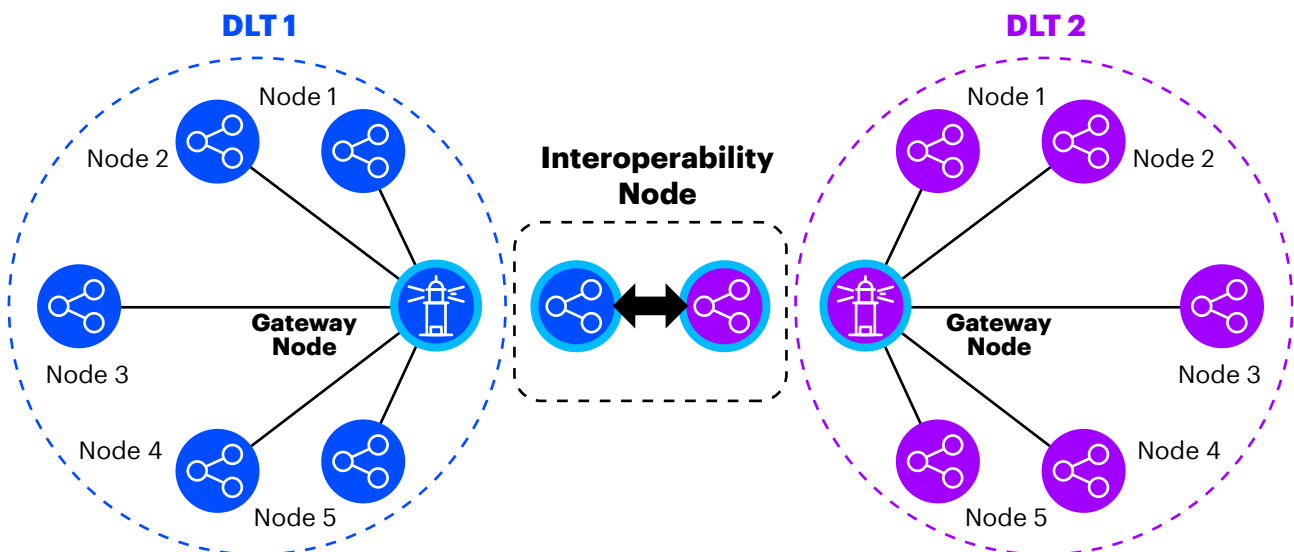
The basis of Accenture’s integration solution is to establish a trusted ‘interoperability node’ that sits between the target DLT systems. This interoperability node is given the appropriate identity and access control capabilities to all in-scope DLT systems. For processes that require movement of assets from one platform to another (and must identically and simultaneously exist on those networks), the interoperability node enables that synchronization. Within the node, a rules engine governs the appropriate movement or alignment of data between DLT systems. There are two possible approaches:



Value transfer: the ability to transfer a tokenized asset from one DLT ecosystem to another where different DLT platforms are used while protecting against “double spend” and maintaining fidelity and provenance.



Active state: the ability to have a mutualized data element or piece of reference data to simultaneously exist in two or more DLT platforms/ecosystems such that it is kept in constant synch; all participants are able to say “I see what you see”.

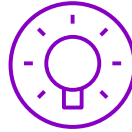


An integration protocol requires that the leaders of two or more DLT based ecosystems establish the business rules, policies, standards, and governance by which they agree to work together. The business logic resulting from these governance agreements is then used to configure the interoperability node and technical implementation.

Additional considerations for the solution included:



Asset Locking Mechanism in value transfer. At a high-level, assets are transferred from one DLT to another by “locking” the asset on the first chain and then creating a representation of the asset on the second DLT platform.



Prevent Double-Spend in “active state.” When building a blockchain integration solution, the solution must maintain as many blockchain-like guarantees as is possible. For digital assets (even, digital representations of real-world assets), it is necessary to ensure that multiple representations of the same asset do not exist at the same time. For example, double-spend in a supply-chain may make some assets disappear and other assets be overcounted.



PROGRESS AND NEXT STEPS

The ability for Blockchain-powered business networks to achieve maximum scale and utility will become a reality only when we have a reliable and robust DLT integration solution. Enterprise leaders have had lingering concerns about selecting the “wrong platform” upon which to build solutions. Having confidence in being able to integrate across different platforms depressurizes much of that concern. Accenture built the first working prototype of an Interoperability Node capability and is engaging with clients on first implementations to prove its readiness for production.

Our near-term goals are to continue to test effectiveness with each of the leading DLT platforms and work with clients and partners to expand the possibilities for cross-industry/cross-process collaboration.

As we move forward, we expect integration will create new opportunities. It can free the capital and time necessary to drive further efficiencies. It can unleash capabilities from combined datasets and a potential unification of identity protocols.

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¹ Gartner, The Evolving Landscape of Blockchain Technology Platforms, Ray Valdes, David Furlonger and Rajesh Kandaswamy, March 2017, accessed 18 April 2017, <https://www.gartner.com/doc/3626317/evolving-landscape-blockchain-technology-platforms>

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