

PROGRAMMABLE INTEROPERABILITY: THE KEY TO STANDARDISATION IN REGULATING TOKENISED ASSETS

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Blockchain offers open networks as alternatives to regulated intermediaries

Blockchain technology represents an innovation in the custody of verified data – including ownership, transfer and settlement of assets. Financial institutions are adopting this technology to improve liquidity and access to financial products. A variety of architectures has emerged, including systems that rely at least in part on private, or permissioned, blockchains.

But a complex and fragmented blockchain environment presents a challenge for regulators how can they establish regulations that allow participants and institutions to access the benefits of blockchain at a global scale?

A [recently published white paper](#), produced by Axelar Foundation and Metrika, explained paths institutions can take to ensure their blockchain implementations are interoperable. Financial institutions Citi, Deutsche Bank, Mastercard and Northern Trust contributed insights to the paper in spotlight sections. Drawing references from that white paper, we present *programmable interoperability* as a path for regulators facing this challenge.

When blockchains are connected by open, programmable interoperability infrastructure, standards can be implemented at the cross-chain layer and applied to all systems and blockchains that connect to the global internet of blockchains.

Dimensions of open blockchains: Technical, operational & governance

Technical: Open blockchains represent a new way to store and transfer verified ownership data, using automated and self-executing publicly available open-source software. Verification is made publicly available and, while the details of transactions may be shielded, validity is assured through transparency. No longer does ownership data need to be stored by a regulated intermediary.

Operational: An open blockchain is operated on a distributed and decentralised basis through *crypto-economic security*, where incentives and penalties provide guarantees of honesty. Certain mechanisms are similar to a bond posted as assurance by a counterparty in a transaction. Crypto-economic security creates an incentive model that facilitates the storage



and transfer of ownership data by entities that have no prior relationship with each other and provides trust in the recording of such ownership data.

Governance: Open blockchains decentralise control over software. Rather than one intermediary controlling an electronic database and making all relevant decisions, all token holders have an opportunity to vote on changes to the software. This ensures that all user perspectives can be considered for decisions.

When these technical, operational and governance innovations are taken together, a new way to store and transfer ownership data arises. Ledgers that were once private and paper based, and that necessitated reliance on intermediaries are now open and transparent, with no need to rely on a specific individual or entity.

Asset tokenisation emerges as a compelling use case for blockchains

The history of institutional participation in asset tokenisation begins as early as 2017. Then, established financial firms and startups alike began developing tokenised securities on the Ethereum blockchain, using the new ERC-1400 standard designed for regulatory compliance. In recent years, asset tokenisation has gained momentum among financial institutions. Analysts estimate the total value in tokenised assets could reach \$16 trillion by 2030¹.

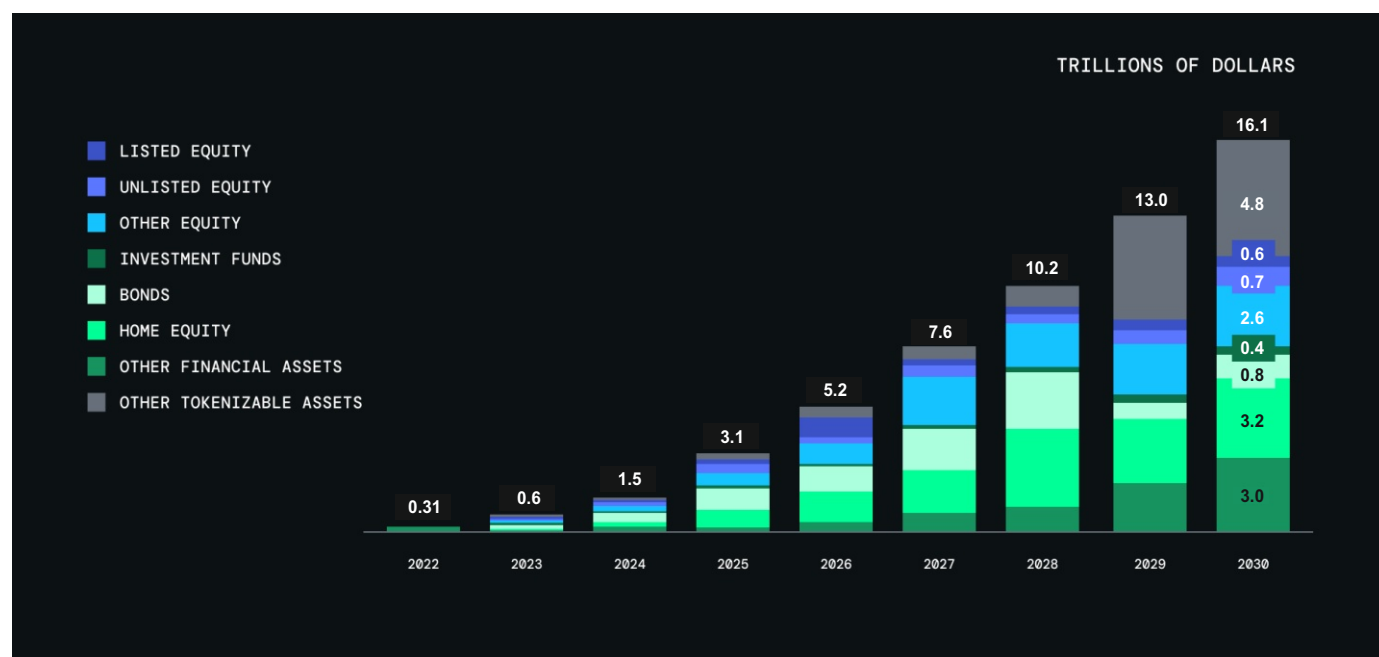


Figure 1: The opportunity in tokenised assets could grow to \$16T by 2030, according to one estimate – but institutions are pointing to liquidity fragmentation as a potential obstacle to that growth. (Source: World Economic Forum – Global Agenda Council, BCG Analysis¹)



Put simply, asset tokenisation records ownership on a blockchain, where it can be transferred as any digital asset – or “token” – might be. tokenisation expands access and liquidity for historically illiquid asset categories – including agricultural products, artwork, films, green energy, music licensing, precious metals, raw materials and real estate². These categories have historically been difficult for asset managers to integrate into financial products³.

The need for interoperability in asset tokenisation

Cryptocurrency tracker CoinGecko lists 172 top smart contract platforms by market cap. Each represents a distinct open blockchain, and there are many more in the long tail. These open-source blockchain projects—especially at the top—are hubs of activity.

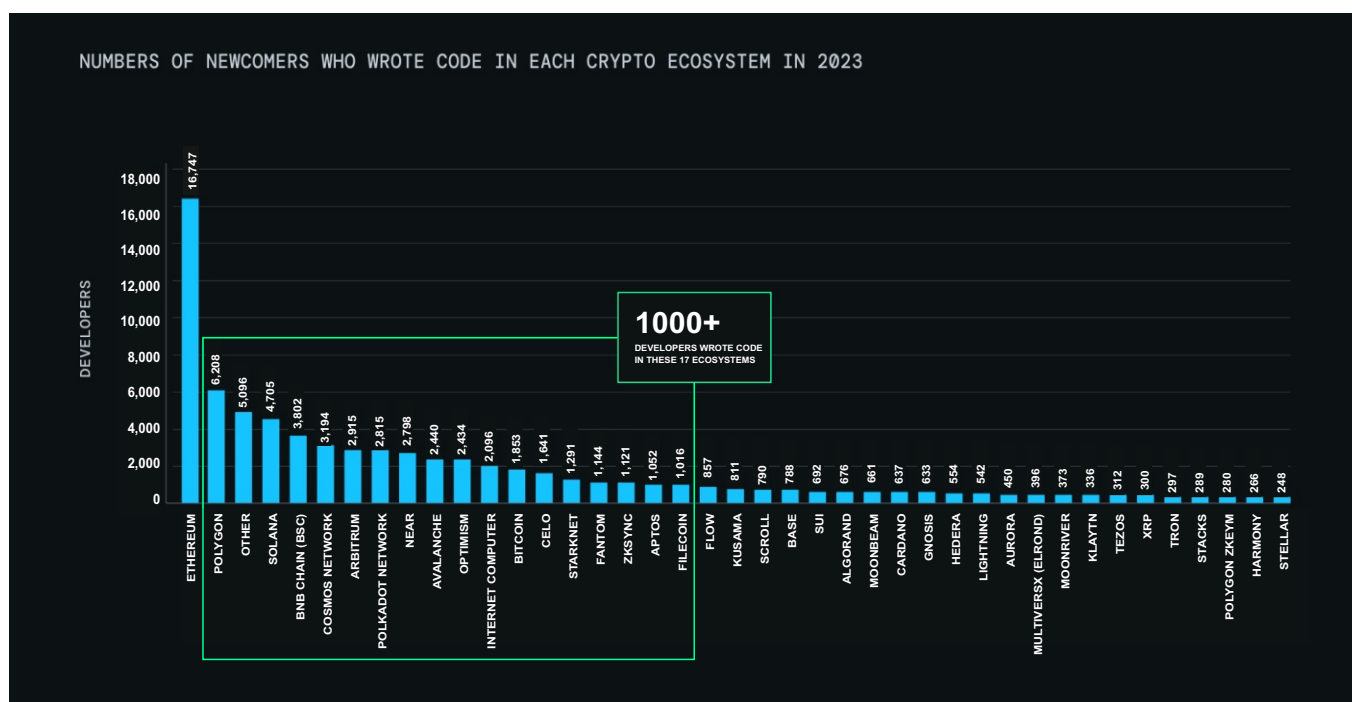


Figure 2: Each of the top 17 blockchain projects drew 1,000+ new developers in 2023. (Source: [Electric Capital Developer Report, 2023](#))

Even connecting the many instances of institutional permissioned chains to a single public network would be a challenge – add to that the many public chains that are building actively.

In addition to open blockchains, financial institutions have developed asset-tokenisation systems on private and permissioned blockchain ledgers⁴. Many institutions are understandably averse to the risks of transacting on a public blockchain, where regulatory compliance may not be clear-cut, and coding errors can trigger irrecoverable losses.



The number and variety of blockchains, open and private, creates a problem that could limit the benefits of liquidity and access for tokenised assets. Deutsche Bank summarised its approach to this situation in a [recently published white paper on institutional interoperability](#), produced by Axelar Foundation:

*A key assumption behind Deutsche Bank's experiments and proof of commercialisation is that there will be a proliferation of blockchains. **Different clients will use different blockchains and different blockchains could better fit certain use cases.** Each blockchain, including their stacks like Layer 2 or sidechains, will be likely to have multiple beneficiaries and host multiple types of digital assets including digital cash and smart-contract-based applications. **Hence, interoperability is a practical necessity.***

Programmable interoperability brings standardisation to a multichain ecosystem of tokenised assets

The technical, operational and governance innovations that blockchain provides necessitate a new approach by regulators and policymakers. Historically, regulators have looked to either the physical bearer asset or the ledger responsible intermediary when creating rules. In an open-blockchain-based system, there is neither. In many scenarios, the role of intermediaries involved with the storage and transfer of ownership data has been replaced by automatic, self-executing software.

The rise of this new technology brings regulatory challenges and uncertainty, but there are several benefits for regulators and policymakers as well.

One thing that regulators and policymakers are concerned with is consistency and standardisation. To the extent that regulators and policymakers pass new rules with respect to an asset class, they want to ensure that the rules will be consistently applicable.

In the traditional finance industry, market-level standards are implemented through financial market intermediaries. These intermediaries push out requirements to users, who thereby adopt these requirements and use them with counterparties. Accordingly, policymakers can push standards via such intermediaries.



The most straightforward way to apply this principle in the emerging world of tokenised assets is to implement it at the interoperability layer. Enabling this requires a programmable interoperability network, where specific instructions and compliance requirements can be encoded in the cross-chain infrastructure. These instructions can then be translated for every connected blockchain to ensure end-to-end, consistent application of regulations without variability by blockchain implementation.

Policies and paths can be standardised for applications connecting to a smart-contract layer built on an open interoperability protocol that connects private and public blockchains

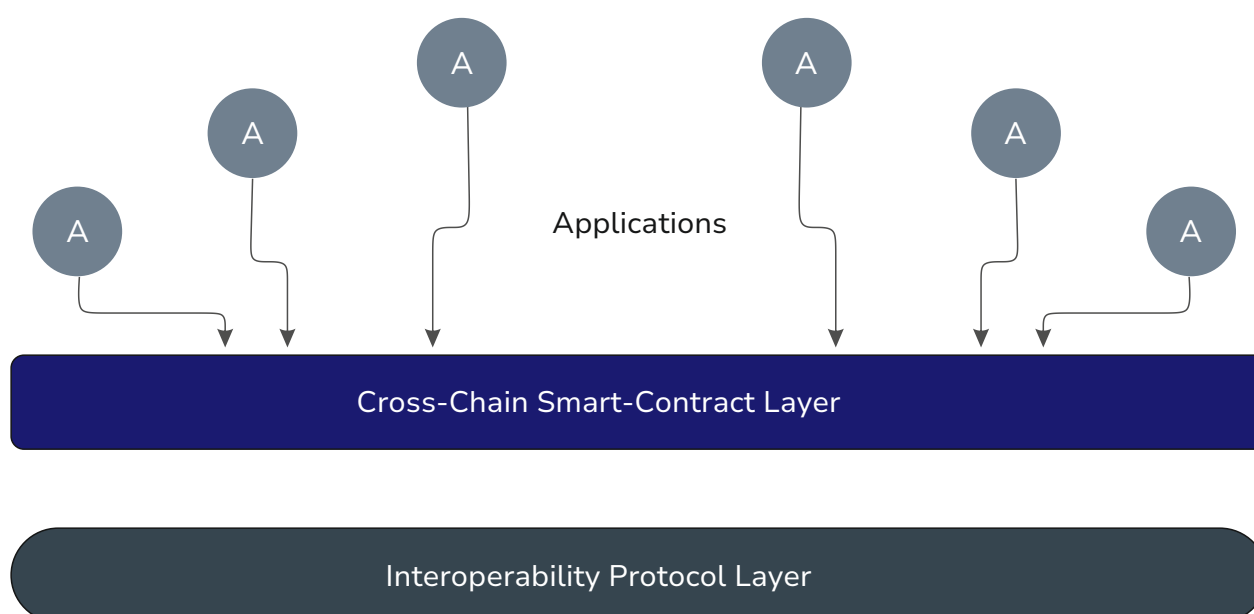


Figure 3: A programmable cross-chain layer enables regulatory standards to be applied consistently and openly across many applications that connect via diverse blockchains. (Source: Interop Labs)

In asset tokenisation scenarios, it is likely that participants will want to connect new assets and new blockchains, both public and private. Rather than oversee and regulate each of these resources piecemeal, open and programmable interoperability networks present the potential for standardisation at the interoperability level, covering multiple blockchain connections.

Two considerations are important for establishing how this interoperability-layer regulatory standardised infrastructure might be configured.



Open networks provide assurance

Entities from diverse policy jurisdictions must be empowered to program specific standardised parameters into such a system. To the extent there are various standardised parameters applicable to an asset class, each party needs the ability to program its own individual parameters. In any system designed to serve such diverse stakeholders globally, a level of reasonable neutrality must be assured. There can be no question of proprietary ownership in a single jurisdiction or corporate entity.

Therefore, interoperability based on an open blockchain is desirable. Open blockchains provide market infrastructure where:

1. Smart contracts govern compliance for tokenised assets.
2. Transparent monitoring and full traceability are enabled.

Hub-and-spoke topology supports standardisation

Users rarely consider the configuration of nodes in the networks they use, whether digital or physical. However, these configurations (known as *network topology*) are crucial to the services rendered.

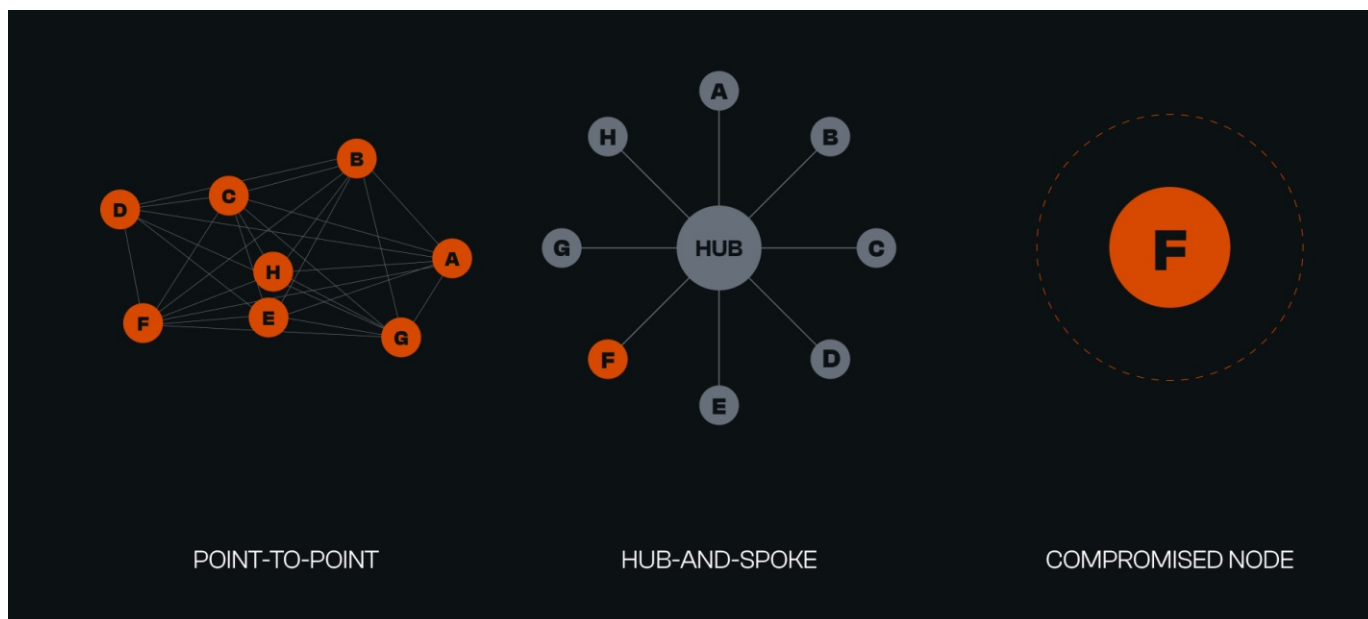


Figure 4: Well-designed network topology is necessary to strengthen security of funds and facilitate compliance on the institutional side of Web3. (Source: Interop Labs)



Two kinds of network topology are frequently used in both digital and physical networks: hub-and-spoke and point-to-point. In a hub-and-spoke network, the hub has visibility into all nodes. Problems (or, in this case, instances of noncompliance) can be isolated quickly, preventing contagion.

There are also advantages in economies of scale: on a hub-and-spoke topology, newly connected nodes can communicate immediately with any other nodes on the network; on point-to-point networks, the number of required connections scales exponentially with each additional node.

For the purposes of promulgating regulatory and policy standards across diverse blockchains, a hub-and-spoke network topology is desirable. Hub-and-spoke gives the opportunity to push upgrades to all connected applications and networks.

The benefit of looking at standards at the interoperability layer is that they would apply to all the connected chains.



Conclusion

The benefit of looking at standards at the interoperability layer is that they would apply to all the connected chains. For example, where regulators and policymakers work with the interoperability industry, there could be a welcome opportunity to develop one set of standards that would be applicable across several blockchain networks.

When dealing with the storage and transfer of ownership data, regulators and enterprises have historically adapted their approach to new technologies. Initially, paper was considered – from paper bearer assets to paper ledgers, certain regulations made sense. With the rise of electronic databases, use of such databases by different sets of intermediaries needed to be regulated; new regulations were adopted, and prior regulations set aside. Accordingly, the innovations around decentralised systems call for similar changes – it is time for regulators to embrace this new technology and evolve their thinking.



About Interop Labs

Interop Labs is a leading developer of blockchain interoperability technology, used by Web3 infrastructure protocols to support scaling the next generation of internet applications to billions of users. Interop Labs is the initial developer of Axelar network. Learn more at interoplabs.io.

About Axelar network

Axelar is the Web3 interoperability platform, delivering the shortest path to scale on an open stack to connect all blockchains. Adopters include Uniswap, Microsoft and dozens of natively multichain startups, building applications to reach all blockchain users at once – 10X as many active users as the leading Web3 application environment. Axelar supports smart contracts on a cross-chain layer that is open, scalable and secure. Backers include Binance, Coinbase, Dragonfly, Galaxy and Polychain.

Learn more: axelar.network.



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Jason writes about the intersection of law, technology and policy. Jason is currently the Head of Legal at Interop Labs, the initial developer of the Axelar network. Prior to this role, Jason was the Global Legal Lead for Blockchain at Accenture and Assistant General Counsel at R3, an enterprise blockchain software company. Much of this work related to the interaction with blockchain networks (including the development and use of digital assets) by banks, central banks, financial market intermediaries and large-scale enterprises.

The author's views are his own and do not reflect those of Elevandi or its staff.

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