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TRUSTLESS B2B & B2C REPORT

PREFACE

The first decade of cryptocurrency development has primarily focused on establishing reliable infrastructure. However, in recent years, the emphasis has shifted towards bringing real-world use cases to these technologies, aiming to drive widespread adoption. Distributed Ledger Technologies (DLT) inherently offer transparency, leading to their initial applications in public and open-source domains. However, there are indications that this dynamic is evolving, with the lines between public and private sectors beginning to blur.

This report delves into this particular topic: the convergence of public technology with more private Business-to-Business (B2B) and Business-to-Customer (B2C) interactions. Traditionally, these interactions were the domain of banking institutions, providing private services to companies and acting as trusted third parties to handle complex business relationships beyond formal computer logic. But today, certain protocols have progressed beyond the pilot stage, signaling the potential for real-world business applications.

In this journey, many competitors vie for success. The next cycle is likely to determine an interoperability protocol standard, amid the emergence of new challenging approaches. For now, we will focus on the two major classes of blockchain interoperability protocols: Oracle-based and consensus-based, each offering distinct trade-offs. First, we will examine their differences and market shares.

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It's important to separate two types of networks because they will require different interoperability architectures. The key difference in their infrastructure is based on the public versus private usecase :

PUBLIC NETWORKS (INTERNET)

In public networking, the shared values revolve around security and transparency, even if it comes at the expense of certain critical central points that are kept highly secure. This design choice is akin to the development of the global internet we know today, with server-based hosting in data centers, TCP/IP facilitating transparent communication between servers, and the DNS (Domain Name System) acting as a centralizing and systemic part of the internet. In the blockchain industry, this model aligns with an Oracle-based interoperability system, where data storage is decentralized across multiple chains, communicating via a common messaging standard (like CCIP). Drawing a comparison to Chainlink is appropriate, as multiple DNS providers exist for the internet, much like there would be numerous oracle service providers in the Chainlink network. Public infrastructures often trade-off reliance on a central actor for enhanced simplicity and ease of onboarding.

PRIVATE NETWORKS (INTRANET & DATABASE)

On the other hand, private networking is the preferred choice for businesses and corporate structures. It is either adopted for internal interoperability (intranets) or to facilitate exchanges with external counterparties (through shared databases, for instance). The technical implementations of private networks vary significantly from one company to another. To achieve interoperability, they often adopt "general-type" standards across partners. Challenges arise when smaller businesses interact with larger dominant entities, leading to difficulties in achieving seamless integration. A blockchain private network context is analogous to a consensus-based interoperability system like Cosmos' IBC (Inter-Blockchain Communication) protocol. Each chain produces its own consensus to secure the message exchange. The information transport is entirely trustless and can be operated by independent relayers. The messages format is open but adheres to different InterChain Standards (ICS-x). Private infrastructures typically trade-off overall complexity for increased flexibility and composability.

ORACLE BASED

- ✓ The transport layer security is the same at all points of the network
- ✓ One messaging standard for everyone, ease of on-boarding
- − Rely on a single (decentralized) infrastructure & its governance

CONSENSUS BASED

- ✓ Totally decentralized transport operated by open & trustless "Relayers"
- ✓ Open messaging dataType for full customizability (also greater privacy)
- − More complexity & variable security depending on each party's collateral.

This comparison tells us that CCIP & IBC are likely not direct competitors but more certainly targetting different marketshares. One for public & permissionless networks, the other for private & permissioned databases and intranets.

CONSENSUS SECURITY

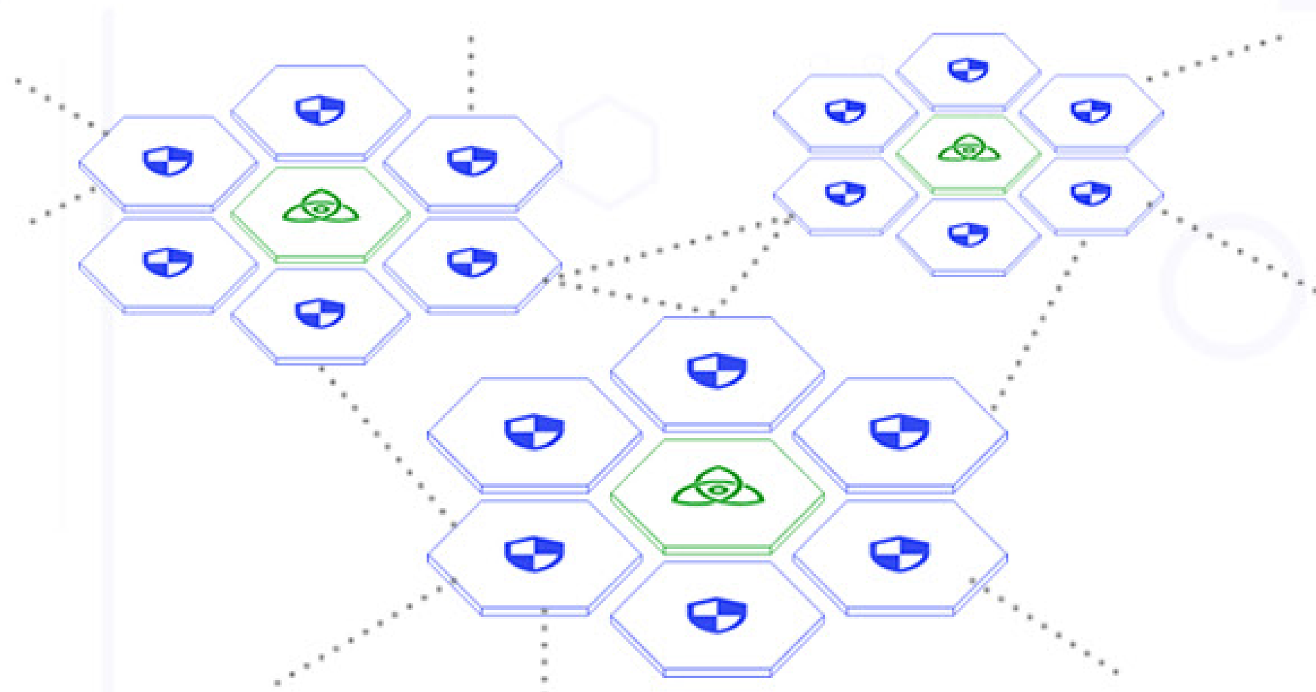
Compared to today's industry, in which banks are common intermediaries. In a decentralized B2B system based on consensus interoperability, the landscape would resemble multiple "islands" of distributed databases and intranets. However, a critical consideration in this system is that these islands will exhibit varying levels of security, contingent on the collateral value they stake in the consensus mechanism. As a result, security and collateral become crucial factors if smooth interoperability is to be achieved.

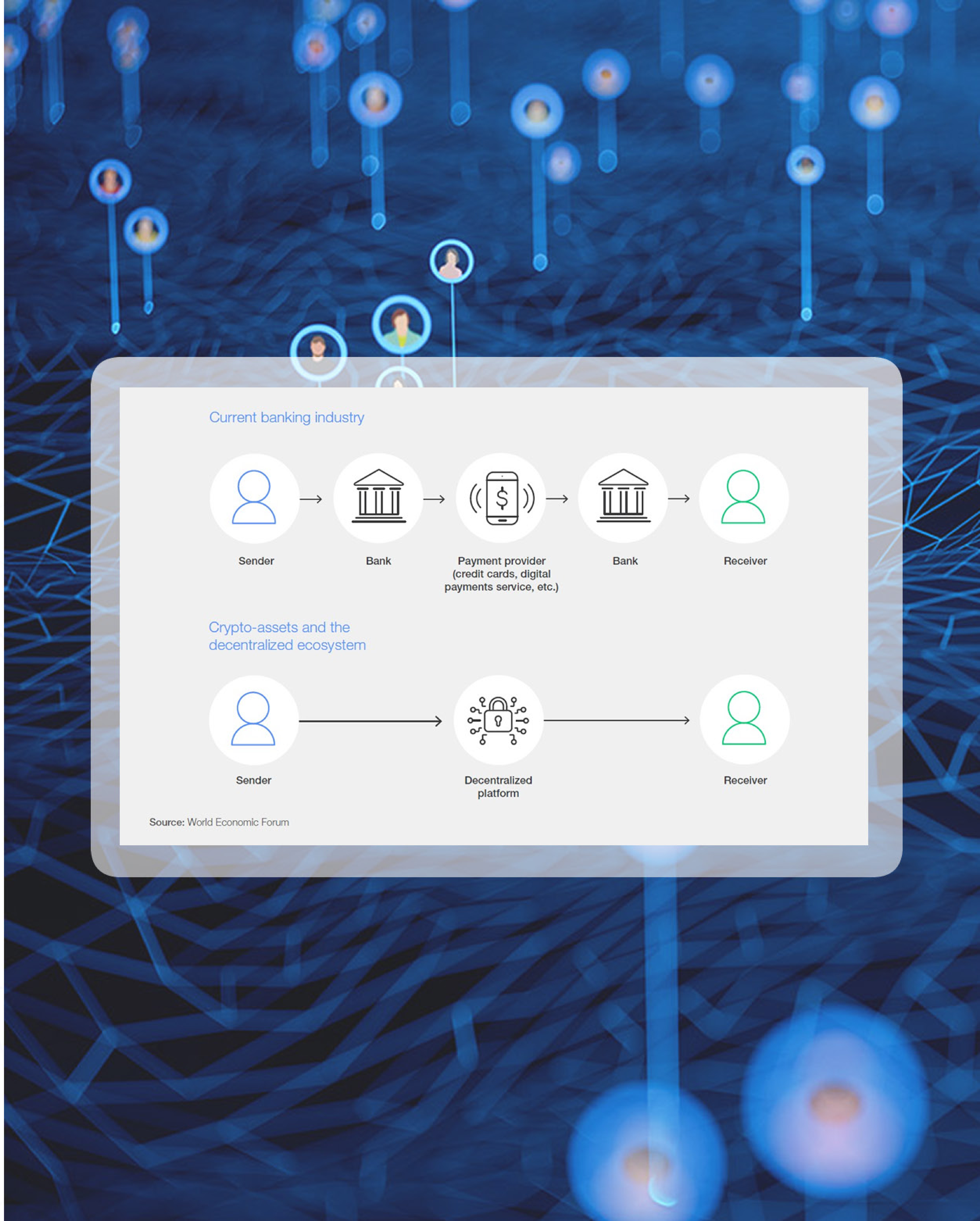
While this system holds the potential to eliminate the need for the traditional banking infrastructure, it is more likely that banks would transition to this new decentralized environment. They might even actively participate in these consensus "islands", contributing their collateral value to enhance the overall system's security. In doing so, banks would maintain their relatively central role, albeit in a decentralized context.

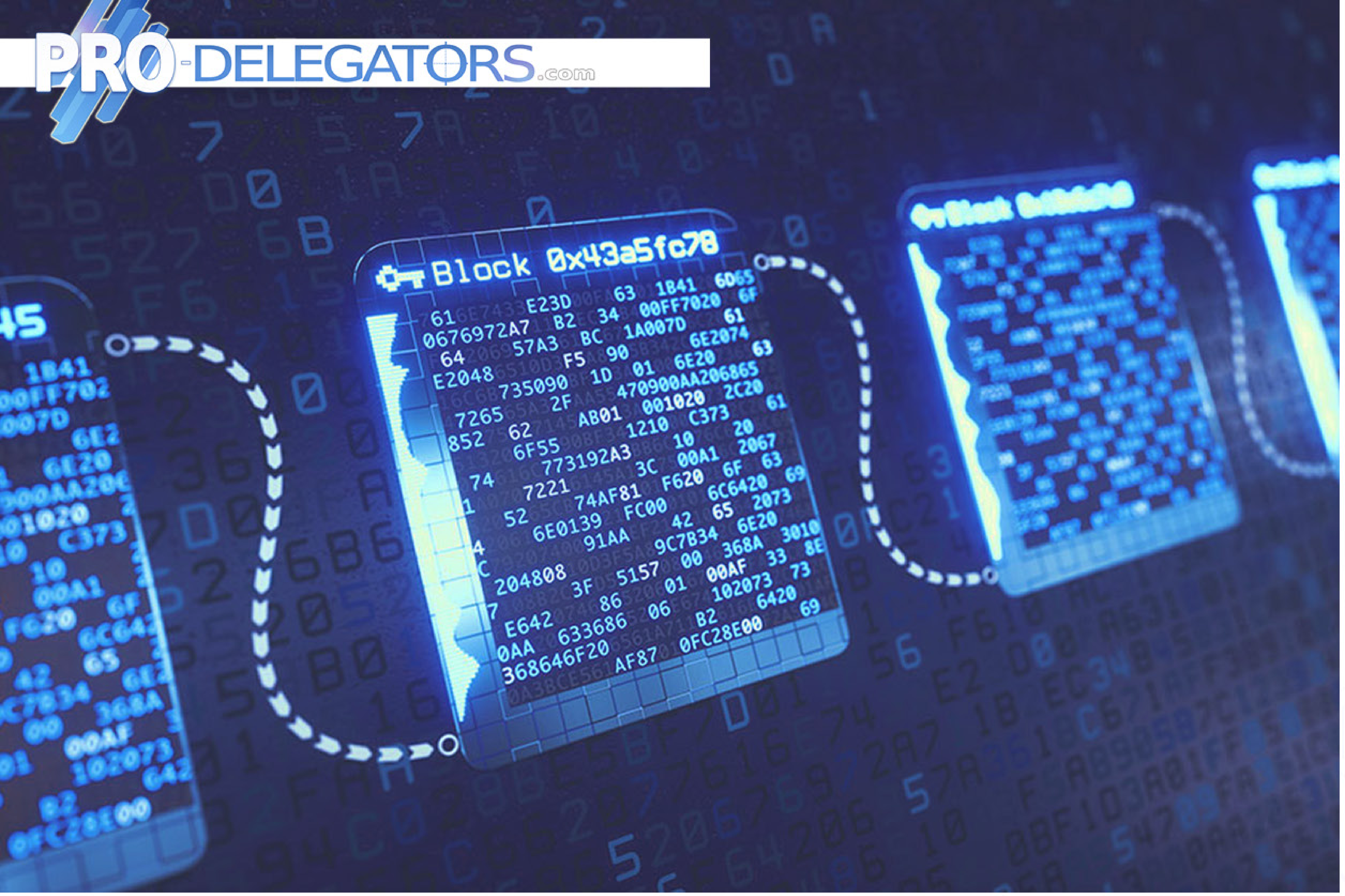
MODULARITY

Should businesses utilize their own consensus-based infrastructures, they would engage in reading, writing, sharing, and trading various databases among themselves. This raises a vital question of how to partition these datasets. Consequently, the most critical component of our infrastructure would be modularity - separated components with their own logic architected around a common consensus core. This system would require the ability for these "modules" to communicate with one another and establish connections to external modules based on other consensus cores, all facilitated through programmable and permissioned connections.

Providing services to seamlessly transition existing databases into this modular blockchain equivalent can be likened to the transformative impact that website creation had on the e-commerce landscape during the internet's explosion.







PRIVACY & FINALITY

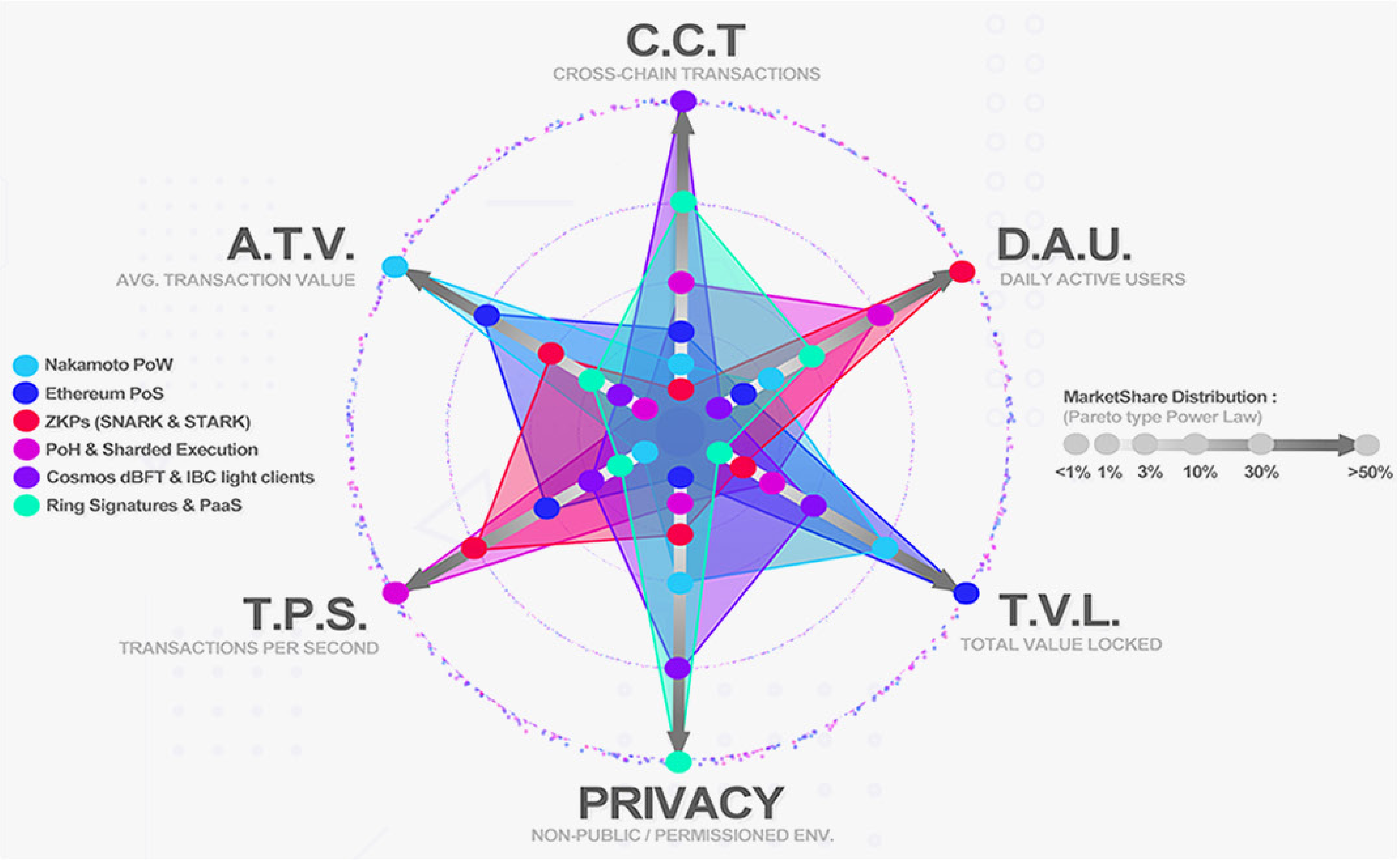
Privacy stands out as another pivotal concern for businesses. Opting for a centralized consensus model is an impractical route, given that it would jeopardize the pseudonymous nature of all participants within the network. Consequently, the connections require a permissioned approach, coupled with extensive programmability. This arrangement empowers businesses to create custom-tailored solutions that align with their specific requirements.

Another pivotal inquiry revolves around the notion of block finality within the interconnected chains. The swiftness of finality directly impacts the promptness with which messages can be processed by the recipient chain and subsequently relayed to another chain in an unceasing flow of data traversing the participants. In this context, a network characterized by instant finality would manifest significantly enhanced efficiency.

> *Among various blockchain ecosystems, only the Cosmos Ecosystem currently offers all these features at a production-stage maturity*

TRADE-OFFS

In selecting Cosmos as the optimal choice for a B2B2C network, it's crucial to acknowledge that each ecosystem entails its own set of trade-offs. Our proposed model revolves around ecosystem specialization, delineating six distinct pools of market share. According to this model, our network would take the lead in interoperability, capturing over 50% of the Cross-Chain Transactions (CCT) market share, as depicted by the purple distribution in the left chart. While also securing a secondary share in privacy, the model suggests that achieving this might involve a trade-off with daily active users (accounting for less than 1% market share) and average transaction value (around 1%).



This alignment is logical, considering that B2B interactions prioritize utility over user engagement. The relatively lower transaction value could be attributed to the prevalence of contract-based and information-related transactions, such as business agreements, data sharing, and collateral insurance deposits, as opposed to settlements. By employing this model, we gain insights into the key metrics to monitor for adoption confirmation. Successful adoption should manifest through a notable uptick in cross-chain transactions, coupled with a significant portion of non-public transactions in comparison to public ones, while ignoring daily active users, average transaction value or even transactions per second.

ENTERING THE COSMOS

As mentioned earlier, consensus-driven interoperability offers the benefits of customization and privacy, but this comes at the cost of increased overall complexity. The Cosmos Ecosystem aligns well with this characterization. It's alsoworth noting that the Cosmos SDK, being an open-source framework, is under continuous enhancement. To navigate this landscape with a comprehensive understanding, it is necessary to start by outlining some of its core components.

- The Delegated Byzentine Fault Tolerance (dBFT) consensus and the role of "Validators".
- The Inter Blockchain Communication (IBC) channels and the role of "Relayers".
- The Core Modules of the SDK and the on-chain Governance Module capabilities.
- The InterChain Security (ICS) and the Security as a Service (SaaS) business.

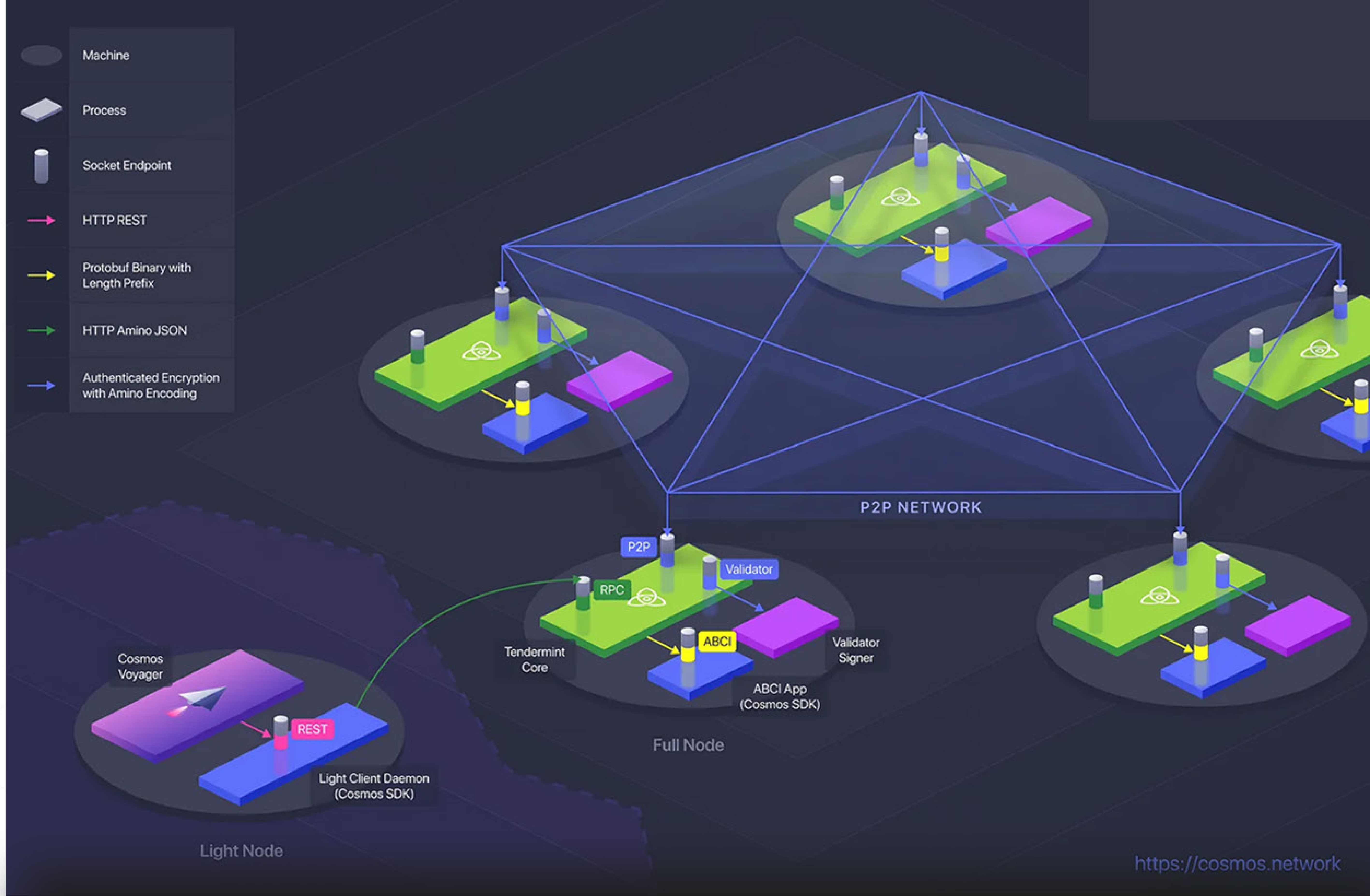
CONSENSUS VALIDATORS

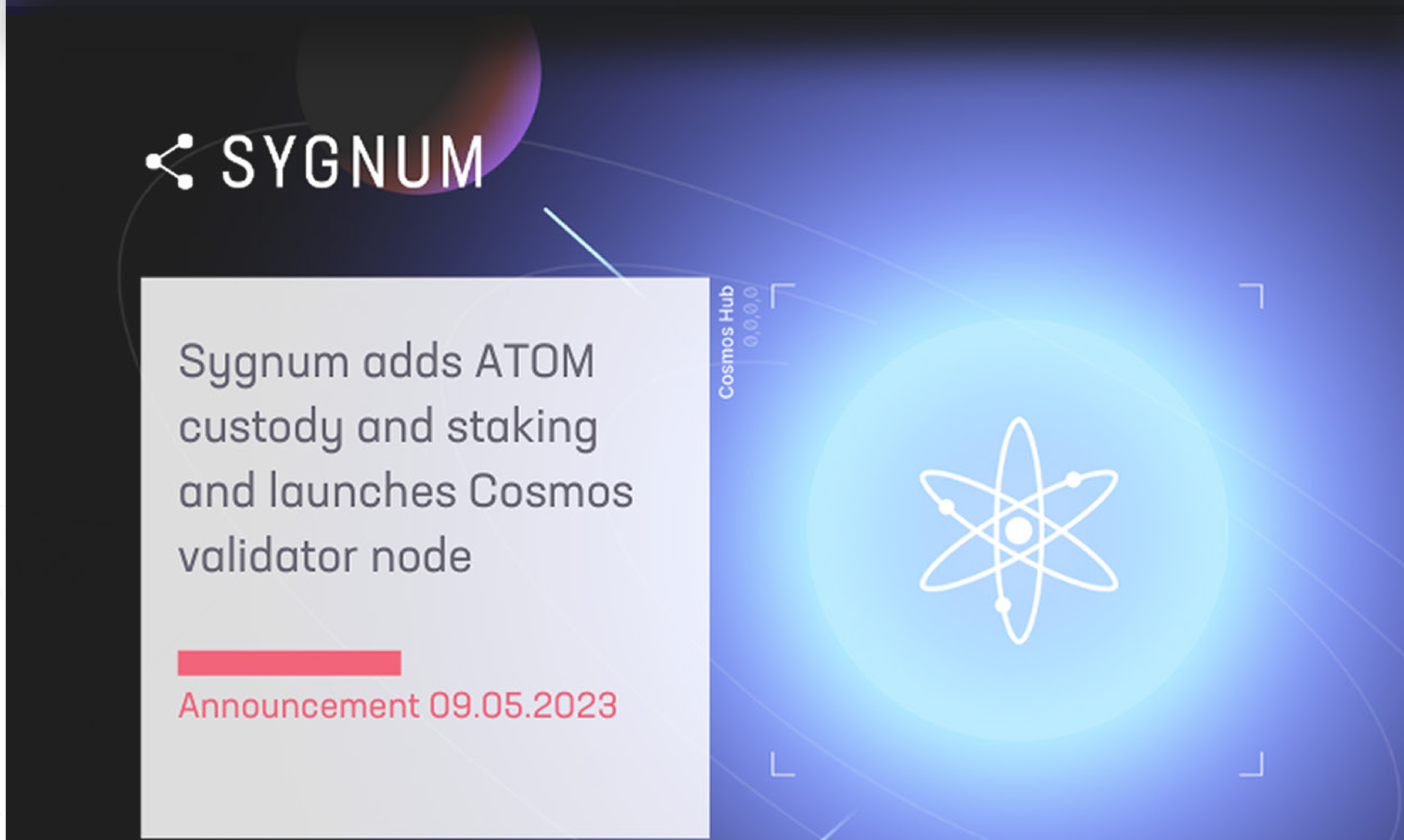
For simplicity, we will provide a basic summary of the Cosmos dBFT consensus without delving into technical details. Numerous online resources are available depending on your desired level of understanding. In a Cosmos blockchain, the number of validators can range from one to thousands, depending on the required level of decentralization.

- Validators must stake a certain amount of tokens to participate in the consensus and contribute to writing on the blockchain. Contrary to common belief, each chain does not necessarily need to have its own token; it can use any token or even multiple different tokens. This flexibility is facilitated by the IBC protocol, which enables InterChain Security (ICS). Non-token-based mechanisms like proof of authority are also possible.
- Validators need to communicate with all other validators. If more than 33% of the network fails to respond or rejects the new state, block production halts temporarily. It simply pauses until the consensus threshold is met again, with all active participants agreeing on the state. This instant finality ensures there are no forks in Cosmos; consensus is either reached or the block production stops. Safety is never compromised, but liveness may be affected if the consensus participation deteriorates below two thirds.
- Validators can take on various forms, ranging from public to private or a combination of both. The flexibility of the code itself allows for endless customization, from hidden code within a few permissioned participants to public open-source code, such as the Cosmos Hub, which operates with an open validator set where the top 180 validators with the highest stake are chosen to write blocks, while others wait in line to enter.

It's crucial to understand that validators are at the forefront, defining what gets written to the blockchain, what remains public, and what stays private. This is why banks are likely to operate as validators, preserving their existing role as intermediaries between business practices, the regulatory framework, and tax reporting. Validators are the sole entities capable of communicating information about the state, accepting and responding to requests via their RPC (Remote Procedure Call), as indicated by the green arrow in the top chart.

Before exploring the additional services that banks could provide in a Cosmos-based B2B2C network, it's important to note that this is not mere speculation. Banks like Sygnum have already begun offering validation services within the ecosystem. There are likely others operating as white-label validators or under venture capital organizations.





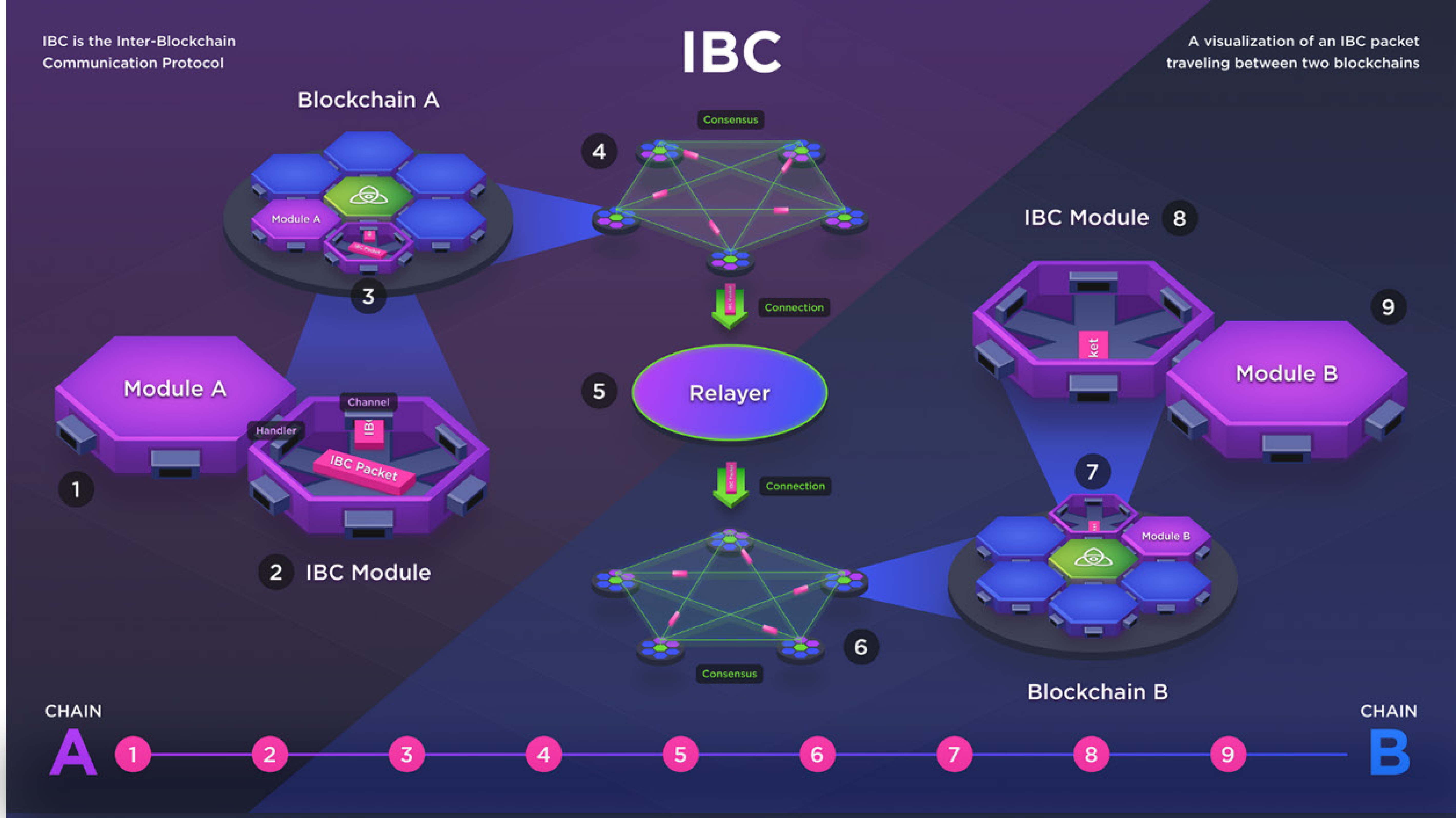
IBC & RELAYERS

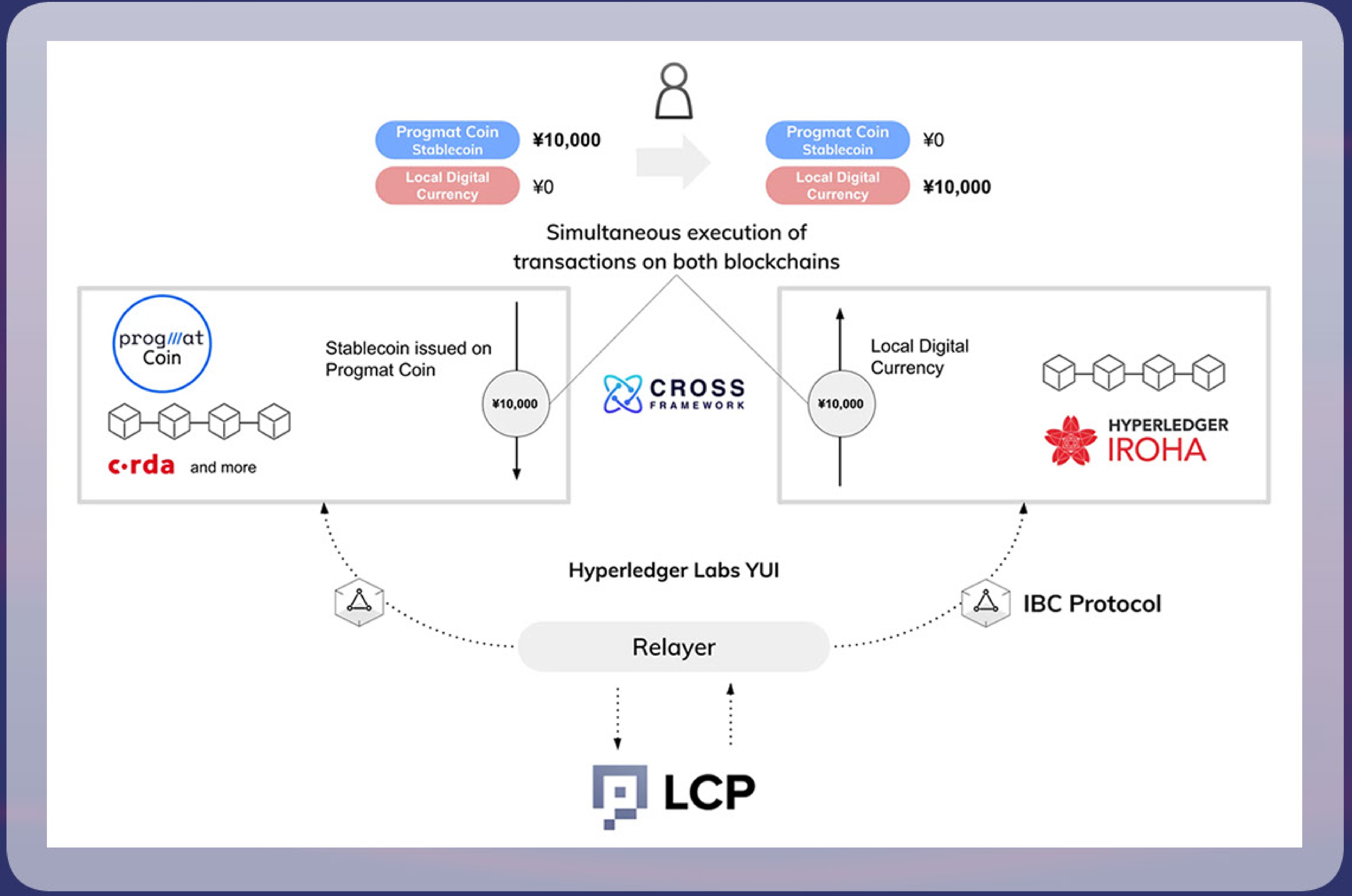
If participating in validator sets represents the frontier for banks, relaying is the first of many infrastructure services they can offer in a Cosmos B2B2C system. Relaying mobilizes resources and thus forms its own economy, with relayers charging small fees that accumulate across the interchain. For banks, this could equate to the regular operating fees in today's financial system. To grasp the significance of relaying, let's delve into the core fundamentals of the Inter-Blockchain Communication (IBC) protocol.

- IBC channels can only be created through joint acknowledgment between the two connected chains before any messages can pass through the channel. IBC's composability is limitless, allowing developers to create various middleware to extend the IBC module's capabilities.
- The IBC module on a Cosmos SDK chain can interact with all IBC-enabled modules within that chain. Additionally, these connected modules can emit IBC packets to interact with external modules existing on connected chain(s). Chains can set different channels for different Messaging standards (ICS-x).
- One of IBC's key advantages is its "chain-agnostic" nature, enabling the connection of chains of different types beyond the Cosmos SDK-based chains. Chains without instant finality may need to compromise by waiting for finality before sending packets. Notably, working IBC module implementations already exist for all major virtual machines (Ethereum, Solana, Hyperledger Fabric, C3 Corda, and more).

The key distinction lies in the openness of IBC relaying compared to oracle-based systems. Unlike the latter, the IBC protocol offers unparalleled customizability, empowering developers to establish their own IBC middleware, thereby unlocking endless possibilities for innovative business logic structures. As an example, customized modules could create token-gated encryption and decryption for channels, enabling data privacy. Consensus privacy is also imaginable, so long as there is enough visible and trusted collateral on both ends to agree and sign the joint acknoledgement. In the event-based IBC packet transport system, the relayer requires only the knowledge of where to connect and where to send the packet upon emission. Upon successful reception, the relayer sends an acknowledgment back to the origin chain, providing proof of rightful execution. This streamlined and secure process ensures the integrity of data transmission within the interconnected ecosystem.

Indeed, institutional relay services are becoming a reality in the blockchain space. A prime example of this is demonstrated through Mitsubishi Banking Corp's integration for its stablecoin product platform. The structure of this platform is outlined in the bottom chart.

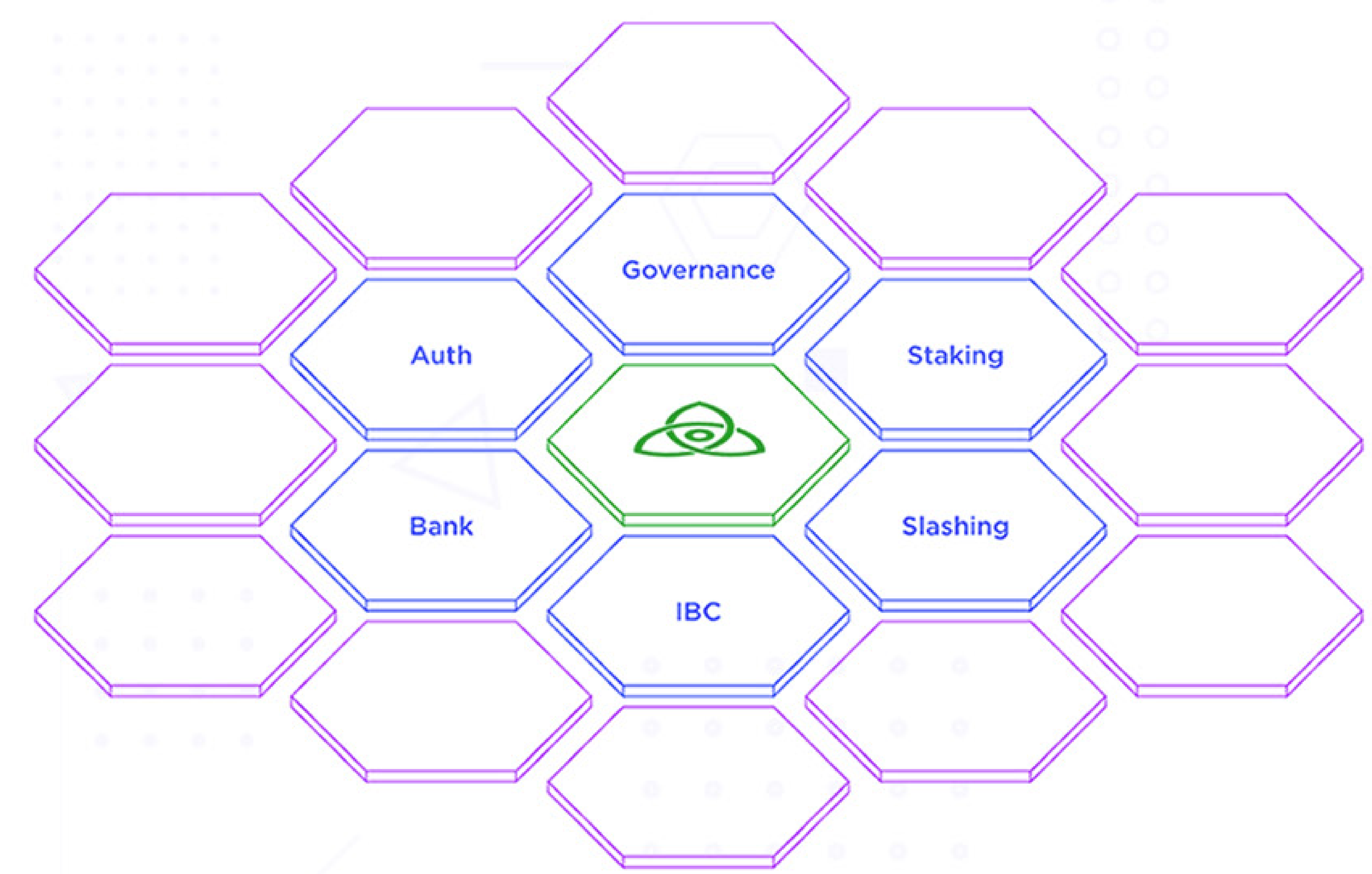




CUSTOM MODULES

Beyond the core modules, businesses will be left focussing on building their own tailored infrastructure for data & value. At the heart of this lies the fundamental composition of a module. Down to its basics, a module consists of two key elements: a "Keeper" and "Types". Simplistically put, the "Types" are the definitions of object based elements. They can be tailored to the exact need of any type of database storage. The "Keeper" manages the logic and state transitions within each module's datasets. Keepers are responsible for processing transactions, updating the variables state, and executing module-specific operations.

Modules can engage with the logic of other modules through the use of messages. Simultaneously, users can interact with modules via transactions. Notably, the execution of logic incurs gas consumption, a mechanism that maintains the equilibrium between cost-efficient operations and the prevention of spam-related attacks.



The consensus core secures the execution, the core modues provide the basic building blocks (accounts, tokens, ...), then the custom based modules corresponds to each business particular datasets and their logic. The inherent compartmentalization, coupled with the seamless integration of IBC for interaction with external module data, makes this model perfectly suited for a B2B2C framework. In essence, this modular architecture has been thoughtfully designed to facilitate the smooth migration of pre-existing databases and intranets into their blockchain counterparts.

CORE MODULES

Given the inherent intricacies involved in establishing a new blockchain, to alleviate the associated efforts, the Standard Development Kit (SDK) presents one of the most comprehensive repositories of open-source code, in the form of modules, serving as ready-made blueprints for essential functionalities of a Cosmos blockchain. The "core" modules encompass the previously mentioned Governance, IBC, and staking modules, alongside:

- **BANK** : provides core functionalities related to account management, transfers, and token functionalities. Its primary role is to facilitate the creation, management, and transfer of native tokens within the network.
- **AUTH** : handles the authentication and authorization of transactions and actions within the network. It ensures that only authorized users can initiate transactions and interact with specific functionalities.
- **SLASHING** : detects and penalizes misbehaving validators, by punishing validators who engage in malicious activities, such as double-signing or downtime, through the reduction of their staked tokens.

Since the inception of the network, numerous other modules have been built and open-sourced. Notably the NFT, Authz, ICA (InterChain Accounts) and ICQ (Interchain Queries) modules. More details on https://docs.cosmos.network/v0.47/modules

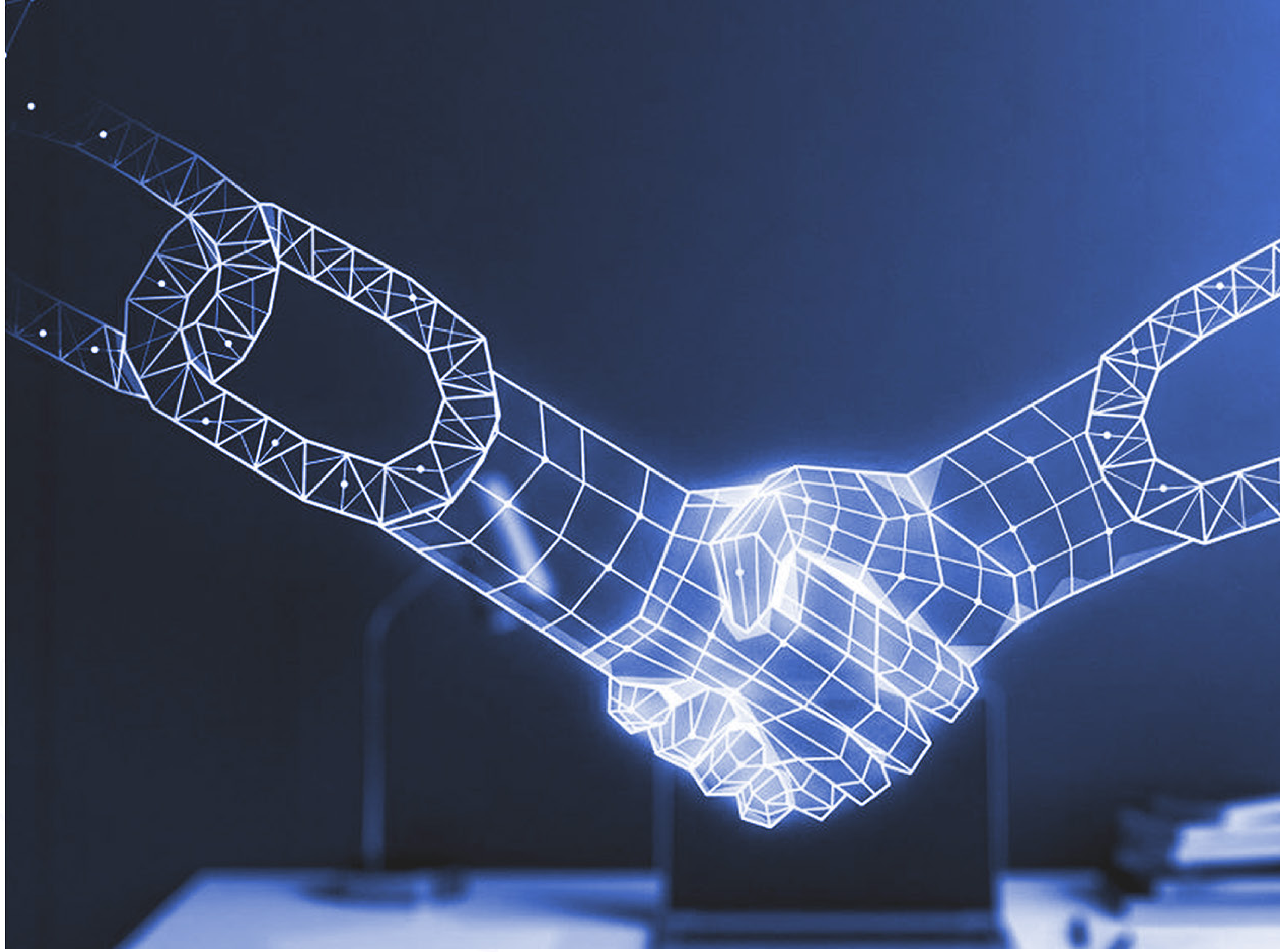
ON-CHAIN GOVERNANCE

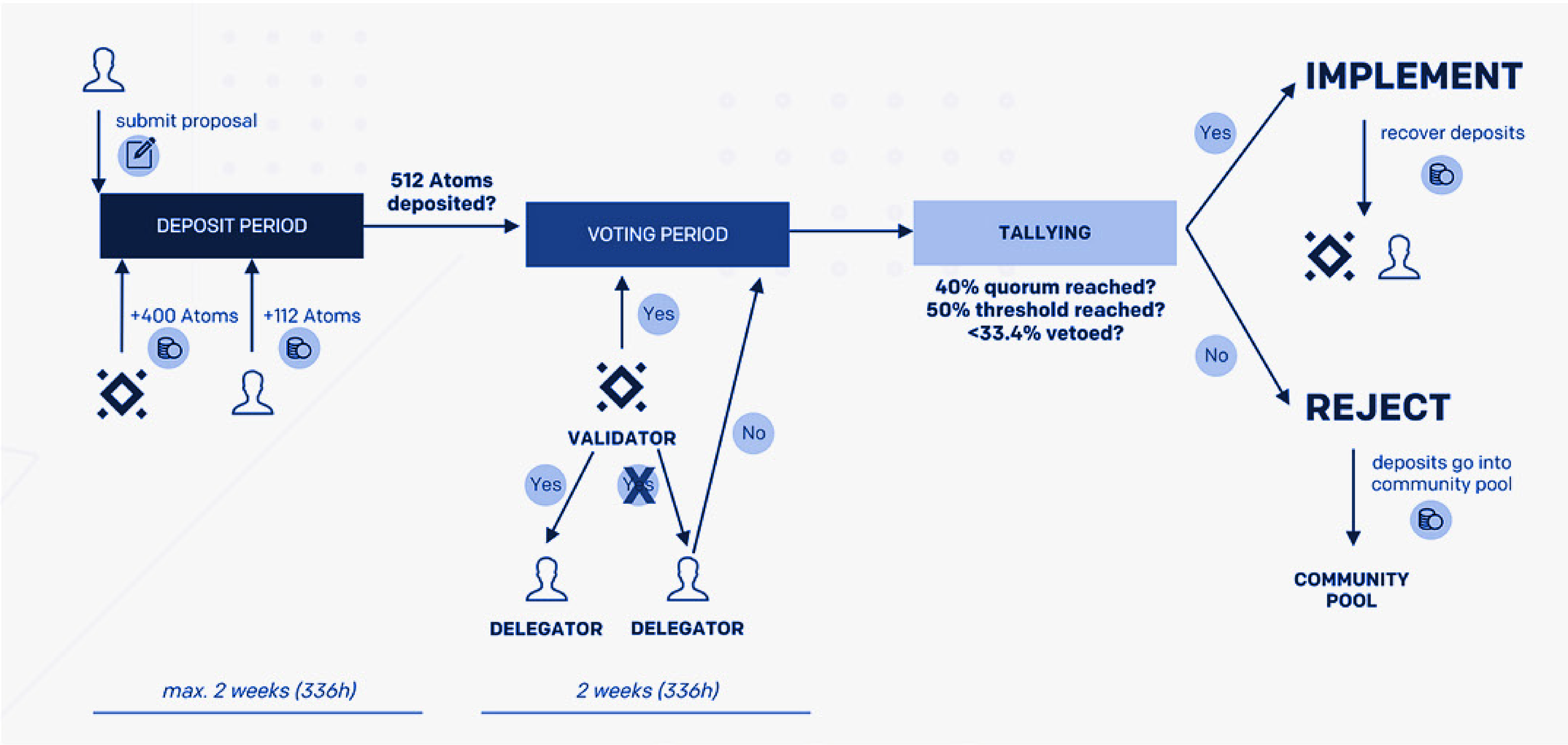
The significance of governance within the Cosmos Ecosystem cannot be overlooked. On that front, the Cosmos SDK stands apart from its competitors. Unlike other platforms where proposals merely gather votes to provide an overall result, the Cosmos SDK's governance module can enforce actions at the consensus level based on pre-defined conditions. This introduces a new era, redefining the balance of power between politics and economics. It is now time to delve into the Governance Module.

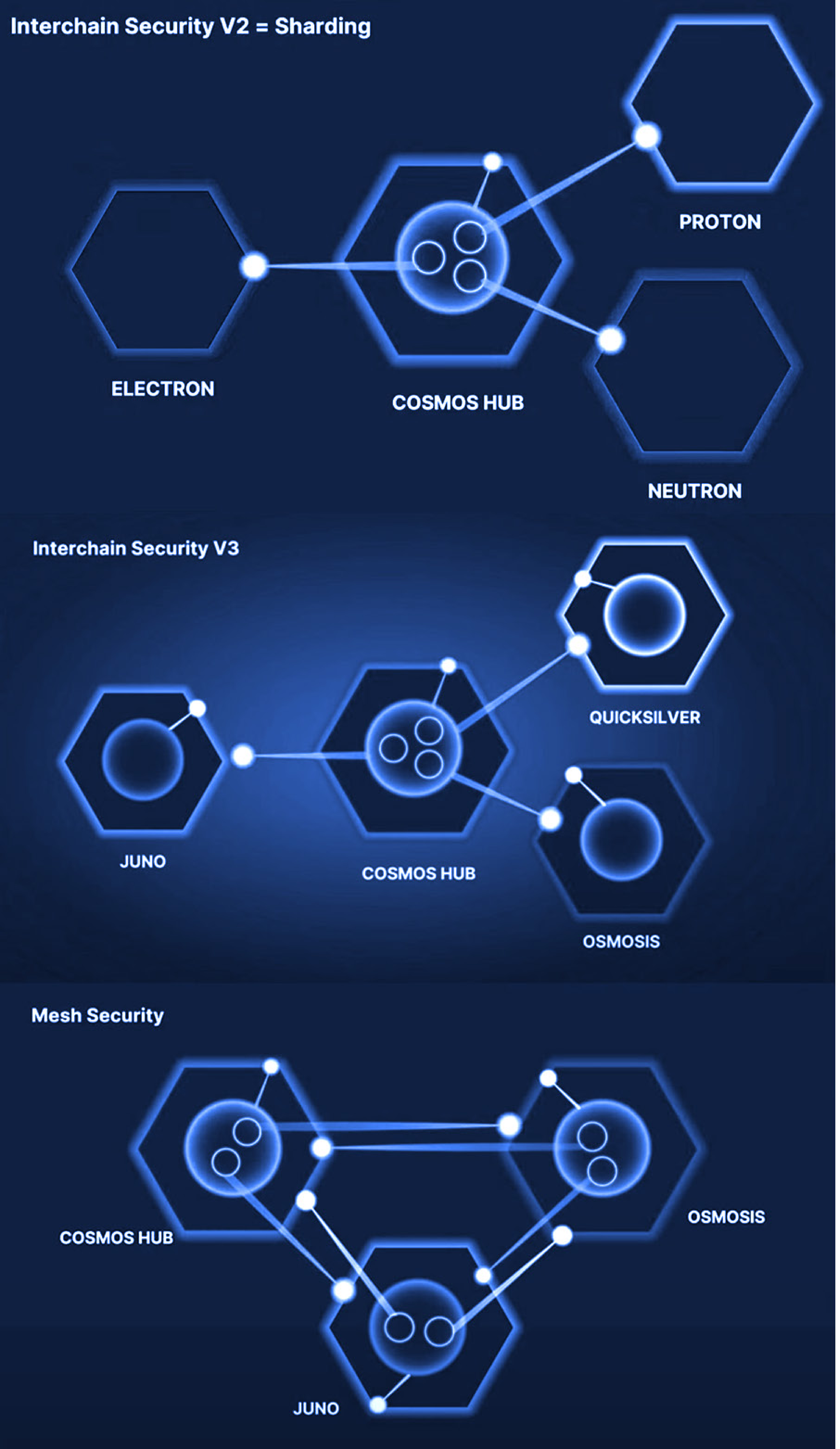
> *It is worth noting that the SDK is continually evolving and improving. However, chains have the freedom to go even further and engage in endless customization of the public module. This flexibility empowers chains to tailor the governance mechanisms to their specific requirements, paving the way for a more finely-tuned and efficient governance system within their respective ecosystems*

- Any participant within the network can submit an on-chain proposal by providing a minimum deposit as set by the blockchain parameters (which can be changed through a vote). Others can add to this deposit, increasing the stake placed in the vote.
- Next, the voting period begins, its duration defined by parameters as well. During this period, each token holder has the ability to vote directly or through the validator(s) they have chosen to delegate their tokens to. In the latter case, the validator will cast the delegator's vote unless the delegator votes directly.
- The tallying period gathers the votes and determines the outcome based on pre-defined criteria of validity, also defined by the blockchain code, allowing for extensive customization (quorums, thresholds, vetos, weight adjustments, quadratic voting, etc.). Based on the outcome, actions can be triggered, and the initial deposit can be recovered, burnt, or allocated for other purposes.

Now, let's consider the possibilities of an IBC-enabled Governance Module. *(A reminder : almost any module of the SDK can be turned to an IBC module, enabling it to send & process cross chain related actions).* Different islands of consensus could join forces, vote collectively, choose weights, and enforce pre-defined irrevocable actions based on the result. Participants from various chains could vote or use validator delegations. Depending on the level of complexity, we can envision an entirely new frontier for corporate governance an B2B legal agreements, and much more. Cross-chain governance introduces a crucial foundation for existing law firms to transition and provide personalized services in the blockchain space.







INTERCHAIN SECURITY

InterChain Security (ICS) is a notable feature offered to Cosmos chains, often referred to as "Security as a Service." It enables a "provider chain's" token to offer its security services to "consumer chains" using the Inter-Blockchain Communication (IBC) protocol. This feature is being rolled out in multiple stages. In its current form (v1), validators of one chain can validate a second chain using the same collateral tokens for both. ICS employs IBC to send slashing packets to the provider chain in case a validator misbehaves on the consumer chain.

The next stage will introduce more granularity, allowing independent validators to selectively choose which other chains they want to validate using their collateral. In v3, consumer chains can have their independent set of validators running alongside the provider chain's validators. The ultimate goal is to achieve "Mesh Security," where all chains act as both provider and consumer chains, engaging with chains that share an economic alignment. This creates an intriguing dynamic within the system, balancing the relative level of security for all participants. It addresses the weakness we previously identified with consensus-based interoperability, making InterChain Security a valuable compensation mechanism.

PUBLIC APP-CHAINS

If we establish a model in which code is open-sourced, and chains can be replicated, forked, and continuously improved upon, they become highly specialized, module-centric entities. Each chain would focus on optimizing one module to its fullest potential. Protocols would then utilize the best-performing module-chains as a foundation, leveraging IBC for interoperability to execute complex interchain actions and services.

In essence, after a period of apparent chaos driven by competition, the system would stabilize, offering the optimal infrastructure for complex protocols to build upon. This embodies the Cosmos app-chain vision, emphasizing open-sourcing and continuous iteration instead of closed-source gatekeeping. This approach treats infrastructure as a public good, allowing protocols to create value while simply paying gas for the modules they utilize.

It's time to summarize the key points we have covered so far. Let's review the logical progression of our exploration :

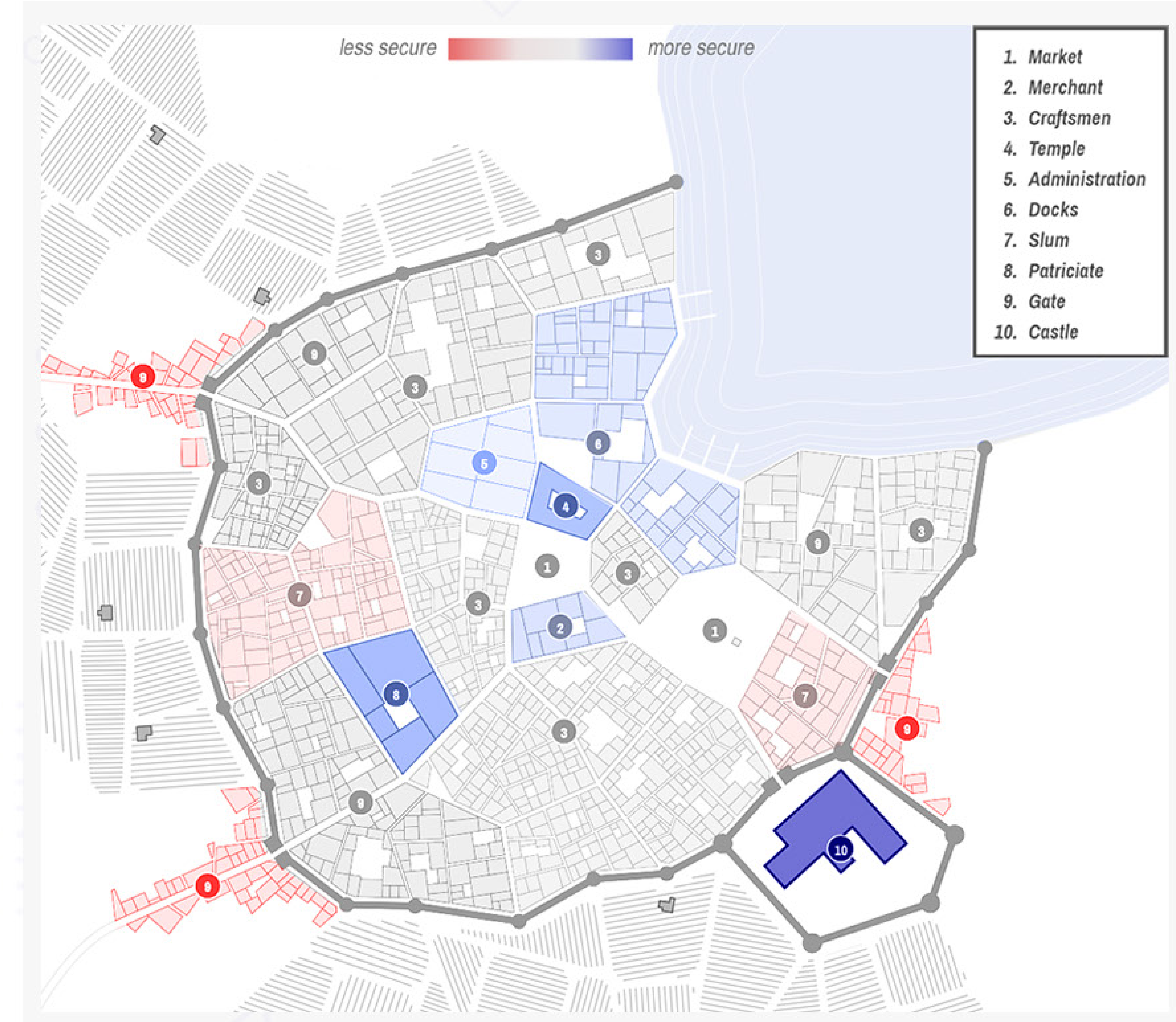
1. We began by introducing blockchain interoperability and comparing the two leading methods: oracle-based and consensus-based.
2. We then compared these methods with the existing public and private computer networks. We examined their advantages and disadvantages.
3. The importance of modularity emerged as a critical factor, enabling a service-based economy and opening up new possibilities for blockchain.
4. Privacy considerations highlighted the necessity of instant finality, whilst scaling required a public, well-maintained codebase.
5. We delved into the Cosmos Ecosystem's consensus mechanism, identifying validators as its core components.
6. The customizability and composability of IBC channels and the role of "relayers" in the network's economy were explored.
7. We then examined the governance module and the potential for inter-chain features to significantly disrupt corporate and B2B management.
8. Finally, we introduced the InterChain Security (ICS) feature, which serves as "Security as a Service," along with the app-chain thesis, showcasing the potential for specialized, module-centric public chains.

NETWORK ARCHITECTURE

At this juncture, we have outlined the essential components that constitute the overall Cosmos network. Now, let's solidify this knowledge by constructing a comprehensive model of the Cosmos Infrastructure using an analogy. A comparison that effectively explains Cosmos to the general public is to liken it to ancient cities.

In this analogy, we can envision the Cosmos network as a fortified city comprised of data instead of citizens, databases and intranets instead of residantial areas and shops. Let's not forget that, through history, cities and castles have existed long before we created megalopoles and skyscapers.

Now, let's delve into the aspect of security (refer to the chart on top). The city's protective walls symbolize the InterChain Security, establishing a minimum collateral threshold. Beyond these walls are low-security chains and external-type databases (namely the Interchain). Messages originating from the outside undergo processing via "gates," which assess and filter them before granting entry into the city. Within the city, we encounter district-like group structures. The city center accommodates the public administration (5) and a marketplace (1). The Castle (10), a central fortress with its own walls, provides the highest level of security. Military forces often reside within the castle or in its immediate vicinity. They patrol the city, ensuring the foundational security required for peaceful living. This aligns with the Cosmos Hub, where validators undertake the role of city guards.



These patrols are also responsible for securing vital public infrastructure such as the temple (4), administration (5), and gates (9). Certain districts, akin to the patriciate (8), willingly pay an extra fee to have additional patrols due to their higher net worth and living standards. Marketplaces (1) function as public exchanges, reminiscent of Osmosis, where Liquidity providers, much like merchants (2) of the past, gather to trade their inventories. The docks (6) hold a pivotal role in trade as a gateway connecting to the outside world. Moreover, there are slum areas (7), where patrols are infrequent. These zones often house black-market operations, concealed transactions, and various high-risk activities due to their potentially illicit nature.

Through this analogy, we can readily visualize the consensus security layers spread across the city and their interdependencies. The patrols safeguarding public infrastructure parallels ICSv1, the willingness of certain groups to pay for enhanced security corresponds to ICSv2. Patrols in other private districts resemble ICSv3. The foundational security within residential areas is analogous to mesh security.

Switching our focus to the roads, they represent the equivalent of IBC channels. Some roads experience heavier traffic (represented by their width). We also have faster and slower routes (color-coded) depending on the number of relayers and their efficiency in transporting packets. The fastest and most populated roads would likely connect the castle to the marketplace and the city center to the outside world. In this analogy, the docks (6) act as the frontier with real-world assets, where dock operators are tokenized asset issuers and IBC oracles. Meanwhile, gates (9) function as roads to other cities like Ethereum and Bitcoin via IBC native bridges, likely secured by ICS (blue circles).

THE COSMOS HUB

With the aid of the previous model analogies, we can now elucidate the critical role that the Cosmos Hub plays in the Cosmos ecosystem. As the largest market capitalization, with nearly 5 times the weight of the second-largest chain in Cosmos, the Hub stands as the legitimate castle of the city.

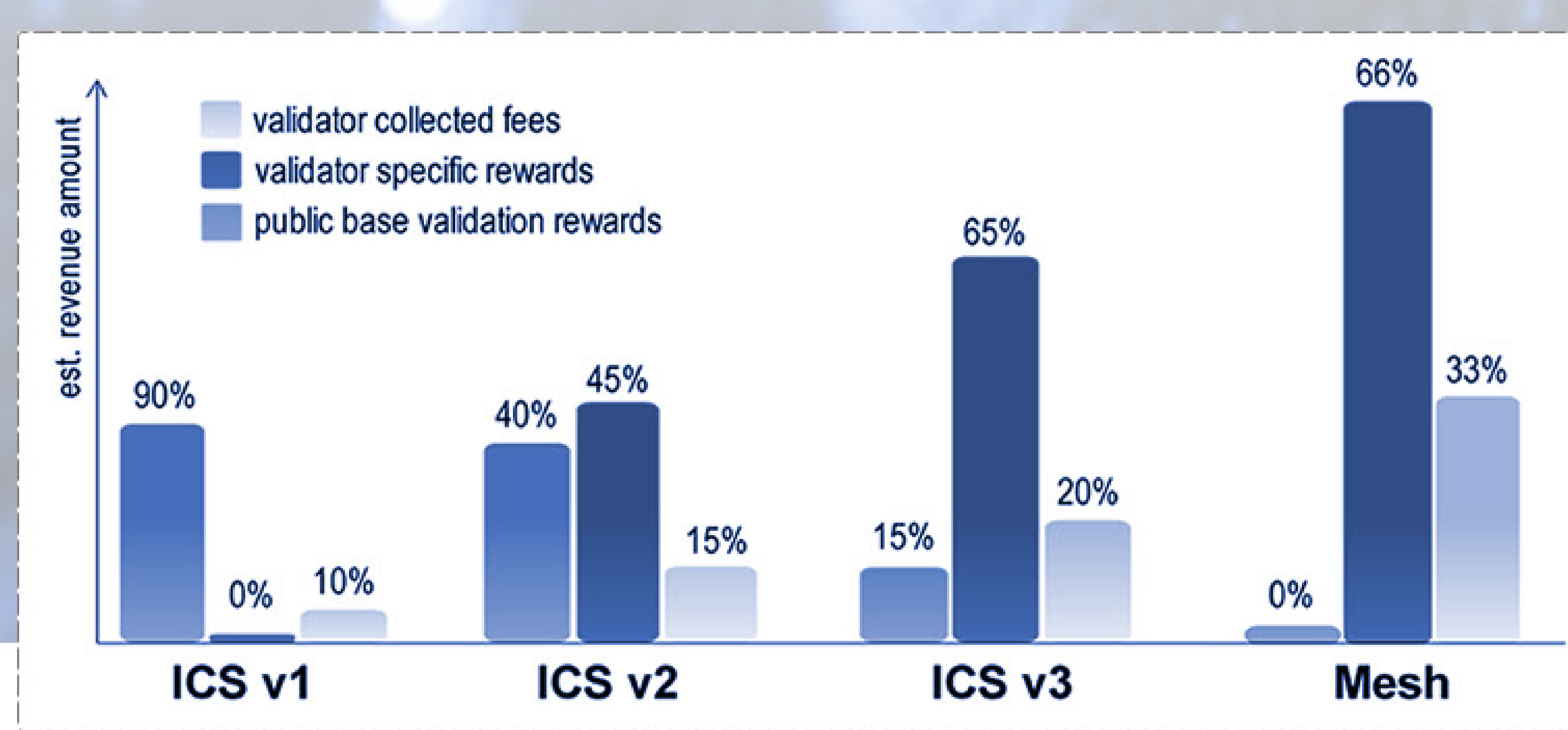
While we will refrain from delving into the Hub's complete legacy, it is worth noting that it ranks among the top #17 chains by capitalization (excluding stablecoins) and holds the #1 position in terms of active developers and token holders within the Cosmos ecosystem. It boasts three times more developers and over five times the number of individual delegators compared to the second-ranked chain.

Apart from providing security, the castle is the center of political activity. Its financial power is vital for investing in public infrastructures that would be unattainable otherwise. In exchange for the security provided and public services like administration, infrastructure construction and maintenance, patrolling, and securing gates, the castle collects taxes. As the custodian of the city's treasuries, the castle assumes the role of a giant safe. Understanding these references helps grasp the Hub's significance for the broader ecosystem.

Cosmos has faced criticism for its intricate politics. However, with this framework in mind, the Hub should become the hub of democratic debate. Rather than reducing politics, it is likely to see an increase in its scope. As the ecosystem's challenges grow in complexity, so should its hierarchical structure. We predict that complex DAOs and sub-DAOs will have to emerge to maintain decentralization and accountability within the system.

Additionally, the Hub has been the subject of criticism for its substantial public spending. Nevertheless, we now comprehend that building the IBC and financing the development of core SDK modules is precisely its role, a role it will continue to play in the future. Continuous spending will be required for the SDK's maintenance and research and development. The key to success lies in the Hub's ability to efficiently collect taxes to balance against its public spending. The deployment of the InterChain Security and its future updates are intended to serve this purpose.

With this model, we can also shed light on the final piece of the puzzle: the role of ATOM validators. They act as the castle relay, providing security across the entire city. Now, let's explore the complex economics surrounding them.



As protocol versions evolve, a shift towards more "validator-centric" models is expected, fueling significant innovation within the ecosystem, driven by competitive endeavors for profitability. This is anticipated to have a profound impact on validators' professionalism and a significant improvement to the Hub's economic credibility.

ATOM VALIDATORS

Utilizing the ancient city framework, we can comprehend the key roles of validators within our B2B2C network. Let's break it down into three parts:

1 **SECURITY** : In our delegated Proof-of-Stake system, security entails providing collateral to the local islands of consensus. In Cosmos, this system operates with different levels of granularity. ICSv1 (or replicated security) the consumer chain inherits the security provided within the castle's walls. This layer should be limited to core political and financial requirements, where few transactions hold high importance or risk, necessitating the most secure enclave. ICSv2 offers granularity at the validator level, implementing supply and demand mechanisms. Each validator possesses a certain "security supply," represented by the ATOMs delegated to it. They must allocate it carefully in a profitable manner, balancing the extra costs against the revenue collected. This stage also introduces validator-specific rewards, allowing delegators to choose from various offers, marking the era of validator competition. Validators must seek to improve their profitable margin by onboarding the most valueable projects while also reducing their operational costs (devOps). Finally, with the introduction of ICSv3 and Mesh, even finer granularity and diverse collateral options for security are anticipated, likely enhancing validators' financial management requirements. This evolution is expected to bring validators' functions closer to those of present-day banks, developping a complex suite of products and services for both businesses and depositors.

2 **LAW INFORCEMENT** : As described in previous chapters, validators are at the frontier of public and private domains. Therefore, they are well-suited to perform due diligence and various forms of discretionary oversight and reporting to related regulatory institutions for compliance. Additionally, validators would enforce justice decisions, withdrawing from the consensus and removing relaying services for non-compliant entities. Although there would still be censorship resistance as validators can operate independently, doing so will likely restrain their access to certain interchain services. This role closely aligns with existing banking responsibilities.

3 **TAX COLLECTION** : Envisioning our B2B2C system with payment processing and global market capabilities, it becomes evident that tax collection on these activities will be necessary. It is likely that the Hub would charge a small indirect fee for securing those channels. Until a comprehensive framework is established, investments and payments may be legally bound to the use of regulated fiat-backed stablecoins or Central Bank Digital Currencies (CBDCs). In this context, validators would collaborate with the issuer to facilitate reporting to tax authorities. This further emphasizes the similarity between validators' roles and those of banks today.

WHY ATOM ?

In the Cosmos Hub, active politics and community expenditure form the visible part of the iceberg, while validators operate beneath the surface to create private value and expand the frontier. However, from a purely economic perspective, one might contend that validators could utilize an alternative base collateral for their operations, merely reaping the rewards without engaging with the associated public costs.

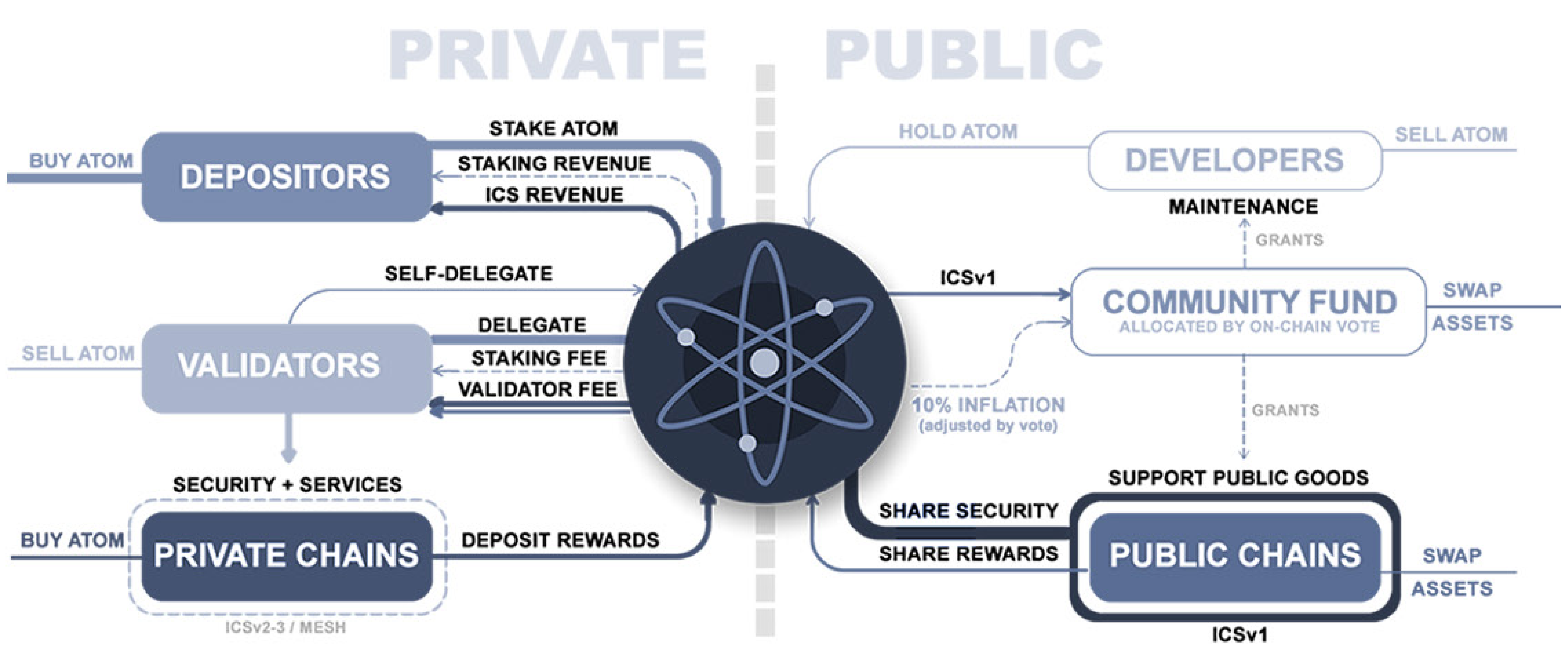
Cosmos boasts a notably horizontal distribution model, which contrasts with the vertical extractions that investors often seek. The concept of Security as a Service (SaaS) serves as a significant economic mechanism in this equation. This system necessitates a collateral, which inherently requires a deposit. The decision here hinges solely on investors' assessment of risk versus reward. This is where Cosmos can feel quite confusing, as most of shared security consumers will be private entities that can't interact directly with the depositors.

> *To further emphasize the ambiguity, businesses need a transparent collateral and investors need a transparent revenue sharing. Meanwhile, the system must maintain privacy and trustlessness.*

The central takeaway is that trust becomes intertwined with the validation system when a common standard unit of account isn't employed. Businesses utilizing a diverse array of collateral must trust that validators have performed due diligence and risk management on counterparties. On the investors' side, a multi-asset deposit necessitates tracking each stream independently. A CBDC or fiat-based system only transposes the reliance towards the centralized issuer. This is perfect for a blockchain application. One that can store the collateral value, its contractual usages and perform the reward distribution. Its utility should be conciled to these usecases.

To maintain their privacy, businesses using SaaS would be enclined to hold ATOM and utilize it directly as a form of payment for the services rendered. An on-chain binding contract would be established between the validator and the client, transparently outlining the fee structure for investors. Even if the payment contract is denominated in fiat terms, the actual value transfer from the business to the depositors would still occur in ATOM, making it a de-facto medium of exchange for trustless and confidential security agreements.

> *As the only source of verticality within the ecosystem, collecting community funds to finance the public infrastructure maintenance align logically. The responsibility to strike the appropriate balance rests with ATOM holders via the governance system.*



FINANCIAL SERVICES

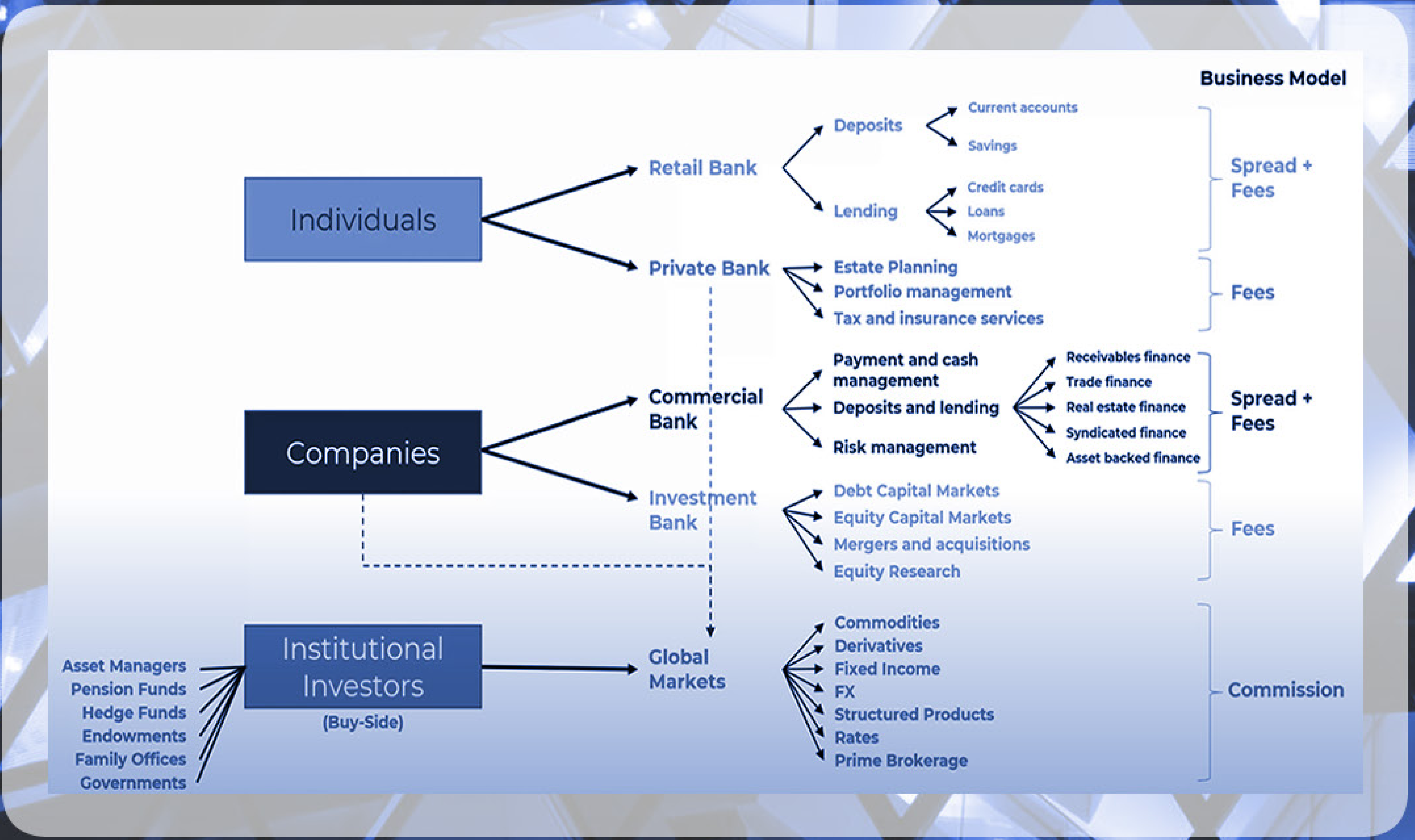
As decentralized platforms continue to gain ground, traditional banking services are likely to see a relative decline in their market share. Banks, recognizing the potential of these alternatives, can strategically invest in these platforms while gradually shifting their existing business models to offer services directly from this new infrastructure. Embracing this transition not only allows them to secure essential stakes in the decentralized ecosystem but also opens up new avenues for exploring additional opportunities

➡ **ASSISTANCE** : Banks can support businesses in tokenizing their assets and seamlessly transitioning their databases into custom Cosmos modules. Implementing trustless migration solutions empowers businesses to manage the process directly, reducing reliance on external parties and simplifying entry into the network. Public initiatives like Ignite have already made signifiant progress on that front, allowing users to scaffold chains and modules via Command Line Interface (CLI).

➡ **COLLATERALIZATION** : With the Cosmos Hub leading the way in offering decentralized Security as a Service (SaaS), banks can actively engage by running validators and offering ATOM investment and custody services to their clients. They have the opportunity to compete for positions in the active set, strategically allocating their collateral within the interchain to generate yield for depositors. Validator fees would be similar to portfolio management fees in traditional finance. Participating in the Hub's economy also contributes to community funding, ensuring a well-maintained, publicly accessible codebase for the network's participants.

➡ **CONSULTING** : Services offered by banks would extend beyond involvement in the public governance of the Hub. They could play a vital role as knowledgeable advisors to businesses, providing guidance on navigating the complexities of cross-chain governance mechanisms. This includes helping businesses with proposal submissions, understanding the intricacies of different voting systems, and defined comprenhensive actions based on the vote outcomes.

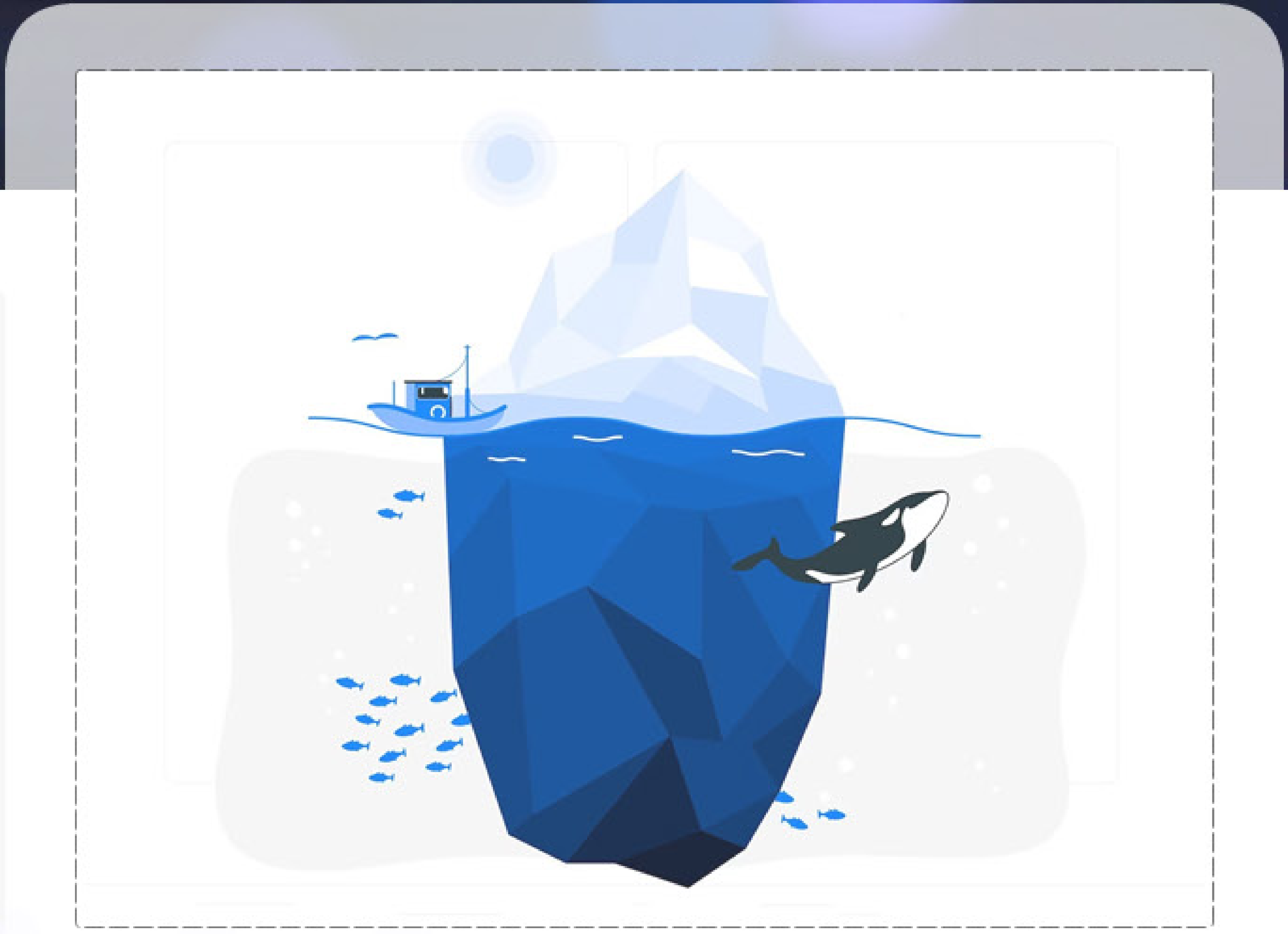
➡ **COMPLIANCE** : By closely monitoring the regulatory landscape across different jurisdictions, banks can provide regulatory compliance services, enabling businesses to adhere to evolving industry standards and legal requirements. Offering accounting and tax reporting services coupled with the Security as a Service ensures comprehensive adherence to local laws and regulations.



EXPLORING REAL USECASES

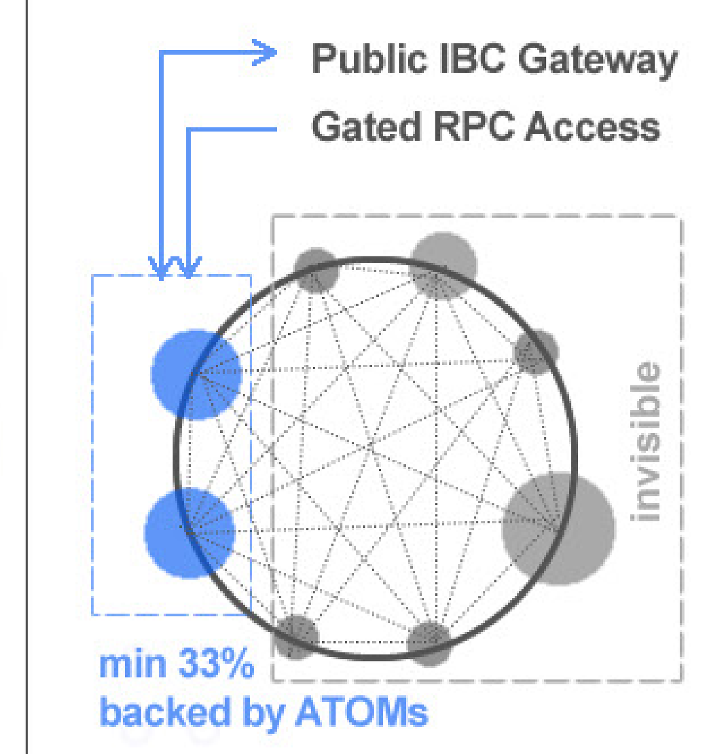
Before concluding this report, it is important to examine some practical examples. With the insights provided in this report, you will gain a comprehensive understanding of their blockchain infrastructure and the position they would assume within the broader Cosmos ecosystem. This, in turn, offers valuable insights into the public infrastructure they are likely to align and connect with. While potentially all existing businesses could gain from transitionning, the first ones will most likely be activities relying on private interoperability, sensible data sharing, censorship risks and public government services.

Despite the immediate improvement in terms of trust removal and cost reduction, it's also important to remember that a significant share of the network's activity will remain invisible to the general public. Operated by independant or private consensus sets relaying their own messages.



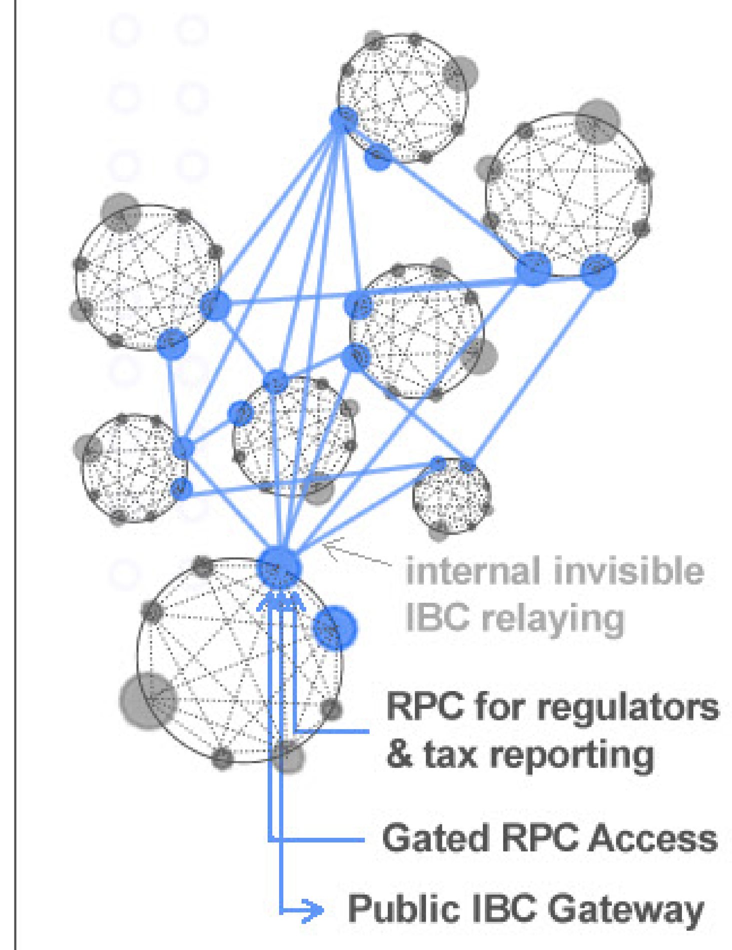
① **SUPPLY CHAINS** : Businesses involved in supply chains could transition from a shared database model to a Cosmos blockchain where all participants become validators. Each participant's data would be encapsulated within distinct modules, protected by encryption and gated access. While these chains can function independently within the Interchain, the true advantages emerge when introducing one or multiple SaaS validators to enhance decentralization. The providers' contracts would involve Non-Disolsure Agreements and KYC as well as some collateral at stake in the consensus. The report has established that these businesses are likely to select Cosmos Hub validators, given their competition to be top performers in the ecosystem. ICSv3 would incorporate ATOM into the local consensus, with the Hub hosting legal agreements and handling payment channels.
Through a theoretical minimum of 33% stake, the blockchain could potentially function with a private codebase, yet still be deemed eligible for connection with other Cosmos chains. The inclusion of public and reputable Hub validators staking their collateral could suffice to establish a trust-minimized IBC acknowledgment, thereby creating private to public gateways (refer to figure 1).

fig; 1 (private shared databases)



② **CORPORATE MANAGEMENT** : Migrating intranets into a Cosmos environment would establish a sovereign chain for each subsidiary. Databases would be updated into separate IBC-enabled modules following interchain standards to transmit data accross participants. A customized cross-chain governance system spanning accross all chains would enhance efficiency and security, enabling executive orders to trigger coordinated state changes directly following votes. This system can also operate privately using a similar ICSv3 gateway to public chains. Corporations are likely to opt for bank-type validators, offering additional regulatory compliance, on-chain accounting, corporate finance and tax reporting services. Regulated entities could even be allowed to replace conventional legal business contracts with audited smart contracts, significantly reducing original costs (refer to figure 2).

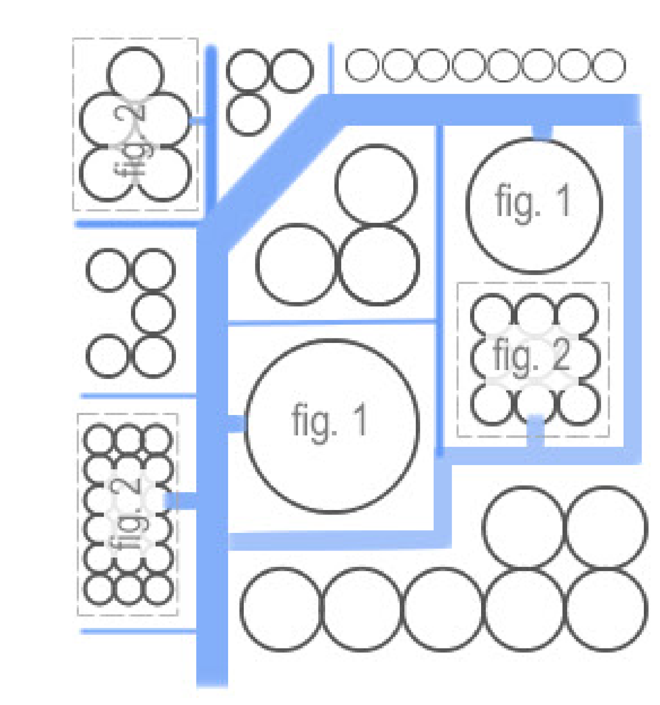
fig. 2 (private intranets)



③ **SENSITIVE DATA** : Through encrypted mempools and national public blockchains, citizens and countries could retain full authority over their personal data. They would be compartmentalized into distinct modules, and token-gated access, along with smart contracts, would facilitate confidential data processing within the chain. Only encrypted results would be exportable. Furthermore, permissioned IBC-enabled modules could enable deep learning without necessitating the extraction of raw data. Each national chain would be overseen by a meticulously supervised, regularly audited, and carefully selected group of trusted validators. Naturally, the centralized security of mempool encryption and decryption keys would be maintained by governments.

④ **E-COMMERCE** : In contrast to centralized government mempool, online commerce could leverage web3 decentralized frontends and user signatures to perform trustless data encryption. Individuals would retain control by authorizing or revoking access to decryption keys. Interchain Queries[1] (ICQ) allows dApps to harvest data from a vast network of independant sovereign chains via IBC routing, thereby creating a giant distributed database of customer activity with signature-gated access. This innovative paradigm disrupts the isolated silos of web2, establishing the foundation for a user-controlled data web3.
Regarding consensus security, businesses have the flexibility to select their desired level of Cosmos integration and privacy. Aligned partners might leverage mesh security for a common baseline, then deciding whether additional SaaS collateral is warranted. From a broader perspective, this network is made of complex amalgamations of security and privacy agreements interconnected via public encrypted IBC routings (as depicted in figure 3). This architecture resembles the intricate organization of ancient city districts, with neighborhoods and interconnected streets.

fig. 3 (distributed data network)



Interchain Queries[1] : A public module using IBC to perform queries to a destination chain RPC via "hops" instead of direct connections

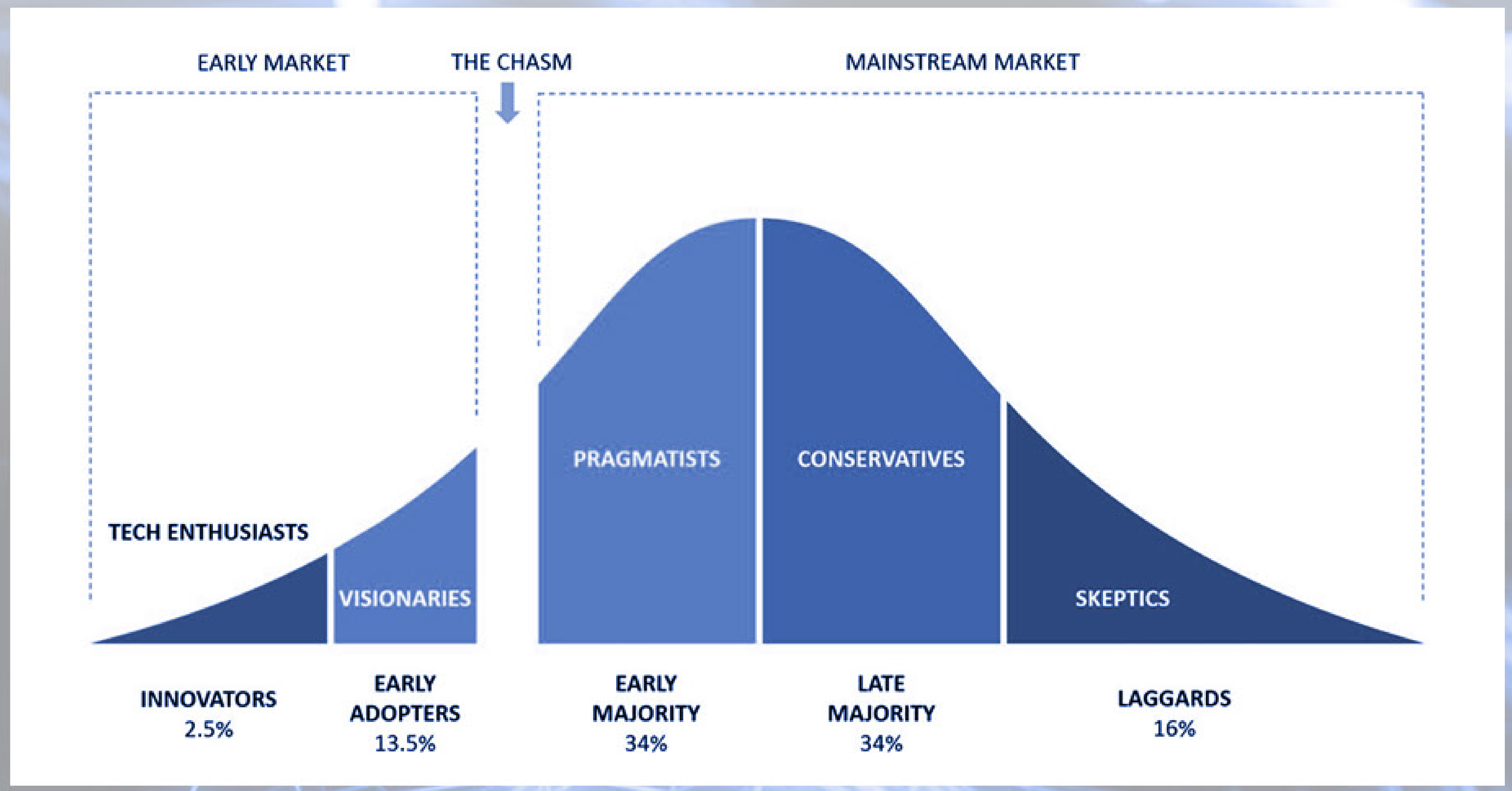
CONCLUSION

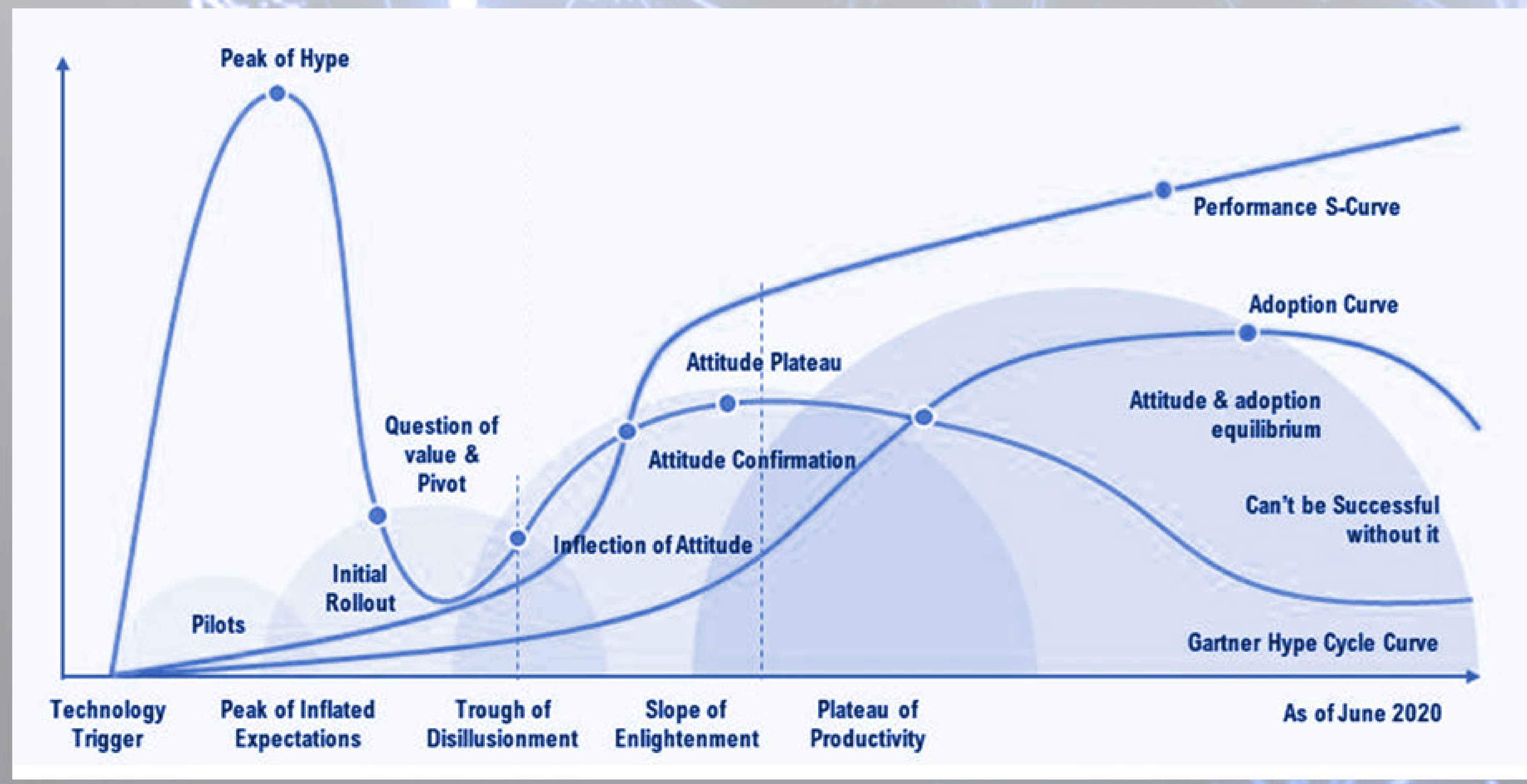
This comprehensive report underscores the pivotal role that the Cosmos SDK can assume in the adoption of a decentralized B2B2C network. Through a detailed exploration, we have dissected the essential components and articulated a compelling model for its gradual implementation. The journey commences with the construction of public infrastructure, gradually evolving towards the integration of private business, with the ultimate aspiration of establishing a fully distributed data network. However, it's important to acknowledge that the present state of the ecosystem is in the "Early Market" phase, intersecting the domains of "tech enthusiasts" and "visionaries." With approximately 2.5% penetration of the Total Addressable Market (TAM), the projected adoption rates surge from 2.5% to an ambitious 16%, representing a remarkable growth potential of over 500%.

The existence of IBC in production for more than two years indicates that the technology trigger has already occurred, as per the "S-Curve" performance breakthrough model. This suggests that the subsequent phase likely involves the public awareness, leading to inflated expectations and market speculation, further fueling growth potential. Venture capitalists, with their focus on high potential Return On Investment (ROI) of 10 to 20x, are well-suited for investing in this stage. ATOM is expected to be a prime focus as it offers substantial market-depth and a predominant position for potential verticality in this economy.

The presence and engagement of fintech venture capitalists are not only plausible but indeed essential. They have the potential to mitigate entry barriers for businesses and consumers alike, rendering the intricacies of the ecosystem more accessible.

Based on projections, we anticipate the "peak of hype" in mid-late 2024, performance breakthroughs between 2027-2030 and peak adoption (50% TAM) around 2032. It is evident that the role of venture capitalists will be instrumental in driving the success through the visionary phase, where banks are expected to be the pivotal actors in the "pragmastist" phase towards widespread adoption of this decentralized B2B2C network.





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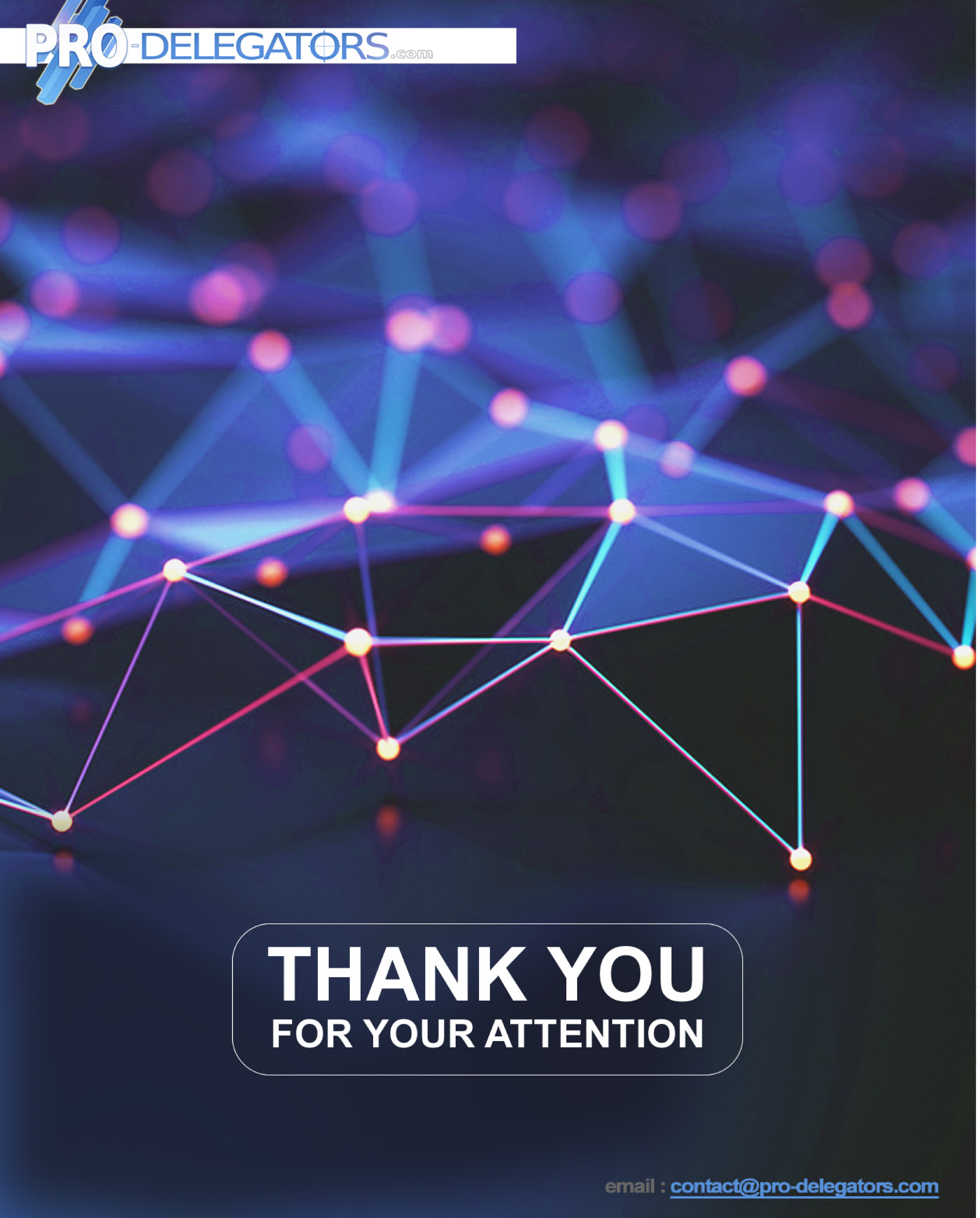

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