The Era of Digital Asset Marketplaces

How players in capital markets can benefit from blockchain technologies

Cointelegraph Consulting

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Foreword

Global regulations have progressed to recognise Distributed Ledger Technology (DLT) as a suitable infrastructure for the dematerialisation of securities. In September 2020, the European Commission published its Digital Finance Strategy (DFS), which included the draft Regulation on Markets in Crypto-Assets (MiCA), proposing a comprehensive EU wide regulatory framework for digital assets based on the principle of "same activity, same risk, same rules".

In the meantime, a number of countries published new legislation. In December, Germany legalized securities to be issued on DLT. In January, Luxembourg adopted a bill that explicitly recognised the possibility of using distributed ledger technology for the dematerialisation of securities. In February, the first part of the Swiss Federal Act on the Adaptation of Federal Law to Developments in Distributed Ledger Technology (DLT bill) entered into force.

These amendments are more than welcome – they will create a number of opportunities to promote the mass adoption of digital assets, given the new laws will make it easier to transfer and hold these assets. Outside of Europe, Singapore, for instance, is another advanced environment where local regulations support digital asset marketplaces. These countries are advancing the financial revolution brought about by blockchain: allowing financial institutions to use new technology operationally.

Since the publication of the whitepaper "Bitcoin: A Peer-to-Peer Electronic Cash System" in late 2008, a series of innovations have paved the way for building the financial system of the future, one which represents a complete revolution of the way banking operations are monitored and organized. Back in the 14th century, the Medici family invented modern finance, as we know it today. They introduced a system based on the pooling of assets and a centralized ledger, which for the first time used the double-entry system of tracking debits and credits or deposits and withdrawals. This meant that even 600 years ago, advances in technology had transformed the world of finance by moving to a decentralized organization and had revolutionized the inherent logic of custody and safekeeping. All of sudden, it became possible to borrow capital for investments in a structured way, more akin to modern lending than the high-level individual banking offered to upper-class and notably wealthy families. In short, the Medici family invented the marketplace for money. Owners of capital were interested in transferring the risks of being robbed, for example, to a bank, while borrowers were keen to have access to capital that they could then invest for a profit. In a nutshell, what happened back then became a core principle underlying modern economic structures today.

We now find ourselves at a similar crossroads. Firstly, decentralized ledger technology is driving transformative change, as it enables entrepreneurs to contribute, in a decentralized way, to building the future of finance now. The amendments contained in the DLT bill are a second key element, which will help pave the way for mass adoption. As we see more and more jurisdictions adopt a more progressive stance regarding blockchain technology, it becomes clear that what has happened over the last twelve years was just the prelude to a massive trend.

Once, while attending a roundtable with many prominent CIOs from investment funds and pension funds, I asked what the main driver behind the way they structure new products that are offered to investors. Without exception, they replied that the main factor influencing their

decisions were not "demand" or "potential returns", but "regulation". "Regulation" goes a long way to explaining the success enjoyed by the eco-friendly funds we saw following the Energiewende (energy transition) in Germany, ethical funds which refuse to invest in specific industries such as weapons or cigarettes, or other sustainable funds that have also attracted great demand.

Together with technological innovation, regulatory progress is the key factor that will influence future banking products and services, as highlighted by the partial adoption of the Swiss DLT bill.

We at Gazprombank (Switzerland) Ltd are pioneers when it comes to developing and offering digital financial services capabilities to our clients. We have

already launched bank accounts in cryptocurrencies, which enable our clients to keep their assets safe and trade cryptocurrencies as they would any other fiat currency. We are in the process of developing crypto payment services, which will perform the three functions of a bank account. We are ahead of our time, soon expecting the roll-out of central bank digital currencies (CBDCs). In the near future, we plan to offer a full range of digital asset capabilities to our clients and help them to access digital capital markets and innovative financial products alongside our traditional banking services. To quote Christine Lagarde, Head of the ECB and a strong supporter of digitalization, "the euro belongs to Europeans and we are its guardian. We should be prepared to issue a digital euro, should the need arise".

Digitalization is not only about currencies and means of payment. The tokenization of assets will fundamentally change how companies access capital and interact with investors. Decentralized access to capital and the real-time distribution of financial information will bring trust, transparency and efficiency to capital markets and therefore benefit all actors along the financial services value chain.

Yet there is a third pillar in terms of what is required for the mass adoption of an innovation, one which still requires some work when it comes to digital asset marketplaces: actors and infrastructure.

The technology required to issue digital assets is ready and waiting – systems have been developed to ensure that a sound IT infrastructure is in place. While we need to change the logic underlying the custody process, the technology for decentralized and automated custody is available. Progress is also being made on regulatory issues, as shown by the adoption of the first part of the Swiss DLT bill. Private assets will benefit from decentralized ledgers as investors emerge across the globe, and at the same time, new qualitative assets, which would have otherwise flown under the radar, become available to a wider audience.

Marketplaces are to be founded and organized so that investors can participate in the market for digital assets. This is the focus of this research paper. Gazprombank (Switzerland) Ltd will stay ahead of innovation in the field of digital assets too. However, we need to be able to rely on many additional institutions for both primary and secondary markets: not only banks, but also exchanges, private market funds, market makers and issuers, for instance, are examples of the financial institutions, which have a role to play. This paper sets out the challenges they face and proposes solutions to these issues, which will help entrepreneurs embrace their future and participate in the building of a new financial order.

We find ourselves at the start of the third millennium with the digital revolution well and truly upon us. Now is the time to shape our future. All the elements are lining up – it is now only our minds that need to evolve!

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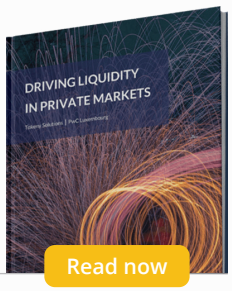
Read Tokeny Solutions Latest Reports

Co-authored by Tokeny Solutions and PwC Luxembourg, Driving Liquidity in Private Markets covers how private markets will be impacted by the blockchain technology. Read this ebook to learn:

- The state of play in private markets
- Challenges and opportunities for the industry
- Blockchain as a solution
- A hypothetical use case



Tokenized Securities is the ultimate handbook on how to issue compliant securities on the blockchain. Download the ebook to:

- Understand tokenized securities
- Define what you want to tokenize
- Ensure compliance in your operations
- Join the right ecosystem

HIGHLIGHTS

SECTION 01

1.0

Every year we see an increase of interest in DLT from institutional players. Blockchain technologies open a large spectrum of new financial services and the demand from Investors is growing. Investors now demand a digital-first experience to discover investment opportunities and manage their portfolio. The first players to offer an easy-to-use web experience to their clients will enable them to make a significant impact in this new digital ecosystem where the transfer of value is almost instantaneous. Blockchain is the IT infrastructure, but investors need online marketplaces built on top of the blockchain to buy, manage and sell digital assets.

The promise of security tokens in terms of improving the flow of liquidity is beginning to materialise. Since their inception, private markets have suffered from poor liquidity due to their limited asset discoverability and lack of transferability. Blockchain technology has opened up the opportunity for financial institutions to launch their digital asset marketplaces (DAMs) and utilise a network that brings solutions to these long-standing problems.

By leveraging DLT and applying the appropriate compliance with smart contracts, existing players can now launch online platforms that broadcast security tokens on a shared network. Issuers can reach and manage a larger audience of Investors. On the buy side, Investors can enjoy a seamless and fully digital experience to discover and subscribe to investments whilst maintaining control over their assets and identity.

2020 saw DeFi (Decentralized Finance) emerge as an industry that cannot be ignored. In terms of asset value that's been locked up through the use of smart contracts, the industry has grown by over 2500% in the last 12 months (from $690mn to $19.9bn at the time of writing). Financial institutions must launch their digital platforms to ensure they are not disrupted by this digital wave of innovation. To do this they need to allow for the easy management and distribution of private securities. The technology is now ready to allow financial players to develop new revenue streams with new services for a larger investor base.

The first Digital Asset Marketplaces (DAMs) have tried to launch in the past few years by building their own private blockchains. Their notion was that they would become the central player controlling the private infrastructure. However, these marketplaces failed to realize that other players wouldn't want to join their network because the beauty of blockchain is in the decentralization: The use of a private blockchain doesn't change what's apparent in capital markets today, which already consists of isolated and fragmented private networks. Financial institutions don't need to manage the full IT infrastructure anymore. However, their position as trusted entities and front-offices for Investors is becoming more important than ever.

Now, by using the right security token standard such as the T-REX protocol, financial institutions can issue, manage and transfer security tokens in a compliant way. They can empower their clients but still keep control in order to bring the trust to the ecosystem. A DAM is a central online platform where a financial institution provides a safe environment for investors to interact with digital assets available on a decentralized IT infrastructure.

CAPITAL MARKETS IN THE DIGITAL-FIRST ERA

SECTION 02

2.0

Public markets already have well established trading venues where digital platforms offer a wealth of opportunities for Investors. Companies can file for an IPO and, albeit a lengthy and costly process, gain access to an electronic market that enables easy asset and price discovery for Investors. Due to this, public markets experience high levels of trading activity. More and more, these markets are made accessible to smaller Investors with new robot advisors and FinTechs offering innovative investment services, such as Robinhood. However, only a few securities are made accessible: the biggest ones. What about the millions of other private securities?

Private market securities are very hard to access because they lack infrastructure. They operate in an industry that is extremely fragmented and still heavily reliant on paper-based processes. Old technology such as fax machines are still being used. As a consequence, the industry has poor asset and price discovery and barely any secondary trading activity. Investors miss out as private markets usually provide higher returns.

Blockchain technology has already opened a new and more efficient way to issue, manage and transfer digital assets. Utility tokens, cryptocurrencies and stablecoins are already accessible and traded by millions of users on centralized marketplaces such as Binance or Coinbase and on decentralized ones like Uniswap or IDEX. The ICO bubble of 2017 and the rise of cryptocurrencies such as Bitcoin have pushed the relevance of tokens issued on decentralized networks. More and more, money and assets are beginning to be tokenized.

We believe the same technologies and protocols can be used with compliant securities: Compliance rules that govern private markets can now be programmed into security tokens. As Investors need websites and mobile applications to use the blockchain easily, the arrival of high quality and compliant assets on a global blockchain infrastructure is helping many service providers and digital marketplaces emerge and scale. These are taking the form of traditional financial institutions or FinTechs that utilise and deliver the digital and compliant technological solutions for their audiences. These marketplaces are materializing to enforce the trust between Issuers of tokens and Investors by leveraging blockchain solutions.

The purpose of this ebook is to outline the role of these digital marketplaces and the value they provide to Issuers and Investors alike, along with the functional elements that are required for such an Operator to exist. We will also see how these new marketplaces can leverage DeFi ecosystems to reach a global audience, while at the same time improving customer satisfaction and loyalty.

WHAT IS A DIGITAL ASSET MARKETPLACE?

SECTION 03

Purpose of a Marketplace 3.1

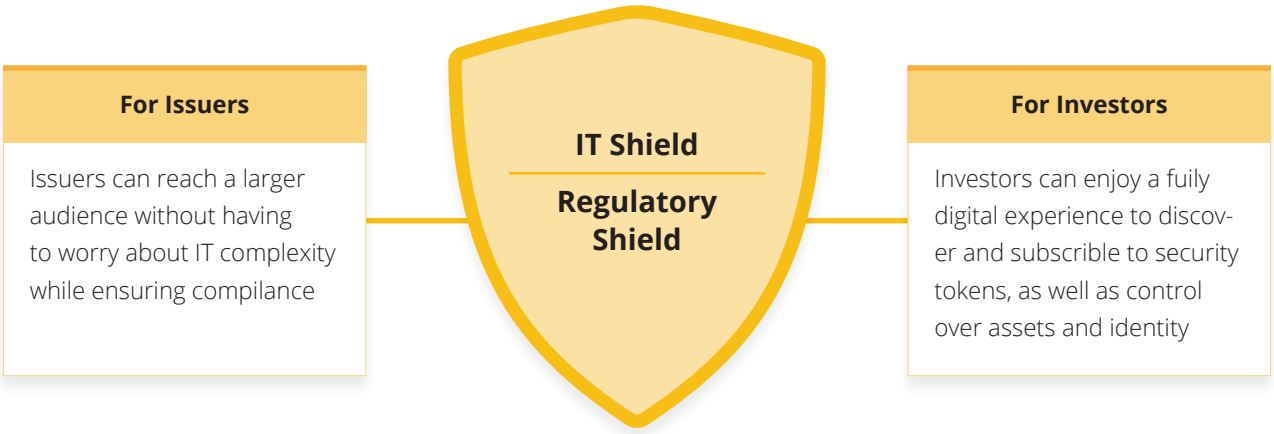
Cryptocurrency exchanges were the first type of Digital Asset Marketplaces (DAMs) to emerge. A few of them such as Binance and Coinbase now mostly concentrate on the development of their audiences, having already successfully delivered easy-to-use and optimized web platforms for buyers and sellers of crypto-tokens. However, no one can claim to be the marketplace for security tokens. As an Investor, if I want to invest in digital securities in order to lower custody fees and improve the liquidity of my portfolio, where should I go?

In this ebook, we define DAMs as platforms that are accessible via websites or mobile applications.Their purpose is to connect security token Issuers with Investors.

DAMs provide a complete framework for their users. They act as a trusted intermediary between Issuers and Investors by proposing a set of tools and services to facilitate transactions between the different players. These tools can be made directly available to the users, and/or additional services can be provided in order to enhance the customer experience.

Stakeholders 3.2

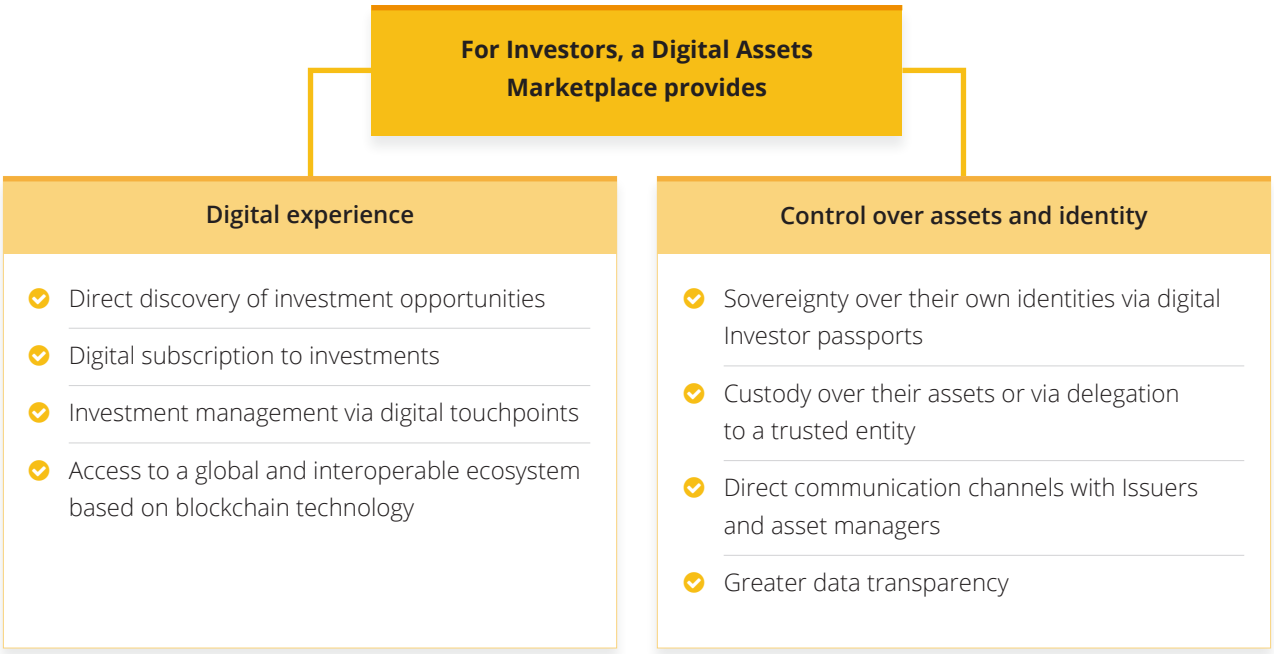
The principle of an online marketplace is to connect several players. When it comes to an investment-related marketplace, the main players are Issuers, Investors, the marketplace Operator, and possibly other service providers.



Investors

Investors are looking for quality investment products. They need to be able to discover opportunities that fit their mandate, subscribe to these offerings, easily manage their assets and have the option to free themselves from their positions when they wish. For Investors, a marketplace is first and foremost a central, easily accessible venue where they can discover financial securities. They want direct access to information in order to assess investment opportunities, expected benefits and associated risks. Ideally, the marketplace, knowing the Investor's profile, only offers them products they are eligible to subscribe for.

The Investors are the main users of the marketplace, but above all, they are the customers of the Issuers. The Operator is a service provider that helps Issuers and Investors to share information and transact. Generally speaking, the Operator makes the connection between the buyers and sellers but never itself acts as an Investor. Furthermore, in the secondary market, Investors can play the role of both the buyer and seller.



Issuers

Issuers of financial securities seek Investors by offering to subscribe to their investment products. To do this, the Issuers must describe their value proposition, detail the financial perspectives and the legal structure of their project, and distribute this information to Investors, while respecting the regulations related to the distribution of financial securities. The advent of web and blockchain technologies allows for the emergence of new tools to facilitate these operations, and most importantly, to create new digital distribution channels.

For Issuers, the main goal of a marketplace is to reach an audience. If the Issuer already has a regular customer base, it can decide to become the Operator of its own marketplace by offering a website where its Investors can discover and subscribe to one or more of its projects. More generally, Issuers can also come into contact with larger marketplace Operators who can aggregate several Issuers and their investment products, offering a greater choice to their users.

Thus, by joining a digital distribution marketplace, an Issuer will be able to offer its products to the marketplace audience. This will generally offer the Issuer various services such as the listing of offers, onboarding for Investors, or even communication or management tools.

Accessing these distribution marketplaces allows Issuers to reach larger audiences and new types of Investors, and even the ability to offer new types of assets. The tokenization of securities makes it easier to fractionalize assets and manage a larger number of Investors, while obtaining a greater level of automation, control and compliance. Also, tokenization facilitates the efficient transfer of securities, something that allows smaller Investors to participate in products usually reserved for Investors who are willing to wait many years before liquidating their position. For example, more and more Issuers are using these distribution marketplaces to target younger (millennials) or retail Investors by tokenizing specific share classes.

For Issuers, a Digital Assets Marketplace provides

Access to new segments of Investors

- Digital distribution directly accessible via the internet
- Enhanced accessibility of the offerings thanks to greater asset fractionalization
- Improved liquidity opening the access to smaller Investors
- Access to a global and interoperable ecosystem based on blockchain technology

Digital administration

- Rapid digital securities issuance and allocation to Investors
- Fee reduction with digital and efficient servicing of securities
- Automated cap table management, even with an active secondary market
- Automated compliance for onboarding and transfers

Marketplace Operator

The Operator of the marketplace is the entity and team that provides the solutions and services to Investors and Issuers. The Operator helps the latter to work in a safe environment through the application of robust governance and the clear definition of rules and responsibilities that apply to the marketplace. For example, the Operator will conduct its due diligence on the projects listed on the platform, provide software where Issuers can enter their offering information and documents, control the access to this information by verifying the information of the Investors and so on.

The Operator acts as an organizer and a place whereby the buyer and seller can meet but should not participate in the marketplace by buying and selling. It should also never be an intermediary in the transactions.

The Operator's role is clear: to provide the compliant tools and services to enable the seamless meeting of buyers and sellers. The Operator facilitates this by providing the technical and regulatory framework and also through the defining of processes and establishing some overarching rules to ensure that they run smoothly.

The main role of the marketplace Operator is to enter into a cycle where supply brings demand and more demand brings more supply, all within the context in which their service improves through networking effects. The marketplace aggregates an audience by helping its users with the curation of content and products proposed on the platform.

For the Digital Assets Marketplace Operator, the objectives are to

- Monetize a customer base by leveraging digital capabilities
- Provide an IT and regulatory framework for Issuers and Investors
- Automate operations and services to customers
- Leverage an interoperable ecosystem based on blockchain technology

Services Provided 3.3

Now that we have defined the different stakeholders in a DAM, this section will define the various services that marketplace Operators can implement and offer to Investors and Issuers across the lifecycle of a private market security.

Primary Market

The primary market is when securities Issuers sell to an initial list of Investors. This is essentially where the securities offerings are created and allocated to the first list of buyers. The offerings can be across any asset class and can be either periodic or continuous offerings. A periodic offering is when the subscription period length is defined. For example, Investors have three months to invest and at the end of the period, the securities are issued and allocated to the approved list of Investors. We see this model mostly for equity and closed-end funds. A continuous offering allows an Investor to subscribe at any point in time during the lifecycle of the security. This is usually the case for UCITS(open-ended funds), for example, and generally for tokenized commodities and stablecoins.

For the primary market, a DAM provides the following services to Investors and Issuers.

Primary market services provided to Issuers

Setup of the offerings

A DAM proposing primary market solutions to Issuers must allow them to list their offerings by providing a process or software where the Issuer can provide information about the investment opportunity. Usually, two types of data are needed:

- *Information about the Issuer:* Investors want to know who is behind the securities and be sure that these people or the company are trustworthy. The DAM provides solutions that allow the Issuer to create a profile where it can describe its expertise and track record, provide additional links, testimonials, reports and ratings, mention the management team etc.
- *Information about the proposed securities:* Investors must be able to assess the investment opportunity in terms of potential and in terms of risk. The DAM provides solutions in order to make an offering page where all the information is made available to users: Type of securities (equity, debt, funds, etc.), images of the project, descriptions, timeline, persons involved, expected benefits, risks elements, compliant token standard used, etc.

The platform can provide the web interfaces to the Issuer to enter all this information, and can also propose some services to do it on the Issuer's behalf. The creation of an Issuer on the platform must be done only after proper due diligence on the issuing company by the DAM. This ensures that the offerings on the platform are high quality and compliant.

Onboarding of Investors

Issuers must collect a set of information and documentation from their Investors in order to comply with legal obligations. At any point of time, they are supposed to know who their Investors are and ensure that only eligible Investors hold their securities. Numerous regulations about the identification of Investor KYC and AML must be applied.

In traditional finance, the onboarding of Investors is very manual and several intermediaries need to share personal information of the Investors as none of them works on the same IT system. Collaboration is complicated, especially with sensitive information. Online platforms can digitize this onboarding process. We saw the power of digital onboarding with the rise of Neobanks: They were able to get thousands of new clients by verifying their identities and creating accounts directly from smartphones. The rise of efficient digital KYC services aided this onboarding method. Today, onboarding solutions exist and can help Issuers or digital platforms scale their user base rapidly and drastically reduce their costs.

In order to deal with private securities, a DAM must verify the identity of its users, and propose to its Issuers that they can rely on these verifications. The DAM can provide the online onboarding interface, with its branding, managing different workflows depending on the type of Investors (individuals, corporate), their status (accredited, qualified, retail, etc.), and their jurisdiction. In this onboarding process, Investors fill in their information and upload their supporting documents to the platform. After this, verifications are performed to generate a risk score allowing the Issuer to decide if an Investor is a suitable owner for its securities.

Placement and subscriptions management

As previously stated, the main value proposition of the marketplace is to bring Investors to the Issuer. Through the use of a digital platform, the Issuer is able to facilitate this and can deliver these investment opportunities to its user base.

Once the Issuer is onboarded on the platform and its offering is created, the project is displayed to the relevant users in the marketplace. The digital platform must help Investors to discover the offering, assess the opportunity, and invest if they are eligible and interested. The Issuer receives subscription requests and it's their responsibility to approve or reject them. In order to make it manageable, the DAM must propose a complete administration panel where the Issuer can easily view potential Investors and approve or reject them based on their validity.

The marketplace Operator may also be able to provide some management services and act as an agent for the Issuers. They will therefore verify the applicants of the offering to review their appropriateness in connection with the financial product. The payment of these orders need to be verified as well: even if payments are automatically reconciled, a paying agent must review them and potentially change exchange rates, proceed adjustments, refunds and capital calls. Finally, the Operator can propose direct support to Investors if appointed by the Issuer to do so. The marketplace should therefore provide communication tools between the Issuers and its potential Investors.

Issuance of the security tokens

In order to fully access the private markets infrastructure, the securities must be represented on the blockchain network chosen by the Issuer and/or the marketplace. This representation is performed by the deployment of several smart contracts and the generation of tokens (digital keys issued on the blockchain thanks to the smart contracts).

As it could be complex for Issuers to issue digital securities, and because the purpose of a marketplace is to provide the IT and regulatory framework to its users, the marketplace must provide the needed tools and services to create the security tokens.

More precisely, the marketplace must use, or impose to its users, a reliable and proven security token protocol. The Operator proposes fully-managed services or self-services to Issuers in order to deploy the needed smart contracts. At the end of the process, Issuers must receive the following:

- **Token smart contracts** — these are the smart contracts that represent the Issuer's securities.
- **Permissions functions to appoint Agents** — this allows the Issuer to assign a role to the agent so they can carry out administrative operations.
- **Token functions** — this enables the Issuer to control the supply, transferability of tokens and the other required specifications.
- **Batch functions** — gas fees can add up if functions are processed on an Investor by Investor basis, batch functions reduce these fees.
- **Compliance smart contracts** — these smart contracts enable the Issuer to enforce the rules of the offering.
- **On-chain whitelist of investors** — Issuers can validate transfers and identities on-chain, creating an immutable register of token holders.
- **Complete allocation to the initial list of investors** — enables Issuers to digitize an existing cap table, or to allocate tokens to new Investors.
- **Access to its cap table** — digitally manage cap tables and benefit from automatic updates.

Primary market services provided to Investors

The Standard Structure of a Digital Assets Marketplace

Discoverability:

For Investors the main benefit of a DAM is to easily discover investment opportunities. The marketplace selects Issuers of securities depending on its positioning and the value they offer to Investors. Some marketplaces are generalist, some focus on certain types of Investors; retail, institutionals, or they focus on geographical regions, or type of asset; funds, equity, bonds, commodities, etc, or even verticals; green finance, real estate, and so on. With tools like filtering, ordering and specific promotion mechanisms, the Operator helps Investors to find projects they like by making them easily searchable.

In today's market, there are multiple providers that offer information and transparency on private market companies. This information is usually very difficult to find and intelligence providers such as PitchBook, Bureau Van Dijk and Crunchbase charge Investors or individuals for access to this information. As the DAM grows, so will its private company intelligence service, representing a rich resource of information for prospective Investors.

With this selection of investment opportunities, the Investor can decide on projects that meet their preferences and ensure they only subscribe to projects based on their level of quality. The Operator can even go further and personalize the recommendations to Investors based on their information and preferences.

Digital subscription:

Being able to easily discover projects is important in terms of improving accessibility, but of equal importance is providing the functionality for a user to be able to subscribe to the offering easily and in a compliant way.

It's for this reason that DAMs must be compatible with the most adopted blockchain identification systems used on the market. It allows Investors to directly use their blockchain account to prove who they are without submitting the same information for each token. We explore this topic thoroughly later.

Order creation: To facilitate the subscription, the DAM must provide Investors with a subscription workflow once they have proven their identity and express their interest in buying a security. The Investor can use a webGUI to create a request for investment. Ideally, the platform integrates and offers a set of tools, such as a calculator to know the amount of tokens the Investor will receive depending on its investment, several currencies, exchange rates indications, and payment methods can be proposed as well. Finally, digital signature capabilities are offered by the platform to facilitate the process for Investors.

Payments: Easy-to-use payment solutions must be provided in order to maximize the conversion rate of the offering. Providing payment solutions to buyers is usually a key role of any digital marketplace. They can offer these two services:

- *Traditional payments via bank transfers:* In capital markets today, payments are processed through the disclosure of bank details and transfers processed and sent by the Investor and their bank. With DAMs, this process can remain the same and banks are able integrate this service with their existing customer accounts. The Issuer will need a bank to receive the funds for this to be possible. Some marketplace Operators have the necessary licenses to offer this type of service. The reconciliation between the orders and the payment can be handled manually or automated.
- *Blockchain based payments:* The DAM may allow Issuers to offer crypto and stablecoin based payments. These payment options are usually more efficient as they are technically P2P transactions without the use of any intermediary. The reconciliation can be made automatically by "scanning" the blockchain. Furthermore, it can be interesting for the marketplace to propose commonly used stablecoins in order to facilitate operations and to avoid the back and forth between the blockchain infrastructure and the banking networks.

Notifications and communications: The DAM must also provide a notification system to inform the Investor about the status of his investment order(s). This information can be visible on the Investor dashboard and can also use traditional communication channels like transactional emails, sms, mobile notifications, or even a paper letter sent by post.

Custody & Asset Management

One of the key benefits of tokenization is that Investors get direct ownership of their assets. Through tokenization, they can directly control their portfolio or delegate the management to third-party service providers. As the assets are controlled by smart contracts, it is important to understand the roles and permissions of each of the parties in order to ensure a high level of security whilst allowing efficient asset management.

Usually, marketplace platforms enable Issuers and Investors to manage security tokens across the lifecycle by providing web interfaces reflecting the blockchain states. If the DAM helps issuing tokens on a public blockchain, they can also provide ways for their users to connect their blockchain identities and/or wallets to secure the access to smart contracts and token keys. Indeed, Issuers and/or their agents need to perform administrative and corporate functions by signing blockchain transactions, and Investors can manage their identity and portfolio of tokens.

Asset management services provided to Issuers

Custody — Safekeeping of private keys

Marketplace Operators ***must not propose wallet services to Issuers***. Issuers must be in control of their securities as they are the liable counterparty. They can delegate some responsibilities but they must be able to manage their service providers. Concretely, the Issuer must be the technical owners of their smart contracts, and be able to appoint the relevant smart contracts functions to their agents depending on their roles and delegated responsibilities.

Therefore, the Issuer needs a wallet that's set as the owner and controller of the smart contracts and one that can be used to grant certain permissions to Agents. This wallet will therefore not be used on a daily basis and can be easily secured with a multisig or in cold storage.

Everytime a function of a smart contract is triggered, a transaction is sent to the blockchain, and an authorized wallet must sign it. In order to respect the roles and permissions, it is important that each stakeholder manages the access of its own wallet. To reduce risks, these wallets must always be replaceable and this is only possible if the wallets are linked to a blockchain identity. For example, a smart contract owner should be able to change its agent(s) at any time, and the agent should be able to recover the lost tokens of an investor and so on.

Custody — Agent roles

Issuers are obligated to perform a range of administrative tasks and functions after the primary issuance of their assets. In traditional markets these functions are typically performed by agents. The marketplace, with its own wallets, can act as an agent and combine different roles such as KYC agent (add proofs of KYC on the blockchain, whitelist Investors, etc.), paying agent, transfer agent, registrar, etc.

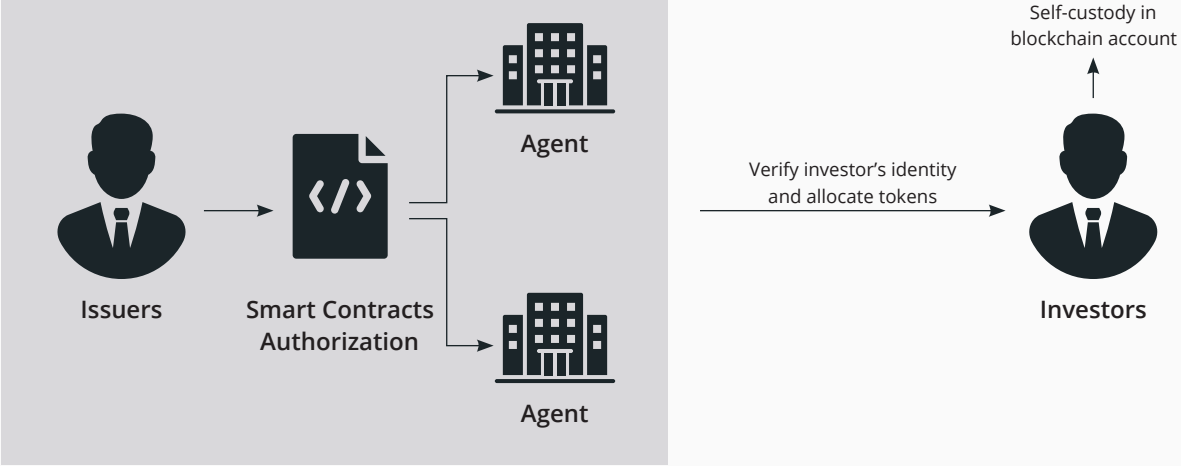
These tasks could be performed on the blockchain directly but of course, a web platform triggering the blockchain functions is more suitable and easy to use. Therefore, in order to perform these functions, Issuers, or the agent they instruct, should ideally access an administration panel linking the blockchain data with confidential information such as the names and addresses of the Investors.

The DAM, by leveraging the security token standard they use, should provide a servicing platform in order to manage the lifecycle of the assets. This part of the platform needs to enable the agent or directly the Issuer

to perform operations on the tokens (like mint/burn, pause/unpause, force transfer, etc.) and to manage Investors status and access their identity information. At the minimum, the platform should provide the following set of features:

- Asset control and oversight to force and block transfers between their Investors.
- Maintain complete and transparent logs of data.
- Run position reports immediately.
- View their cap table that's automatically updated throughout the lifecycle.
- To perform the recovery process for Investors if they have lost their wallet information and access to their security tokens. This can be performed securely through identification of the Investor (seen below).

Custody for Issuers



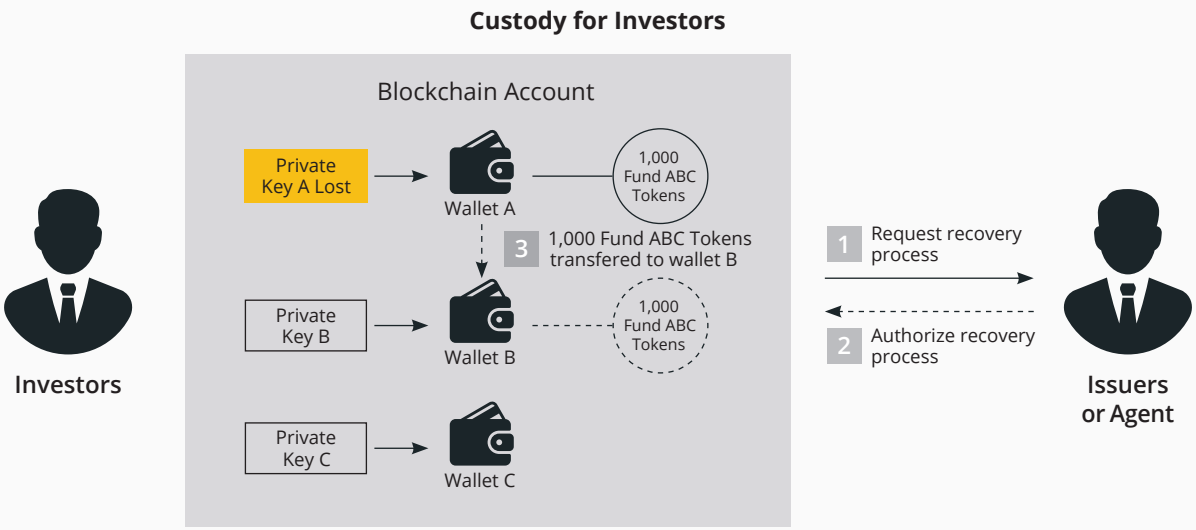
Asset management services provided to Investors

Portfolio management:

Like with investments seen in public and crypto markets, DAMs need to be able to provide Investors with a platform to login and manage their assets. Depending on the type of Investor and their requirements, they can use self-custody thanks to the blockchain or they have the option to utilise institutional-custody services.

As with the Issuer side, the web interface should be developed to make the blockchain functions accessible, executable and simple to use. This gives Investors direct oversight on their assets and enables them to easily manage their portfolio. Through this kind of portal, Investors can:

- Connect or directly use their blockchain wallet.
- Transfer their tokens to other compliant Investors.
- Assess the value of their portfolio through Net Asset Value (NAV) calculations and easily access a range of blockchain-based and immutable reports including those on their position and transaction history.
- To potentially view market and industry news on the assets they own, much like is possible in public markets.
- Perform recovery requests if they have lost access to their private keys (seen below).



Identity management:

The marketplace must also offer identity management services that enable the Investor to easily manage their personal information. They can login to manage and use their identity from their fingertips:

- Ability to update their identity data and automatically alert the relevant counterparties that need to be aware of this change. The information can be linked to the Investor's wallet through an on-chain identity.
- Enable GDPR compliance by giving the Investor control over who has visibility over their data.
- Investors can join a growing ecosystem that's enabled through the creation of a digital assets investment passport.

Communication

The Operator needs to offer certain functions to enable communication services for the Investor. Today, the Issuer and the Investor have a range of intermediaries between them and do not have much direct communication with each other, if at all. The utilisation of technology can act as a communication channel to re-establish this direct relationship and at scale, along with that of the Investor and Operator:

- Reactive customer support from the marketplace should the Investor have any technical trouble with the management of their assets.
- Ability for the Investor to contact the Issuer directly if they have any queries about the team or about the asset.
- Notifications that are triggered based on the Investor's holdings, such as company announcements etc.

Secondary Market

The secondary market is where Investors are provided with a platform that enables them to compliantly transfer their security to another. It is the main pull for Investors and Issuers to this ecosystem as the current infrastructure used in private markets fails to provide any form of transferability and asset liquidity is almost non-existent. The blockchain provides this missing piece of infrastructure by allowing industry participants to apply compliance and control on this efficient, shared and transferable network.

Issuers and asset owners can utilize this network through Operators that provide the use of bulletin boards, order books, decentralized exchanges or regulated exchanges depending on their licence. For this marketplace to function, an underlying system, built on a decentralized blockchain, is needed in order for both the buy-side and sell-side actors to exchange their assets with each other without the need of a regulated intermediary. Through this, market actors can leverage the attributes of the blockchain in terms of global reach, robust record keeping, automation and asset transferability. Ultimately this will enable market participants to solve the well-known discoverability and pricing issues and improve the levels of liquidity in the market today.

Operators can offer the following market services to Investors:

Built in compliance: Of course, as with every other stage of the security token, compliance remains critical in the secondary market. In private markets today, the meeting of a buyer and seller is facilitated by intermediaries, perhaps transfer agents, broker dealers, lawyers or even banks. The process is largely paper based and manual, and typically occurs over email, phone conversations and meetings. These intermediaries bring the trust needed for the two parties to transact as the intermediary is typically experienced and will enforce a thorough KYC verification process and vetting process. Each of these intermediaries would have verified both the buyer and seller. This process is something that takes time and can be expensive for the stakeholders in question.

This same level of trust can be enforced directly and efficiently on the blockchain with the right security token standard, those of which we discuss below, and is made accessible through the technical services the DAM offers to qualify and check the eligibility of Investors. If the web platform only accepts tokenized assets with compliant token standards, it can propose secondary market solutions where the buyer, the seller and the asset are identified by default. They can meet each other via offers on a bulletin board, an order on an exchange, or other means. The transactions can happen directly on the blockchain between the counterparties, without the intervention of the Operator. Even if the transfers are made in P2P, the Issuer keeps control as the compliance will be enforced in the trade, and the cap table is automatically updated.

Asset transferability & liquidity: Through the use of a common infrastructure, buyers and sellers can access, discover and invest in compliant opportunities via a digital platform. Today, OTC markets offer this service but they suffer from low liquidity levels because they operate on private and closed networks. It is difficult for companies to be profiled and offered to investors on a continual basis simply because there is no actor in place with a busy investment community. For this to occur, it's fundamental for a marketplace to demonstrate the accessibility and transferability for market participants. Investors need to be able to easily find, transfer and settle their tokens with one another. The embedded trust, along with the digital nature and the ability to apply automation, allows market actors to bring efficiency to many cumbersome operations seen today and deliver a new and highly transferable digital marketplace. By building the necessary tools on this hyper-efficient network, Investors experience the improvement of asset transferability in the following ways:

- Easy asset discovery that's provided to Investors through a digital and instantly accessible marketplace. Investors can easily sign up to the secondary market, upload their documentation and view the assets they are eligible to subscribe for. Once verified, they can view all the information the offering discloses combined with the information on the asset owners.
- Efficient agreements in pricing are facilitated in the marketplace as counterparties are connected and they can communicate using the medium of their choice and to negotiate the quantity and price.

- The secure and efficient transfer of value is offered to Investors without the need for any escrow agent via the blockchain. They can do this by triggering their wallets and swap, or via the DVP (delivery-versus-payment) smart contracts available on the blockchain. Once the trade is executed and the new investor is eligible for the token, the two Investors are able to sign the transaction and transfer is processed between the two counterparties. The trust is executed by the blockchain and there is no need for an escrow agent.
- The interoperability between multiple marketplace platforms will maximize the amount of users in the network. The use of common token standards will continue to encourage this and develop the connectivity between security tokens. Such interoperability is also promoted by the thriving, innovative DeFi products listed later in the ebook.

REVENUE MODELS

SECTION 04

From the aforementioned services, DAMs can monetize a range of different services across the platform and receive revenue from both Issuers and Investors alike. As complex technical solutions, these services are typically offered to financial players in a ***subscription-based revenue*** model that can be billable on a monthly or annual basis. It is a predominant model for business software and allows the DAM to generate recurring revenue by offering subscription packages based on their customer's overall usage of services. Starter or 'lite' packages are also offered to Issuers that are piloting the service for one offering, or if an Investor simply wants to invest in one particular company. This model allows marketplaces to capitalize on the increasing value of their customer relationships.

From our experience of talking to these market actors, we have identified a set of features that are important for the previously stated services. These features are packaged and sold to both Issuers and Investors.

Revenues from Issuers 4.1

Setup of the offerings: The DAM can charge based on the standardized offering setup services they provide to Issuers. Included in this is a landing page where the information about the asset owner/s is displayed, along with the information needed on the asset itself. Issuers can set up their profile and add as many landing pages for their offerings as they wish. The DAM can charge based on the amount of offerings the Issuer sets up in the monthly or annual license. This setup of the offering can be seen as the usual retainer fee we see in private markets. It is a fee to access and reach the audience and clients of the Operator.

Placement and token allocation: The main revenue stream for capital markets platforms is to take a commission on placement. The marketplace aggregates an audience and monetizes it when its users make transactions. For example, crowdfunding websites usually take between 5-10% of the investment raised. For bigger tickets, the commission is usually between 1 – 5%.

DAMs can also bill for the administration panel provided to the Issuer where they can approve or reject orders from prospective Investors. Here, the DAM can also act as the agent for the Issuer and charge for this service too. Also, the deployment and allocation of the tokens can be billed as a flat fee or included in the placement fee.

Custody & Asset Management: As it could be technically complex, the marketplace may help the Issuer to deploy its token smart contracts. However the ownership of these smart contracts must be transferred to the Issuer, meaning the main wallets controlling the smart contracts must be changed as it is the entity offering the financial instrument to Investors. Also, the Issuer can delegate DAMs certain roles and responsibilities that they can charge a service fee for. If they have the appropriate licences for their jurisdiction, DAMs can also play the traditional banking role of a custodian and are able to bill for the following services it provides to the Issuer:

Agent roles	Oversight of assets	Smart contract management
Marketplaces can offer some traditional agent roles such as that of the KYC agent, transfer agent, registrar agent and so on. They can also provide new roles that are required, such as the recovery processes in case the keys are lost by the Investor.	Issuers have oversight duties in regards to due diligence, asset reporting, cap table management, cash monitoring, and Investor ownership verification. The marketplace can offer this oversight as a paid service to Issuers.	This service can open up new revenue streams by managing the smart contracts needed for the aforementioned servicing of the assets and the management of Investors.

Usually, these agent roles are billed on a periodic basis, or by action with a minimum recurring fee, similar to accounting firms.

Revenues from Investors 4.2

Access to the discoverability services: Being on the primary or secondary markets, the marketplace can drive revenue from the discoverability services it provides to Investors. Investors can be charged for access to the platform and investment opportunities coming from the listed Issuers (primary) or coming from other Investors (secondary).

Also, the DAM can charge additional access fees for features required by advanced investors needing more data in order to properly assess projects listed on the DAM. Private market information and data is notoriously difficult to come by and is a rich and lucrative business asset. The DAM should ensure that it is protected and licensed so it can package this intelligence and sell it to Investors. The service of being able to search across private market information and easily find assets is a significant revenue opportunity for DAMs.

Custody: Depending on the type of user and whether they are institutional or retail, Investors can either self-custody their assets with their integrated wallet or marketplaces can offer services to manage the custody for them. If the DAM provides the wallet services it could charge the Investor for each wallet or offer a certain amount of wallets as part of their subscription package. Depending on the type of Investor the revenue from custody could operate in one of two ways. For traditional institutions it will be expected to charge for Assets under Management (AuM) and to take a percentage fee as they are safeguarding the asset. Although, our take is that as the assets are on the blockchain, the only part that needs to be safely secured is the access. This makes it harder to justify the AuM model, but we expect it to still play a popular role given that financial institutions are familiar with it. Lastly, token recoveries can be charged directly to Investors if the DAM is an authorized agent.

Management: The digital investor services are also billed to Investors, of which are generally included as part of the package. This includes the portal needed for an Investor to manage their assets through the utilization of features such as NAV calculation or immutable transaction and position reports. In addition to this, the ability to access a portfolio whereby Investors update their identity data and automatically update the relevant counterparties, along with the ability to control who has access to their data are also valuable services.

Secondary market: DAMs can improve the transparency, accessibility and ultimately liquidity of the secondary market. By collecting data and information on a wealth of quality assets, they can earn a significant amount of revenue by leveraging the activity and information available on the platform. In fact, this is how OTC markets create a significant amount of their revenue today. DAMs display their data sets in various tools such as company screeners, pricing products, compliance products and so on. DAMs are able to deliver all of this in an Investor platform that's billable as a subscription service.

When a user wants to make an offer on the secondary market, the web platform can charge a fee to post this order. We usually see this kind of monetization on bulletin boards more than with exchanges.

When a user finds an investment they want to make an offer for, the marketplace can monetize the link between the counterparties. It can be matching an order on the exchange or making the contact of the advertiser visible. This linking can easily be charged per event: Today, this is how public marketplaces create revenue as the regulated exchange acts as the central authority.

FUNCTIONAL COMPONENTS

SECTION 05

Here is the specific list of the technical services needed for a marketplace to operate and offer the aforementioned services to Issuers and Investors.

User Identification 5.1

To guarantee a quality and compliant audience to Issuers, the DAM must have a robust user identification system: Users must be able to access a secure account and manage their identity information. The Investor base is generally the main asset of the marketplace. Advanced CRM features can be used to optimize user management. Also, these users should be KYC verified by the marketplace in order to verify their information and to comply with the distribution rules of securities. A simple and easy-to-navigate onboarding system that allows users to go through the workflow, disclose their information, verify KYC information, and the functionality to receive tokens in their wallet at the end of the process is also needed.

Finally, it is helpful for DAMs to be compatible with the main on-chain identity standards in order to facilitate the registration of their users. These on-chain identity systems can act like an investment passport that's reusable from offering to offering across blockchain-based marketplaces. These identities are created on behalf of all parties in the subscription and the transactional process of security tokens (Issuer, KYC provider, security token administrative agent and obviously, Investors). Investors are able to make their information known to third parties on request and can enrich their data with the relevant qualifying information such as accreditations, KYC checks, proof of identity etc.

Wallets & Custody 5.2

The platform must make it easy for Investors and Issuers to use their wallets, and should therefore be compatible with all the main wallets of the blockchain accepted on the marketplace. These wallets are not necessarily provided by the DAM, but the DAM should build the business layer and web GUI on top of the blockchain. This helps its users trigger the functions of the relevant smart contracts when they need it.

Therefore, the DAM should provide a way for its users to connect, manage and change the wallet(s) linked to their profile.

Primary Market Offerings and Asset Data

5.3

A section of the website dedicated to the primary market provides all the offering information needed for Investors to assess the asset and to conduct their due diligence. This will include information on the asset owners, white papers, pitch decks, subscription agreements, financial plans, proofs of sustainability and so on. By offering a landing page that is accessible digitally and on-demand, market transparency and the overall dissemination of information in a currently opaque private market industry is improved. A complete system to manage this content is necessary in order to provide primary issuance listings.

Subscription System

5.4

In order to maximize the conversion rate of each offering, the DAM must have an optimized subscription system. It can be optimized almost in the same way e-commerce shopping carts are optimized. Investors wishing to invest should be able to create their orders and pay easily, with different payment methods and currencies.

Secondary Market Offers and Orders System

5.5

This system allows counterparties to publish and broadcast offers reflecting their intention to buy or sell. It can take various forms depending on the regulations and licenses of the secondary market platform Operator. The system can go from a simple ads management system or a complex matching engine of orders with high-frequency trading capabilities. Today, new networks are being developed to interconnect several liquidity providers together. Projects like 0x (decentralized exchanges or DINO (bulletin boards network) are emerging and help marketplaces to monetize their audience in a better way, as their users can easily find counterparties to trade with.

Operator Dashboard

5.6

The dashboard allows the Operator to select tokens, manage users, moderate content, provide support to Investors and drive the marketplace. Essentially, it is a platform to manage the DAM. Its features and complexity will depend on the services provided by the marketplace to its customers.

HOW DO DAMS LEVERAGE DEFI ECOSYSTEMS?

SECTION 06

The emerging world of DeFi has already leveraged these decentralized networks, and usage has grown exponentially in 2020. At the time of writing, the value of assets that are locked up in smart contracts has reached $14.3bn (December 2020). This is small in comparison to capital markets, but considering the value locked up was $690mn at the start of the year, it showcases the upward and rapid trajectory of this emerging industry. This new industry has emerged because a range of complex financial products have been offered to individuals without the need for a banking intermediary. Innovative and financial products such as automated market-making or algorithmic lending have been enabled through the use of interoperable smart contracts.

DAMs can also benefit from DeFi by providing new services to their users, but also to increase their audience directly or indirectly. By default, using the main DLT infrastructure brings interoperability and compatibility in various ways. For example, a marketplace could easily onboard a new user thanks to its on-chain identity and access the needed information to apply compliance in seconds. Also, the tokenized assets are all compatible, opening countless opportunities. Every time their clients need a counterparty, the DAM can find one by utilizing other networks for its client through aggregating with other marketplaces and monetizing this linking.

For DAMs to connect to this burgeoning ecosystem they need to be built on decentralized market standards that deliver interoperability whilst also ensuring market actors can enforce the compliance that govern private market securities. How do they do this? And what platforms and successful DeFi products are out there already? This is the basis of the next section.

Interoperability

6.1

Blockchains

The DAMs that have tried to launch in the past few years started by building their own private blockchains. They did so with the notion that they would become the central player controlling the marketplace. They failed to realize that it would take years to build such a network, if at all possible, considering it would directly oppose the fundamental principles of decentralized networks. Moreover, the use of a private blockchain doesn't actually change what's apparent in capital markets today, which consists of many isolated and fragmented central networks.

Indeed, a blockchain is a technical infrastructure that individuals and/or entities can use because they trust the mechanics behind the transaction. If the governance or the technical consensus to record transactions across the network is managed by a single or a few entities, it becomes more difficult to trust this network. To create a centralized network, it would be easier to use a database.

Blockchain technologies and ecosystems have evolved a significant amount in the last few years. Decentralized networks such as Ethereum are resilient enough to be used by financial institutions and Investors. Thousands of applications and technical building blocks have proven their efficiencies. Financial institutions are beginning to understand that they don't need to control the IT infrastructure (i.e. the blockchain), but they can control what happens on this infrastructure

through the use of smart contracts, for their own organization, or on behalf of their clients.

The most used and widely accepted decentralized network for financial markets is Ethereum. The network is operated by over 8,000 nodes that share the same consensus for transactions. In addition to this, it has a tremendously active community managing the governance and evolution of the open-source system. On top of this, there are hundreds of thousands of developers building tools, libraries and standards every day to make the blockchain more accessible, reliable and secure for its users.

The ability to deploy and execute smart contracts on the blockchain was a seminal moment for the blockchain industry as many tokenized financial products have been launched in the years since. Today, Issuers of tokens don't need to manage the underlying infrastructure anymore, they can focus on controlling what they issue on the network: tokens.

More and more, developers are building parallel networks to enhance the capabilities of Ethereum. Cross-chains protocols and side-chains are starting to appear and can be used to improve the speed of transactions, costs and/or stakeholder confidentiality. In May 2020, the amount of BTC on Ethereum through wrapped tokens surpassed the amount of BTC on the Lightning Network, Bitcoin's layer 2 scaling network. This cross-chain state is likely to be the future of blockchain,[1] but is only possible through the use of interoperable standards for decentralized networks.

Smart contracts composability

Smart contracts are code and can be executed on the blockchain. A user can combine several smart contracts for several use cases. For example, the smart contract of the token will generate token keys, and these security tokens will be held in a wallet. When a user wants to use its tokens on a decentralized exchange, it's tokens will follow the code imposed by the token smart contract (rules for transfers, etc.), but also the code imposed by the exchange (swap, etc.).

The composability of smart contracts is a real asset for digital securities. A "security token" is usually issued and controlled by a set of smart contracts. These are deployed in order to offer control over the tokens and apply compliance. Additional smart contracts can be added and linked to the initial set of smart contracts to automate revenue distributions, add specific management rules, etc. These smart contracts combine to create security token standards that ensure the functionality and compliance across the token's lifecycle.

It is therefore essential for DAMs to utilize standards that are used in a global ecosystem and those that provide interoperability with other services. It will open the door to many other applications for the marketplace's customers.

Available standards

In order to be compatible with an ecosystem, an Issuer must use the same standards as the other players. Thousands of standards are created every year for various needs.

When the ERC-20 standard was invented and reached its peak in terms of use on Ethereum in 2017, it showcased the significance of interoperability and through the unlocking of new pathways and more efficient flows for capital from a significantly wider group of Investors.[2] The use of common standards like these are required for the interoperability of the blockchain, and without them new applications and services would not be able to work seamlessly with one another.

[1] Page 5 ConsenSys Q2 2020 DeFi Report.pdf
[2] Page 7 https://assets.kpmg/content/dam/kpmg/us/pdf/2018/11/institutionalization-cryptoassets.pdf

The ERC-20, whilst an important invention in the evolution of blockchain technology, doesn't allow for the enforcement of the rules and regulations that govern private securities. For this, many standards have been proposed, with the main standards being the Token for Regulated Exchanges (T-REX) and the ERC-1400. They use a different approach but can enrich each other thanks to the composability of code. Both of the standards enable the enforcement of compliance rules and the control of transfers to eligible Investors.

The T-REX manages compliance by leveraging the security of the blockchain with an automatic and on-chain validator system. This system applies the transfer rules related to users (identities) and those related to the offering. The Issuer of the securities or its agent always keeps control of the tokens and the transfers. ERC-1400 is another approach where each trade must be validated by a specific key generated off-chain by the Issuer.

For services to take advantage of the extended reach and accessibility of DeFi, and more broadly of blockchain, it's essential they work on common and interoperable standards like these.

To represent assets on the Ethereum blockchain, Issuers can use some standards:

ERC-20

ERC-20 is the most important standard to issue tokens on the Ethereum public blockchain. These tokens are compatible with most of the wallets and platforms, bringing a high level of interoperability. ERC-20 tokens are fungible tokens, usually non-permissioned, that can be transferred easily between peers on the Ethereum blockchain.

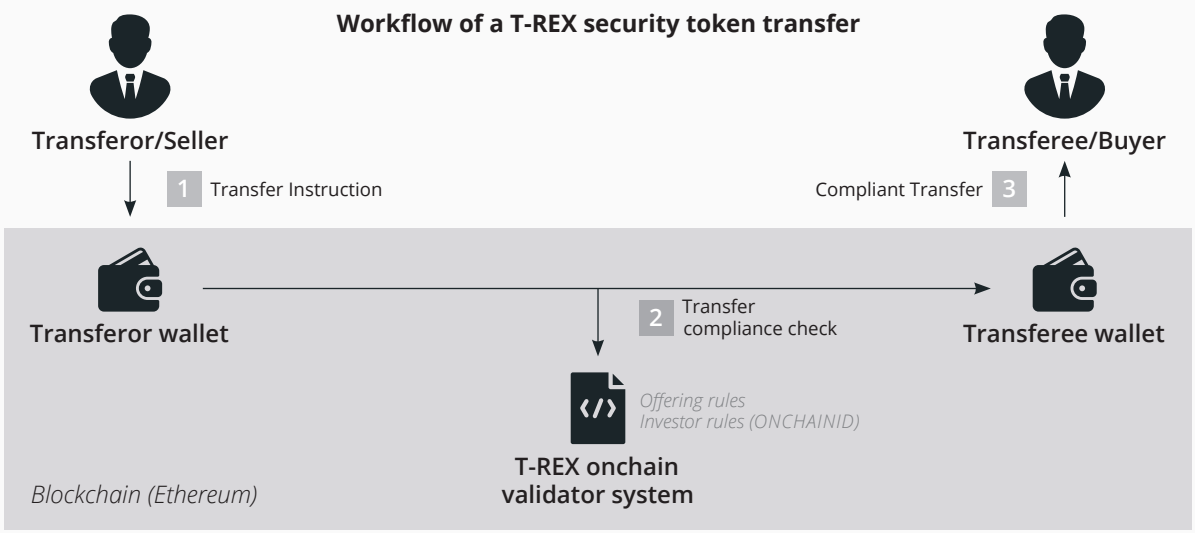
The ERC-20 is a token smart contract that defines and implements all the necessary functions of a standard token on Ethereum such as the token's name, symbol, the total supply, and the number of decimals allowed. Of the 13 functions defined by an ERC-20 token, the most important ones are as follows:

- ***balanceOf:*** This function allows a smart contract to store and return the balance of the provided address. The function accepts an address as a parameter, so it should be known that the balance of any address is public.
- ***totalSupply:*** Although the supply could be fixed (as it is with Bitcoin), this function allows an instance of the contract to calculate and return the total amount of the token that exists in circulation.
- ***transfer:*** This function lets the owner of the contract send a given amount of the token to another address just like a conventional cryptocurrency transaction.
- ***approve:*** When calling this function, the owner of the contract authorizes, or approves, the given address to withdraw instances of the token from the owner's address.
- ***transferFrom:*** This function allows a smart contract to automate the transfer process and send a given amount of the token on behalf of the owner.

T-REX

In terms of functionality, the T-REX is probably the most advanced standard to tokenize assets on the Ethereum public blockchain. Based on the ERC-20 standard, it supplements it with more than 100 functions to enforce compliance and manage control for the Issuer, agents and Investors.

The T-REX smart contracts enable compliant securities transfers. It is the only security token protocol with an on-chain compliance trade validator system. Directly on the blockchain, each transfer's offering rules and investor rules are verified to validate or refuse the trade.



tokeny SOLUTIONS

Thanks to the T-REX smart contracts, securities Issuers and their agents benefit from a high level of control over digital securities. At any time, if authorized, they can carry out the previously mentioned management operations such as creating or destroying securities, making transfers, blocking positions, pausing transfer activity, authorizing or revoking Investors, etc. These operations can be performed one by one or by batch in order to reduce the gas costs.

With the recovery function, Investors are protected from the loss of their tokens, as long as they can prove their identity to the Issuer or appointed agent.

In short, T-REX smart contracts provides:

- An on-chain validator of trade enforcing securities regulations
- An immutable proof of ownership
- An advanced permissions system for Issuers, Agents and Investors
- Dozens of functions to control the tokens (mint, burn, pause, recovery, force transfer, etc.)

ERC-1400

Like the T-REX, the ERC-1400 is open source and was created to transfer security tokens on the Ethereum network. It contains the combination of four other propositions to the Ethereum community:

- ERC-1594 — Core Security Token — enables the necessary functions for token issuance, redemption, transfer and validity
- ERC-1410 — Token Partition — allows for the creation of partially fungible tokens
- ERC-1643 — Document Management — off-chain management of documents
- ERC-1644 — Forced Token Transfers and Controller Token Operation — allows for forced token transfers

Although they can work together, there are native differences between the two standards:

T-REX & ERC1400 Comparison		
Feature	**T-REX**	**ERC1400**
Open source smart contracts	✔	✔
Manage share classes	✔	✔
Audited by an external party	✔	✔
Validate transfers onchain	✔	✖
Block or unblock tokens	✔	✖
Tokens recovery process	✔	✖
Immutable cap table	✔	✖
Permission management with multiple agents	✔	✖
Stakeholders identity management	✔	✖
Perform batch functions	✔	✖
Partially fungible tokens (not compatible with decentralized exchanges)	✖	✔

Overall, the T-REX manages compliance by leveraging the security of the blockchain with an automatic validator system. This system applies the transfer rules related to users (identities, detailed below) and those related to the offering. The Issuer of the securities, or its agent, always keeps control of the tokens and the transfers. ERC1400 is another approach where each trade must to be validated by a specific certificate generated off-chain.

Different token standards on the Ethereum blockchain		
Standard	**Uses**	**Description**
ERC-20	Basic fungible digital asset, ideal for currencies and standard tokens	Most common token on the Ethereum blockchain, it can hold value and be sent and received by most major Ethereum wallets
T-REX	Digital securities	Based on the ERC-20 standard, but with over a hundred different functions aimed at making digital securities more compliant and easy to issue
ERC-1400	Digital securities	A suite of standard interfaces for issuing and redeeming security tokens, managing their ownership and transfering restrictions in a transparent manner
ERC-777	NFTs and Gaming	Unlike the fungible tokens, ERC-777 tokens are attributed with metadata that makes each token unique from other pieces, often used in digital art for verification purposes

Identity Systems

6.2

Identity systems are the key to bring compliant securities in the DeFi space. Compliance or security tokens cannot be enforced on the blockchain without an identity system that allows Investors to identify themselves and manage their data. If participants are not in control of their "blockchain account", the ecosystem will recreate the silos we see today in traditional finance. This identity piece is one of the main differences between the unregulated world of utility tokens or cryptocurrencies and the regulated world of security tokens. For security tokens to work in the DeFi ecosystem, identity is key. When DAMs onboard new users they can easily facilitate the allocation of these on-chain identities.

A blockchain account is an on-chain combination of an identity and a wallet, allowing its owner to prove that they are eligible to receive a defined security token (proof of eligibility), and that they are an owner if applicable (proof of ownership). Currently, a wallet is not recognized as an identity in any jurisdiction and therefore the wallet must be linked to an identity system. This identity system could be managed off-chain as we are dealing with sensitive information, but the end results of the verifications must be added on-chain to allow for interaction with the rest of the ecosystem. As the identity belongs to an individual or an entity, it should be directly managed by its owner. The identity owner should be given the ability to manually grant access to each service needing this identity information in order to process the KYC and AML verifications. From these existing proofs, the service could easily check who has previously processed the checks and if the owner has been verified or not.

Identity systems not only allow Investors, but also agents, depositaries, infrastructure providers and service providers to easily and securely share their data with one another. Today, these systems enforce the compliance needed for actors wishing to utilize the blockchain in private markets. In the future, once these systems are fully developed they will unlock data rich and high functioning assets, providing more accessibility and liquidity in private markets.

If identity systems use the blockchain to share proofs, they can be made compatible with every application of the ecosystem as nobody can alter this digitization of trust. Ultimately these verifications become executable, meaning you can create programs using these proofs. For example, the transfer of a security token can only be executed if the on-chain identity of the receiver contains the proof of KYC.

DEFI PLAYERS

SECTION 07

As mentioned before the DeFi industry is already live and functioning as new financial products are constantly created and offered to users in the ecosystem. However, the DeFi space has not integrated with securities yet and the first Operators of DAMs will be at an advantage to take the largest chunks of market share. For the moment, an individual can buy cryptocurrencies or stablecoins to utilise and benefit from the below the DeFi products below, many of which are traditional banking functions:

Decentralized Distribution 7.1

Decentralized exchanges:

Unlike centralized exchanges, DEXs operate without a central authority and allow users to transact peer to peer. With a DEX, the wallet interacts with the webpage via smart contracts, hybrid order books, or liquidity pools.[3]

For some digital assets, such as cryptocurrencies, decentralized exchanges already exist. They exist in the form of two smart contracts that are hosted on a blockchain. A popular example of this is Uniswap that acts as a 100% on-chain market-maker allowing users to swap ERC-20 tokens. It matches buyers and sellers to determine prices and execute trades through the use of programmed equations that users contribute to in return for interest payments.

Fundamental to these decentralized exchanges are liquidity pools. These pools make the exchanges possible through funding. The more liquidity there is in the pool, the more users can buy with the minimum risk of incurring slippage. Once the funds are added to the pool by the user the funds are available to be traded on exchanges between users. There are many combinations of assets collected in pools such as ETH/DAI or ETH/USDT and so on. So whenever a user wants to sell its ETH for USDT, another user's USDT will be used to buy up the Ethereum on the other side of the trade. This process, in other words, is called automated market making.

A similar scenario could be imagined for security tokens. However, due to security tokens operating in a far more heavily regulated arena, the situation is more complicated. For example, in Europe, there are constraints imposed by MiFiD and CSDR that currently mean that licences are required to operate a DEX for security tokens. We expect the regulation to continue to progress in this area as regulators become more aware of the technology and the ability to improve the accessibility of private markets.

Networks of bulletin boards

In the regions where it is too complex and costly to operate regulated exchanges, the bulletin board approach can be prefered. In today's market, bulletin boards find it difficult to reach a critical size due to market fragmentation. The blockchain can be leveraged to interconnect these bulletin boards and create a global marketplace based on a shared network. These new networks of bulletin boards make all the offers made by Investors visible on every marketplace listing the corresponding tokens.

Lending protocols

For businesses and the public, decentralized lenders or, 'yield farmers', provide the ability to secure loans with no intermediaries. These lenders can collateralize their assets and earn interest. The interest rates are calculated through algorithms and without human intervention. Balance verifications are based on a blockchain and assets are transferred to a smart contract as collateral. This type of lending experienced large growth in 2020 and there are now many platforms working in the space. A good way to message the success of these types of lending platforms is to assess the amount of 'locked' funds in DeFi. In December 2020 funds locked in smart contracts reached its all time high of $16 billion, increasing over 2,200% from the $690 million locked at the start of 2020.[4]

[3] Definitive Guide to DeFi — Cointelegraph
[4] https://cointelegraph.com/news/funds-locked-in-defi-surge-1b-as-analyst-tips-post-election-bull-run

Payments and Stablecoins 7.2

Stablecoins

Cryptocurrencies can be highly volatile and susceptible to price fluctuations. To mitigate this, stablecoins were created. They are backed by reserve assets that are bought and sold through algorithmic mechanisms. They can be backed by FIAT currencies or commodities such as gold but they live on a blockchain and thus reap the benefits of privacy and efficiency of blockchain-based transactions. The most common stablecoin is USDT, which is pegged to the US Dollar and is stored on nearly 1.4 million addresses with close to $7 billion in circulation, making it a top five cryptocurrency by market cap.[5] For security tokens, stablecoins can make offerings more accessible as volatility concerns are mitigated.

Fiat to tokens ramps

This is a service provided by payment processors in order to facilitate direct payments from bank cards in exchange for cryptocurrencies. These types of applications are centralized but are very important to link the banking infrastructure with the blockchain infrastructure. Crypto-exchanges are currently the main providers of fiat to tokens services. More and more, stablecoins Issuers are providing these services directly as well.

Wallet & Asset Management 7.3

Wallets are a fundamental element in the Digital Asset Marketplaces ecosystem. In the issuance of tokenized securities, each actor needs a wallet to securely store their assets. As discussed previously, having wallets that are ERC-20 compatible are required, as it means they can be connected to the wider DeFi ecosystem through a variety of DeFi Management tools such as Zerion and others. They are very easy to set up and manage.

[5] Definitive Guide to DeFi — Cointelegraph

CONCLUSION

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As we have previously noted, the limited accessibility in private markets is due to the lack in use of a shared infrastructure. Today, Issuers and Investors have many obstacles to overcome to interact with one another. This leads to a closed market with poor asset and price discovery and ultimately low levels of liquidity. Therefore, there is a real need for digital asset marketplaces (DAMs) to emerge and help the market players to interact with each other by providing the suitable IT and regulatory framework.

Conversely, these accessibility and liquidity problems are the strengths of this new wave of innovation in DeFi. New and everyday types of Investors are gaining access to complex financial products that have previously only been seen in capital markets. Users can now collateralize, lend and earn competitive interest through automated market making algorithms at the click of a button. More and more traditional banking functions are slowly being replaced by executable code. At the time of writing this industry has grown by over 2500% in terms of value locked in smart contracts. However, actors should proceed with caution: many compare this DeFi wave with the ICO boom of 2017 where the majority of Investors fell victim to fraud. As the identities of stakeholders in DeFi are largely unknown, it is fertile ground for those wishing to exploit unknowing Investors.

As we cast our eye over to private securities, what happens when compliance meets this decentralized network? Issuers and Investors are protected by two things: the built in trust of the blockchain and the regulations that govern securities. They get the best of both worlds by being protected whilst also leveraging this highly transferable and efficient network. The balance of opening access to investment opportunities whilst also protecting Investors remains a challenge for regulators although it is one where they are reacting - the SEC recently announced changes in crowdfunding and similar progressive moves have been made in Europe too.

For this wave to reach the shores of private markets, marketplaces need to be built withthe necessary building blocks to enforce the compliance and governance on a digital-first platform. Once this has been established, high quality assets will be issued and a vast array of Investor types will be attracted. Regulation will change to firstly protect, but also to open access to more Investors. In this new era of private markets, Investors will ultimately be able to build their wealth and easily access, discover, and agree asset prices in a flourishing and more liquid private security marketplace.

[6] https://www.coindesk.com/sec-capital-formation
[7] https://tokeny.com/simple-prospectus-exemptions-to-target-retail-investors-in-europe/

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