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ROUND TABLE ASSETMANAGEMENT

Navigating the Future: DLT and Digital Assets in the Evolving Realm of Asset Management

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Chapter I – Executive Summary

Emerging technologies such as Digital Ledger Technology (DLT) are revolutionizing numerous industries, including the asset management sector. This whitepaper aims to provide a detailed analysis of the recent advancements in applying these technologies within the asset management industry and provides a prospective outlook for the digital transformation in the years ahead.

Over the past few years, the asset management industry increasingly leveraged digital assets and DLT for the diversification of their offering and enhancing operational efficiency. Notably, the institutional interest in digital assets is rising, bringing them into the spotlight for several investment strategies. Major industry players, such as Goldman Sachs and BlackRock, are showing commitment to the space, underlining its significance. This whitepaper therefore explores how the integration of DLT into asset management operations is unfolding, detailing the advantages, potential risks, and recommendations for a successful adoption. The paper elaborates on how DLT can streamline operations, reduce costs, and enhance transparency within asset management processes such as research, trade settlement or even risk management.

The paper delves into key areas such as tokenization, trade settlement, risk management, and opportunities in Decentralized Finance (DeFi), along with a noteworthy case study by Bankhaus Metzler on the issuance and trading of native crypto fund units according to German legislation. Simultaneously, the paper also discusses the challenges of adoption, especially issues concerning security, scalability, performance, legacy integration, regulatory compliance, and investor education. The volatility of digital assets demands a sound risk management strategy tailored specifically for this new asset class. The paper concludes by highlighting the effects of integrating DLT and digital assets in the asset management industry. It underlines the need for careful execution and monitoring to leverage the technologies' benefits fully. Adapting to the changes will open up new growth streams, help maintain a competitive edge in an ever more digitized financial landscape and shape a future where traditional finance and digital assets coexist. The ability to adapt will fundamentally define an asset manager's success in this era.

Chapter II – Overview of DLT

This chapter delves into the specifics of DLT. It explains the functioning of the technology and shed light on the increasing attention from institutional players. By discussing their relevance in the financial world, it establishes the foundation for the discussion on their impact on the asset management industry.

Since the heavy decline from their 2021 all-time highs (global market cap hit 3 trillion USD in Nov 10, 2021) and extensive discussion about financial stability issues related to crypto currencies, peaking in the meltdown of former crypto exchange FTX in late 2022, retail investors have become more cautious about crypto investments. Despite the cooling in public interest, a lot has happened behind the scenes, especially in the institutional field where the number of players experimenting with crypto asset products and DLT-based capital market infrastructure is increasing.

Just recently the first leveraged Bitcoin Future ETF has been approved by the SEC in the USA. Renowned companies as Goldman Sachs and Blackrock intensified their spending on digital assets according to recent reports, with the latter officially applying to offer a Bitcoin Spot ETF with the SEC, which in the meantime was already approved.

This known, DLT remains a strongly discussed technology, especially in the world of finance. These recent developments are underscoring the importance of DLTs and urged the FIRM roundtable to publish a follow up on the first whitepaper on crypto assets from 2021, focusing on the impact of these trends towards the asset management industry.

WHAT IS BLOCKCHAIN / DLT?

The technical aspects will be kept at their minimum. For a more comprehensive explanation please refer to the whitepaper from 2022.

Summarizing the first whitepaper: A blockchain is a digital ledger that chronologically records transactions across its network. Each set of transactions is stored in a „block." Once recorded, it is designed to be resistant to modification. When a transaction is added to such a block, it is with today's standards, impossible to change or erase it in any way. Thus, data integrity and security are ensured. These blocks, formed from bundles of transactions, are interconnected, forming a chain—hence the term „blockchain". Being cryptographically interconnected, this chain provides an extra layer of security, making it hard for any single block to be tampered without affecting the whole chain. So, an attempted change of a value within the chain, becomes immediately apparent to all participants.

To ensure the validity of transactions before they are bundled to a block, there are depending on the DLT protocol dedicated groups of participants and mechanisms in place. The underlying mechanisms that define these participants and the system of bundling transactions is generically referred to as "consensus mechanism". Participants of the network validating transactions are called "validators". These validators determine the validity of each transaction and get usually rewarded for their efforts. In which way a transaction is validated, and what eventually leads to a block's formation is depending on the previously stated consensus mechanism. The most common consensus mechanisms are the so-called „Proof-of-work" (PoW) and „Proof-of-stake" (PoS) mechanisms.

WHAT DRIVES BLOCKCHAIN'S REVOLUTIONIZING REPUTATION?

What relevance does blockchain hold for the finance sector? At its core, blockchain extends beyond the mere storage of digital transactions. Its notable feature is the incorporation of „smart contracts" within its network. Envision smart contracts as protocols where, upon meeting certain conditions, specific actions are automatically executed. When multiple smart contracts are methodically linked, they can replicate some traditional financial processes. For asset managers, this presents a potential avenue for exploring decentralized mechanisms, be it on a public or "permissioned" network, that could mirror certain asset management functions, or even establish digital contractual agreements, but with careful consideration of their advantages and limitations.

KEEPING PACE IN A DIGITAL WORLD

For asset managers keenly observing market trends, blockchain presents a nuanced opportunity. One of its prominent use cases is „tokenization," the process by which tangible assets - from real estate to traditional financial instruments - are converted into digital tokens on a blockchain. Tokenization has the potential to redefine liquidity, especially for traditionally illiquid assets. Consider a piece of art, for instance. By representing a property as tokens on a blockchain, it becomes possible to trade fractions of that property with increased ease and potentially with less intermediaries using parts of the classical capital market ecosystem like exchanges. Similarly, traditional assets like stocks or bonds could be tokenized to improve capital market functions, potentially enabling instant settlement, which in current infrastructure might take days. This is a potential paradigm shift from a system that currently is based on daily cut-offs. While questioning existing and functioning systems often stirs up resentment, the industry should also consider potential benefits, such as less tied up

capital and the reduced counterparty risk. Besides these advantages the technology can also foster diversification in an investment portfolio. With assets traditionally considered illiquid now in a more liquid format, asset managers have the opportunity to rebalance portfolios with a wider array of assets. But the discussion doesn't end at tokenizing real-world assets. The emergence of cryptocurrencies offers asset managers a dual-fold opportunity: firstly, to diversify by directly investing in this new asset class, and secondly, to offer clients instruments that provide exposure to these assets. Prominent players in asset management are already exploring these waters. Noteworthy ventures, like BlackRock's push into Bitcoin ETFs, underscore both the potential rewards and the industry's shifting stance towards crypto assets offerings. While the digital transformation spearheaded by tokenization seems futuristic, it may soon be indispensable. For asset managers, adaptability to these shifts could not just be about capturing new revenue streams but also about maintaining a competitive edge in an increasingly digital financial landscape.

Chapter III – Trends in Digital Assets

This chapter explores current and upcoming trends in the digital assets market by using market statistics and regulation changes. It discusses innovations in tokenization, how decentralized finance is creating new opportunities for lending and borrowing and manages liquidity, operational costs, and potential risks. It also gives a brief overview of the regulatory landscape and the differences in the regulatory approach between the EU and the US.

As per statista, the revenue in the Digital Assets market was projected to reach €25,750.0m in 2023 and is expected to show a Compound Annual Growth Rate (CAGR 2023-2027) of 16.85% resulting in a projected total amount of 48,000.0m by 2027. Regarding the German digital asset market, the revenue was projected to reach €2,170.0m in 2023. According to a GlobeNewswire article in August 2023, the digital asset management market is predicted to grow at an astonishing CAGR of 10.3% between 2022 and 2032. This leaves great potential.

With the increasing growth of this market regulators show different reaction. While the EU passed the Markets in Crypto-Assets Regulation (MiCAR) which creates a uniform framework that regulates crypto assets the SEC in the US took a more defensive stance. This is also shown by the U.S. regulators´ warning in February 2023 regarding liquidity risks from cryptocurrency-related clients, highlighting that some of their deposits could prove volatile, while Germany´s current trends demonstrate an increasing interest in the digital asset market. Deutsche Bank applied to BaFin in June 2023 for a digital asset license to operate as a crypto custodian. In September 2023, Taurus, a provider of digital asset infrastructure, announced that they signed a global partnership agreement with Deutsche Bank. The latter will use Taurus' custody and tokenization technology to manage cryptocurrencies, tokenized assets and digital currencies and provide its services for institutional clients. This would be a crucial step towards the digital asset space as it will be the first time that the bank will hold a limited number of cryptocurrencies as well as tokenized versions of traditional financial assets. There are more German banks heading in the same direction, just to name a few: Deutsche Wertpapier ServiceBank (Dwpbank) launched the wpNex crypto trading platform in March 2023, which would allow 1,200 banks in Germany to offer Bitcoin trading to their customers. DWS announced its collaboration with Galaxy Digital to offer exchange-traded products of cryptocurrencies in Europe while Commerzbank and DekaBank have applied with BaFin for crypto custody licenses focusing on institutional clients with the latter developing its own tokenization platform using DLT. Crypto markets are becoming the center of attention internationally as more banks increasingly rely on digital solutions to execute their services. More precisely, Citi Treasury and Trade Solutions (TTS) announced in September 2023 the creation and piloting of Citi Token Services for cash management and trade finance. The service, which uses DLT and smart contract technology, is supposed to deliver digital asset solutions for a broad range of institutional clients.

In the coming years, DLT technology may also have a revolutionizing impact on still prevalent correspondent banking. JPMorgan for example is currently planning- to launch a DLT-based deposit token and further created a platform for tokenized collateral management (TCN) and other use cases around tokenization.

Decentralized finance (DeFi): DeFi has created new possibilities for peer-to-peer (P2P) lending and borrowing, enabling users regardless of their location or financial status to access financial services which were previously only available through traditional banking institutions. DeFi borrowers are provided with a wide range of lending models, including decentralized exchanges (DEXs), which provide smart contracts to cryptocurrency traders, enabling direct transactions without an intermediary or a custodian, and automated market makers (AMMs), which facilitate trading in crypto assets. This trend will be further explored in chapter IV d.

Tokenization: Tokenization is a transformative process within the realm of blockchain technology that converts rights to an asset into a digital token. This digitization of assets, including traditional assets like real estate or new assets like Bitcoin,

has the potential to disrupt the asset management industry significantly. For asset managers, tokenization offers several key benefits:

- Increased Liquidity: Tokenization can convert traditionally illiquid assets, such as real estate or artwork, into tradable forms. The fractional ownership made possible by tokenization allows these assets to be made available to a larger number of investors, enhancing liquidity.

- Access to New Markets and Diversification: Tokenization provides an entry point for asset managers into new digital asset markets. These digital assets can provide diversification for an investment portfolio, introducing assets classes with different risk and return characteristics.

- Cost and Efficiency: By removing some intermediaries and allowing for easier reconciliation, processes are streamlined, making transactions quicker and more cost-efficient.

- Greater Transparency and Security: As each transaction is recorded on a blockchain, transparency is enhanced, reducing the potential for fraud while improving audit trails.

- Democratized Investment: Tokenization can lower the barrier to investment in certain asset classes. Fractional ownership allows smaller investors to gain exposure to assets that may be traditionally limited to high-net-worth individuals or institutional investors.

REGULATORY DEVELOPMENTS IN THE US

In the US, there is an on-going friction between the Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC) regarding the responsibility concerning jurisdiction over digital assets. On June 6th, SEC sued Coinbase for violating securities law as it was allegedly disregarding the regulatory structures and evading the disclosure requirements of US securities law.

However, not all stakeholders agree with the SEC approach. In July 2022, Coinbase filed a petition against SEC requesting clear rules related to the regulation of securities that are offered and traded via digitally native methods, including potential rules to identify which digital assets are securities. Furthermore, it highlighted that digital assets have the characteristics of commodities. The CFTC is also contesting the SEC's jurisdiction over digital assets. The CFTC has taken the position that Bitcoin and Ether are commodities subject to CFTC jurisdiction and that fund managers investing in digital asset futures contracts, or that use leverage or margin to invest in digital assets, must register with the CFTC.

In this context, in July 2023 the House Financial Services Committee and House Committee on Agriculture voted on the Financial Innovation and Technology for the 21st Century Act (FIT Act), which is considered as a breakthrough piece of legislation for the digital assets market. The FIT Act received vital bipartisan support, while its biggest win is that it is setting boundaries between the SEC and the CFTC, placing commodity digital assets under the Commodities Exchange Act for the first time.

A landmark development was marked by the U.S. District of Columbia Court of Appeals in August 2023 which ruled that the SEC wrongfully rejected to list an exchange-traded fund (ETF) that tracks the price of bitcoin issued by Grayscale Investments. Grayscale applied to convert its over-the-counter Grayscale Bitcoin Trust (GBTC) into an ETF listed on the New York Stock Exchange's Arca market. The application was rejected by the SEC on the basis that the products were not designed to prevent fraudulent and manipulative practices. Although it has approved bitcoin futures ETFs in the past, it did not agree to use the same market manipulation safeguards for GBCT. Grayscale's argument relied on the Chicago Mercantile Exchange's (CME) oversight in the spot market which meets the investors protection criteria. The Court ruled that the SEC failed to explain its different treatment on similar products and how spot market could be riskier for investors. The Grayscale victory paved the way for several firms to file an application for spot Bitcoin ETFs for listing on Nasdaq or CBOE Global Markets.

These applications have been finally approved by SEC on the 11th of January in 2024. Rumors about the approval, had been driving up the Bitcoin price for weeks in advance. The now granted permission marks another milestone in the adoption of crypto assets both for retail and institutional investors. Eleven asset managers got their approval for a Bitcoin Spot ETF and most of them began trading the following day. A spot ETF requires providers to physically store the underlying asset. This led most asset managers, including BlackRock and Vanguard to choose Coinbase as their custodian. Coinbase, as custodian, is now responsible to store and secure the respective number of Bitcoins. Solely Fidelity has decided to store the Bitcoins themselves.

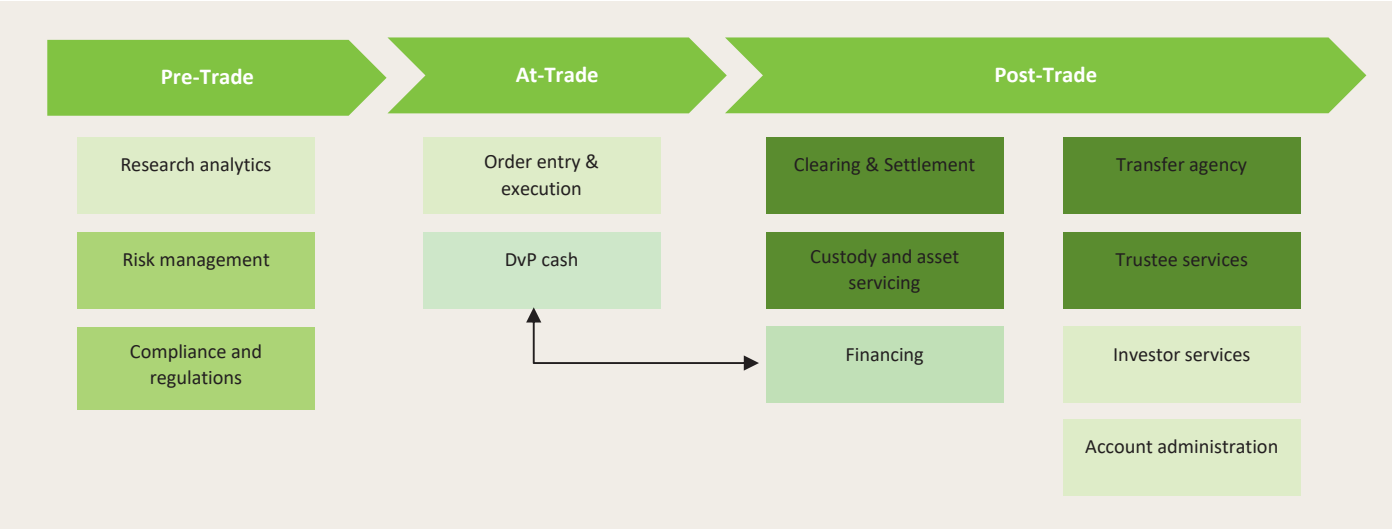


Figure 1: Trade process and ist stages

Chapter IV – Key Use Cases Across the Value Chain

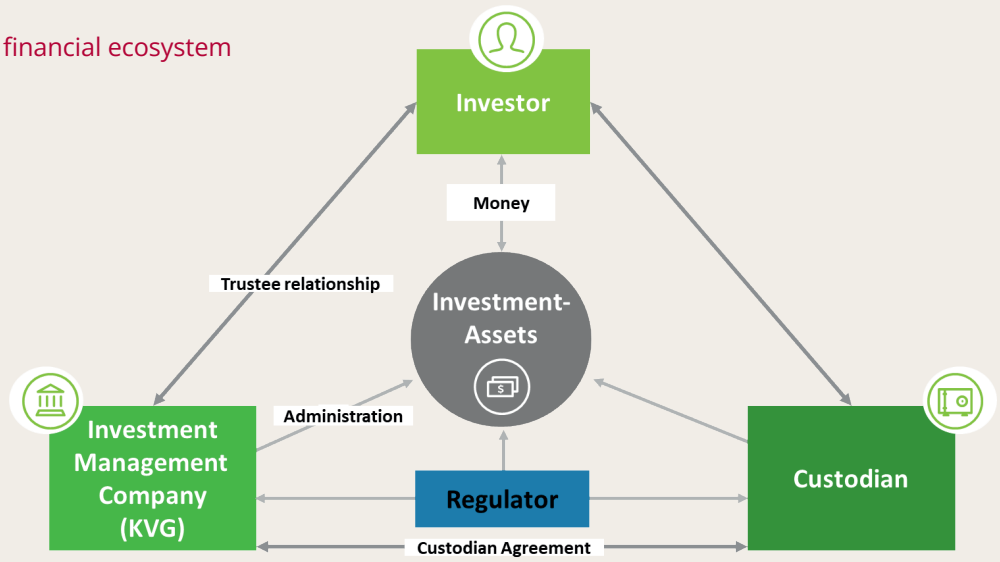
This chapter investigates the use cases of DLT within the value chain. It provides detailed scenarios of how tokenization can be used in various business models to improve the delivery of services in asset management. The chapter examines their use in trade settlements, risk management strategies, and fund administration.

Chapter IV a – Tokenization and investment opportunities

Digital assets are a very recent phenomenon. They can represent traditional or completely new assets. They exist solely in electronic form and are based on cryptographic proof. These assets, while intangible, possess qualities of transparency, programmability, and decentralization, attributes that make them unique and more agile than their traditional counterpart. The potential of digital assets is prognosed to be fundamental. According to a study published by the Boston Consulting Group[1] , the tokenization of illiquid assets could reach 16.1 trillion USD by 2030 which would contribute to the market of tokenized assets (liquid and illiquid) to reach 10% of the global GDP by 2030.

Different services and products across the traditional value chain of the trade process, are impacted differently by Digital Assets. In the process-diagram above darker green-colors

Figure 2: Value chain of financial ecosystem



1 Kumar, S., Suresh, R., Liu, D., Kronfellner, B., & Kaul, A. (2022). Relevance of On-Chain Asset Tokenization in "Crypto Winter". ADDX, BCG.

indicate higher impact by Digital Assets and conversely lighter-green colors show lower impact by Digital Assets. While the Pre-Trade phase and the At-Trade phase are likely to be the least impacted by Digital Assets, the Post-Trade phase is more susceptible to disruption by Digital Assets.

Within financial ecosystems, the value chain is upheld through the interlinking of three predominant actors: Investors, Investment Management Companies (KVGs), and Custodians. Investors allocate their capital to KVGs, permitting them to function as administrators and caretakers of the entrusted funds. In this symbiotic relationship, each actor plays a pivotal role, with Custodians ensuring the secure holding and safety of the assets, KVGs managing and overseeing the investment strategies, and Investors providing the essential capital to fuel the entire operation. Beyond the role of custodians, regulators frequently mandate the inclusion of a Central Securities Depository (CSD) to ensure the secure and efficient handling of securities within the whole financial ecosystem.

Tokenization, the process of converting rights to an asset into a digital token on a DLT, offers a wide range of different benefits in the financial ecosystem. Advantages of tokenizing different assets include enhanced liquidity, fractional ownership, real-time and cost-effective transactions, and access to a wider range of investors, especially tech-savvy investors.

Although there is a wide variety of assets that can be converted into tokens, starting the tokenization process with caution is essential. Selecting which assets to tokenize is the first step. Different asset forms and use cases can be found in the scatterplot below based on their market maturity on the x-axis and their market opportunity on the y-axis.

In addition to the opportunities that emerge from tokenizing traditional assets, investments in cryptocurrencies could have immense potential for asset managers. Cryptocurrencies being an emerging asset class could allow for increased diversification if included in different portfolios, catering to risk appetites and a wide range of investment goals. Additionally, staking could allow for new forms of yield, as most Proof-of-Stake cryptocurrencies offer attractive interest on staking. The growing demand for cryptocurrencies investments to different types of investors has led to the emergence of financial products which enable investments in cryptocurrencies via Exchange-Traded-Products (ETP) or Exchange-Traded-Notes (ETN). They offer investments in cryptocurrencies without exposure to technological risks and the need to develop and setup complex and new infrastructure to cater to this demand.

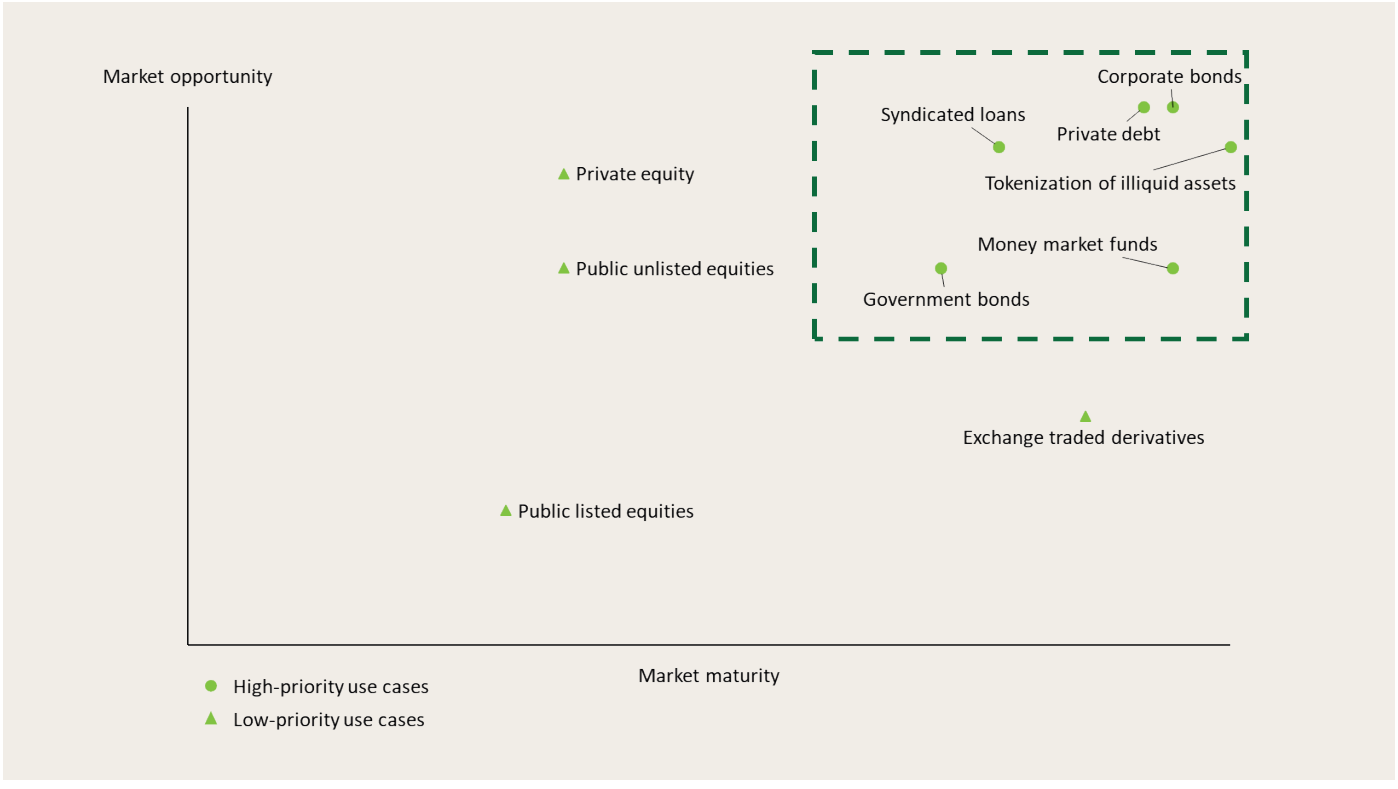


Figure 3: Product tokenization prioritization matrix (excerpt)

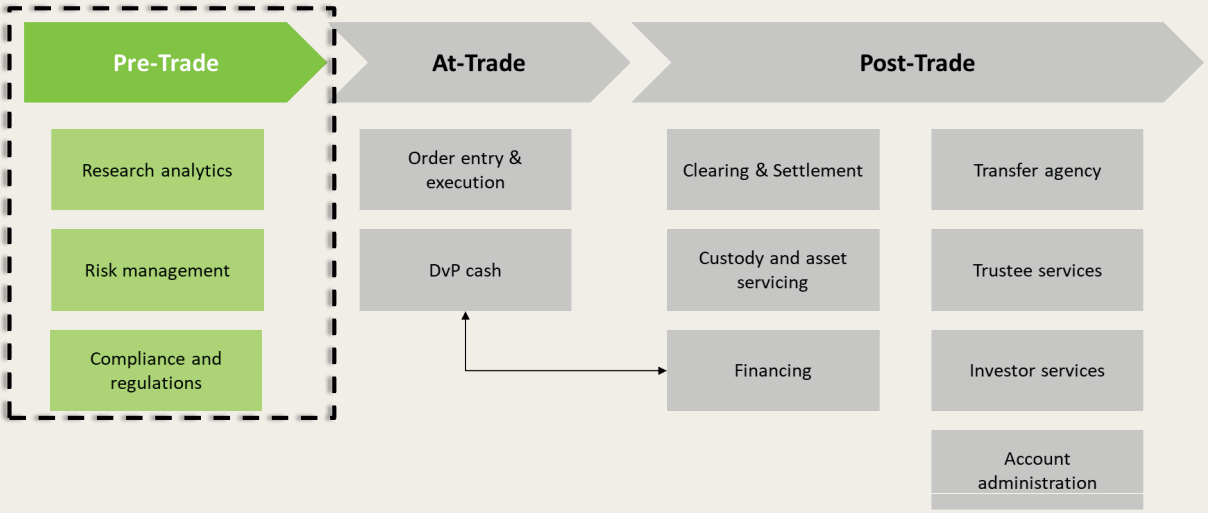


Figure 4: Blockchain Analytics: From raw data to insightful information

governance, but brings other concerns with its energy-intensive Proof-of -Work (PoW) mechanism, contributing to a significant environmental footprint. Some argue that bitcoin mining supports the expansion of renewable energy sources and predominantly utilizes surplus renewable energy. On the other hand, critics suggest that this surplus could be more effectively employed for other purposes, such as hydrogen production. Alternatively, the Proof-of-Stake (PoS) model, used by other cryptocurrencies like Ethereum, offers a more energy-efficient approach, which might have other downsides regarding the governance aspect. To keep things brief, we won't go deeper into these trade-offs here, but they're definitely worth further examination.

The growing buzz of tokenization and cryptocurrency investments, which reflect an integration of innovation with conventional financial structures, are poised to significantly influence the future scene of asset management. The sector's future direction is expected to be determined by the widespread acceptance of tokenized assets, regulatory developments, and the incorporation of sustainable practices. These predicted developments point to an innovative future in which the role of tokenized assets in portfolios is going to increase and play a key role in changing financial ecosystem and traditional investment strategies.

Chapter IV b – Enhanced Transparency and Risk Management – A view on blockchain Analytics

Blockchain analytics is rapidly becoming a crucial aspect of using blockchain technology effectively, particularly in the asset management landscape. By offering an innovative

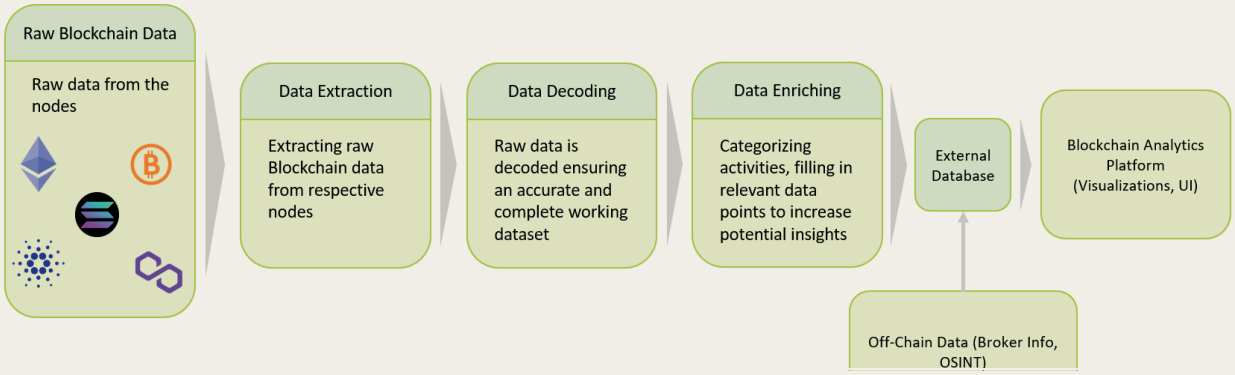


Figure 5: Trade process – focus on pre-trade

approach to research and risk management, blockchain analytics capitalizes on blockchain's transparent and immutable record of transactions. This level of transparency is a significant advantage as it allows real-time transaction monitoring, which can swiftly spot and address potential threats. Furthermore, blockchain analytics extends into predictive insights, analyzing vast and complex transactional data to produce actionable insights. By tracking and recognizing patterns in transactional data, asset managers are better equipped to predict and prepare for market shifts, enhancing their strategic agility. On the other hand, asset managers must adapt to new data providers and emerging information sources, which, at least currently, may be less consolidated than traditional data sources.

Blockchain analytics tools offer advanced capabilities for examining transactional data and shed light on activities that would otherwise remain hidden, such as terrorist financing, money laundering or other unlawful activities. These advanced toolkits can also uncover links between hidden wallets and wallets already under investigation. This not only refines transaction patterns that have already been identified, but also aids in Anti-Money-Laundering (AML) and Anti-Terror-Financing (ATF). From a regulatory perspective, such insights are invaluable to government agencies, as they can ensure tax compliance and detect financial anomalies. In addition, by closely tracking and consolidating transactions of influential market participants - such as asset managers - predictive insights into potential market movements can be gained, providing a strategic advantage. However, these advantages do not come without challenges. Due to the volume of data and the unique characteristics of blockchain data structures, integrating blockchain analytics into existing risk management tools and procedures can be complex. This complexity is compounded as blockchain networks evolve and both the volume of data, the complexity, and the speed of transactions increase. Maintaining data quality and ensuring the security of data on blockchain networks become increasingly difficult tasks.

To address scalability issues, the adoption of solutions like Layer 2 or sharding has been proposed. Layer 2 solutions function often use a second data storage outside the "main" chain to increase transaction capacity, while sharding partitions the network to process transactions more efficiently. While these solutions can dramatically improve scalability and transaction speeds, they present their own challenges, including potential security vulnerabilities, decentralization issues, and added complexity. It also makes blockchain analytics more complex as the data can be more distributed and less accessible.

In conclusion, blockchain analytics offers significant advantages in terms of risk management, strategic decision-making, and improving transparency. However, recognizing and addressing potential pitfalls is critical to effectively harness the potential of blockchain analytics. As blockchain technology continues to evolve and mature, the need for advanced analytics and risk management tools will only grow, necessitating continuous evaluation and adaptation of analytics strategies and tools.

Chapter IV c – Trade settlement / reconciliation

The integration of tokenization and tokenized assets could potentially fundamentally change integral processes like trade settlement and fund administration. But like all shifts, this transition presents both opportunities and challenges. Stakeholders, ranging from fund managers to portfolio administrators, now find themselves navigating a terrain that merges traditional practices with digital innovation. Shifts towards T+1 settlement cycles compared to the current T+2 settlement cycle by regulators could further drive the adoption of DLT for trade processing as it could provide the necessary technological capabilities to enable these shorter settlement cycles. This chapter aims to provide an overview of these tokenized systems. First, we want to start with three exemplary processes and explain what they are about and what the impact of DLT could be.

Trade settlement, at its core, is the culmination of a transaction where the final transfer of securities and funds occurs between parties. It's the bridge that transforms an agreement or intention to buy or sell into an executed transaction. In a traditional environment, this process involves multiple intermediaries and is processed within T+2 (i.e., two business days). Some regulators can be even seen enforcing T+1 settlement. The use of DLT aims to compress this timeframe significantly. But why? The shorter the settlement time, the lower the risk – both in terms of counterparty default and market fluctuations. Blockchain-enabled atomic Delivery-versus-Payment could reduce current counterparty risk even further.

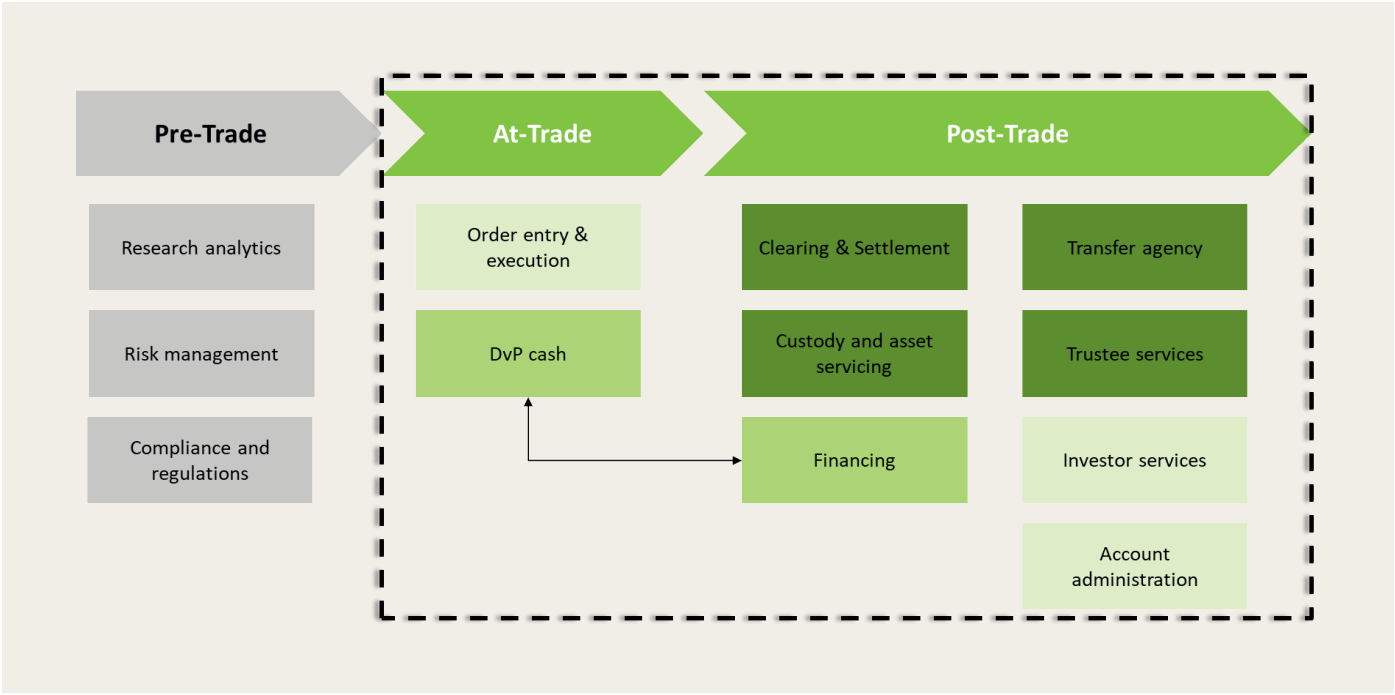


Figure 6: Trade process – focus on the at-trade and post-trade stages.

Reconciliation is the act of ensuring that two sets of records (usually the balances of two accounts) match. It is a standard process, for instance, to align the records of KVG, CSD and Custodian, thus proving an essential risk management tool in traditional asset management. It acts as a safeguard against discrepancies that could arise from human errors, system glitches, or fraudulent activities. With DLT technology, the reconciliation process can be automated and streamlined for all participants, thanks to the transparent and immutable nature of a blockchain's ledger recordings.

Tokenized fund administration refers either to the management of funds that are represented digitally as tokens on a blockchain or to the management of a fund that itself is tokenized. The primary advantage of tokenization in fund administration in both ways lies in the ability to simplify complex processes, reduce costs, and offer unparalleled transparency. But, as with all innovations, understanding the infrastructure, its potential, and limitations is paramount.

The integration of tokenization within the financial sector represents a transformative shift, offering profound operational efficiencies and strategic advantages. This section will detail the mechanics, benefits, and driving forces behind tokenized trade settlements and the streamlining of reconciliation processes.

Tokenized Trade/ Settlement Mechanism: Through tokenization, assets and their ownership rights are digitally represented as tokens within blockchain platforms. Enabled by smart contracts, these tokens can be efficiently transferred between parties following a trade agreement, thereby minimizing the traditional dependency on intermediaries and associated time lags.

KEY BENEFITS:

- Speed & Efficiency: Settlement periods, which traditionally span days, are notably shortened, leading to reduced operational costs by eliminating extended administrative overheads and minimizing intermediary fees.

- Security & Trust: Real-time settlements largely mitigate counterparty risks. Further, the atomic Delivery-versus-Payment feature ensures that asset transfers and payments are executed simultaneously, enhancing the security framework of trades.

- Streamlined Reconciliation: Tokenization, underpinned by blockchain's transparent ledger system, provides a unified and immutable record. This reduces discrepancies that arise in systems where individual parties maintain separate records, making reconciliation more straightforward and reliable.

The advent of tokenization in the financial sector necessitates a reevaluation of roles and responsibilities within fund administration. The integration of decentralized technologies introduces both complexities and efficiencies, prompting a recalibration of how various stakeholders operate.

This chapter sheds light on how tokenization impacts the fundamental pillars of fund administration.

In a tokenized environment, **fund managers** are tasked with the oversight of portfolios that consist of digital assets. This includes:

- Asset Selection and Allocation: Just as with traditional assets, managers must evaluate the potential returns and risks of tokenized assets, taking into consideration their liquidity, market sentiment, and regulatory landscape.
- Performance Monitoring: Utilizing blockchain analytics tools and platforms designed for digital assets, fund managers can track real-time performance and adjust strategies accordingly. NVAs could potentially be calculated 24/7 challenging the current cut-off-oriented settlement processes.
- Communication: Engaging with investors becomes even more vital, requiring transparent communication about the nuances and unique attributes of tokenized assets.
- Increased Transparency: As changes and the performance of portfolio can potentially be tracked in real-time the way of communicating with investor and regulators could also significantly change.
- For **investors**, tokenized fund administration presents both opportunities and learning curves:
- Access and Liquidity: Tokenized assets often offer increased accessibility and potential liquidity due to fractional ownership and 24/7 markets.
- Due Diligence: The digital nature of these assets means investors need to be educated about the underlying technology, the security of their investments, and the implications of blockchain's transparency.
- Diversification: With a wider array of assets becoming tokenizable, investors can explore alternative investment avenues that were previously hard to access or illiquid.

Also, the role of **custodians** evolves significantly:

- Digital Asset Security: Custodians need to specialize in cryptographic security measures, multi-signature wallets, and cold storage solutions to safeguard digital assets.
- Transaction Verification: Leveraging blockchain's transparency, custodians can verify asset transfers in real-time, ensuring assets' integrity.
- Regulatory Compliance: With regulations for digital assets continually evolving, custodians must stay updated and ensure all holdings and transactions comply with local and international laws.
- To summarize, the incorporation of tokenization in fund administration redefines the roles and responsibilities of key stakeholders along the triangle of trust. While the realm of digital assets presents immense potential, it also demands a thorough understanding and adaptation of traditional roles to harness its full benefits.

The promise of tokenization, particularly in terms of efficiency, transparency, and accessibility, is significant. It has the potential to streamline processes, reduce operational costs, and broaden the scope of tradable assets. However, these advantages come hand-in-hand with new challenges, primarily related to security, regulatory compliance, and integration with existing systems.

While the benefits of tokenized systems are clear, the importance of a structured and informed approach to their implementation cannot be overstated. This means robust IT infrastructure, comprehensive staff training, and close collaboration with regulatory bodies and other industry stakeholders.

Chapter IV d - DeFi: Opportunities for Asset Managers

Within the realm of Decentralized Finance (DeFi), smart contracts have emerged as a key foundational element, driving a multitude of services and functions. These automatically executing contracts have spurred innovation in how financial products are designed and traded digitally and decentrally, thereby offering a unique set of opportunities for generating yield. Until recently, DeFi has been primarily propelled by individual participants and developers. However, an increasing number of institutional players are showing interest, particularly in a more controlled version known as permissioned DeFi. One of the main differentiators of permissioned DeFi is that all participants are KYC/KYB verified and AML compliant. While the automated and decentralized nature of DeFi may pose challenges to traditional asset managers, it also uncovers potential pathways for growth in an increasingly digital financial landscape. By transferring their established expertise in risk management, regulatory compliance, and product development into the blockchain ecosystem, and exploring yield-generating strategies like staking, asset managers can enhance their risk-return profiles. As the DeFi sector evolves, institution driven permissioned DeFi could emerge as a significant trend that asset managers should closely monitor due to its potential to impact the future landscape of asset management profoundly. Keeping a pulse on this trend is essential as it presents both potential opportunities and risks for asset managers looking ahead. This chapter therefore aim at explaining some key concepts and protocols from the DeFi world, that could offer opportunities for asset managers in the near future.

YIELD FARMING (INVESTMENT OPPORTUNITIES)

Yield Farming refers to strategies in DeFi that aim to optimize returns on investments, including activities like lending, borrowing, staking, and liquidity mining. Beyond these methods, it often involves tactically moving capital between protocols to maximize yield. Protocols which allow users to generate any kind of yield are referred to as "yield generators".

Liquidity Provision (Market Making): Central to DeFi platforms are liquidity pools, repositories of tokens stored in smart contracts, accessible for lending or borrowing. By participating as a liquidity provider, users deposit pairs of tokens, helping to ensure smooth transactions on the platform. In return, they earn fees based on the trading activity of that pool. There are multiple types of liquidity pools tailored to specific use cases, e.g.:

- Automated Market Makers (AMMs): Instead of using an order book like traditional exchanges, AMMs allow users to trade against a liquidity pool. These pools are filled by liquidity providers who deposit a balance of two tokens.

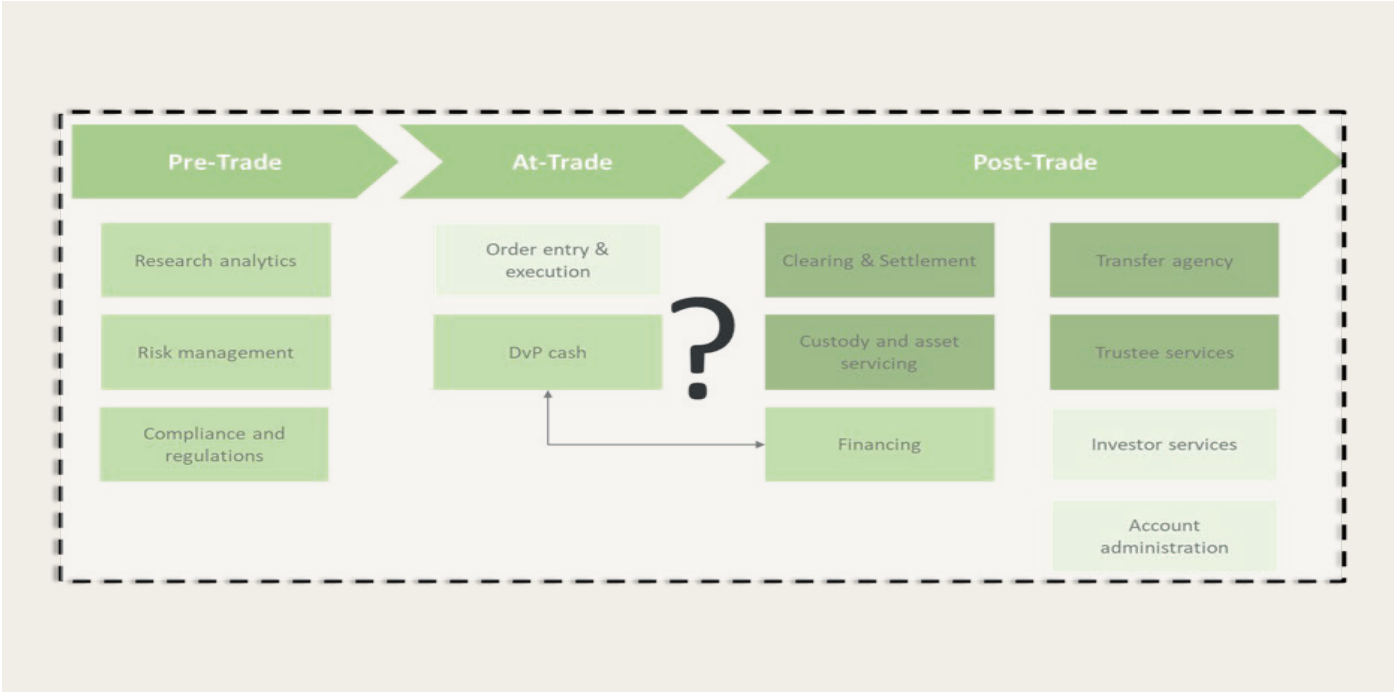


Figure 7: Trade process – what impact will DeFi have?

- Lending Pools: These pools allow users to earn interest by depositing their assets. Borrowers can take loans from these pools.

Liquidity Mining (Dividend Reinvestment): Closely aligned with liquidity provision, liquidity mining offers an added incentive. Users still provide liquidity, but they receive additional tokens as rewards, typically the platform's native token. This strategy not only rewards providers but also fortifies the platform with enhanced capital and stability. The rewarded tokens can either be sold for additional yield or utilized to participate in protocol governance, like shareholders, although the extent of participation rights acquired through native tokens varies across different protocols.

Staking (Fixed Income Investing): This is the act of users locking up a sum of a particular cryptocurrency to assist in various blockchain operations. The rewards are usually in the form of additional cryptocurrency tokens. Many PoS-based cryptocurrencies, notably Ethereum, use staking for network security. Established players like Börse Stuttgart Digital Exchange have embraced this DeFi aspect and with entities like Munich Re offering slashing insurance, risks associated with staking are being mitigated, further integrating DeFi with traditional finance.

Liquid Staking (Securitization): An advanced form of staking, this allows stakers to maintain liquidity by receiving a tokenized representation of their staked assets. This ensures they can still engage in other financial activities without removing their staked assets, merging the benefits of liquidity and staking. However, it poses risks like potential price discounts if staked assets are less valued during market preferences for liquid assets or due to protocol bugs or hacks causing asset losses, as evidenced in past incidents within the DeFi space.

Synthetics (Derivatives Trading): Synthetics is a system that facilitates the creation of on-chain synthetic assets, termed „synths." These synths offer tokenized representations of a wide variety of real-world assets, from fiat currencies to commodities, equities, and stocks. Importantly, this framework allows users to gain on-chain exposure to the price movements of their selected assets, providing a mechanism to participate in asset values without the need for direct ownership. The most widely adopted DeFi protocol in the realm of synthetic assets is "Synthetix".

YIELD AGGREGATORS (AUTOMATED INVESTMENT STRATEGIES)

Yield aggregators are platforms designed to automatically maximize users' returns from various yield-generating protocols, such as borrowing, liquidity provision, staking, and more, ensuring the most optimized and efficient yield farming experience. By automating the process of identifying and shifting assets towards the most favorable returns, they present an efficient and convenient way for users to maximize profits.

Yearn Finance is one of the leading protocols in that realm. A key element of the protocol is Yearn's ‚Vaults', which can be visualized as adaptive pools of funds. Users can deposit into those pools and assets within these Vaults are smartly allocated between different DeFi applications based on strategies that continuously adjust to market conditions, such as changing returns, ensuring a consistently optimized performance.

Strategies employed by Yearn are a blend of pre-defined logic and adaptive mechanisms. Some can be complex, using leverage, integrating multiple steps, or interacting with various protocols to enhance returns. Each strategy is assigned a risk score based on multiple risk metrics, offering users a transparent view into the balance between potential rewards and associated risks.

ASSET MANAGEMENT PROTOCOLS

Asset Management Protocols, such as Enzyme and Spool, represent a next-generation approach to managing and optimizing assets within the blockchain ecosystem. These platforms bridge the gap between traditional asset management methods and the innovative functionalities of blockchain.

Asset Management Protocols often use the "vault" concept. However, these vaults serve a different purpose compared to yield aggregators. In platforms like Yearn, vaults are typically tools for executing predefined automated strategies. Yet, in Asset Management Protocols, vault's function more like portfolios actively managed by a vault manager. User can deposit their funds into those vaults to make profit based on the vault managers strategy.

Vault managers can use a variety of strategies and DeFi applications to maximize the return for their vault: they can

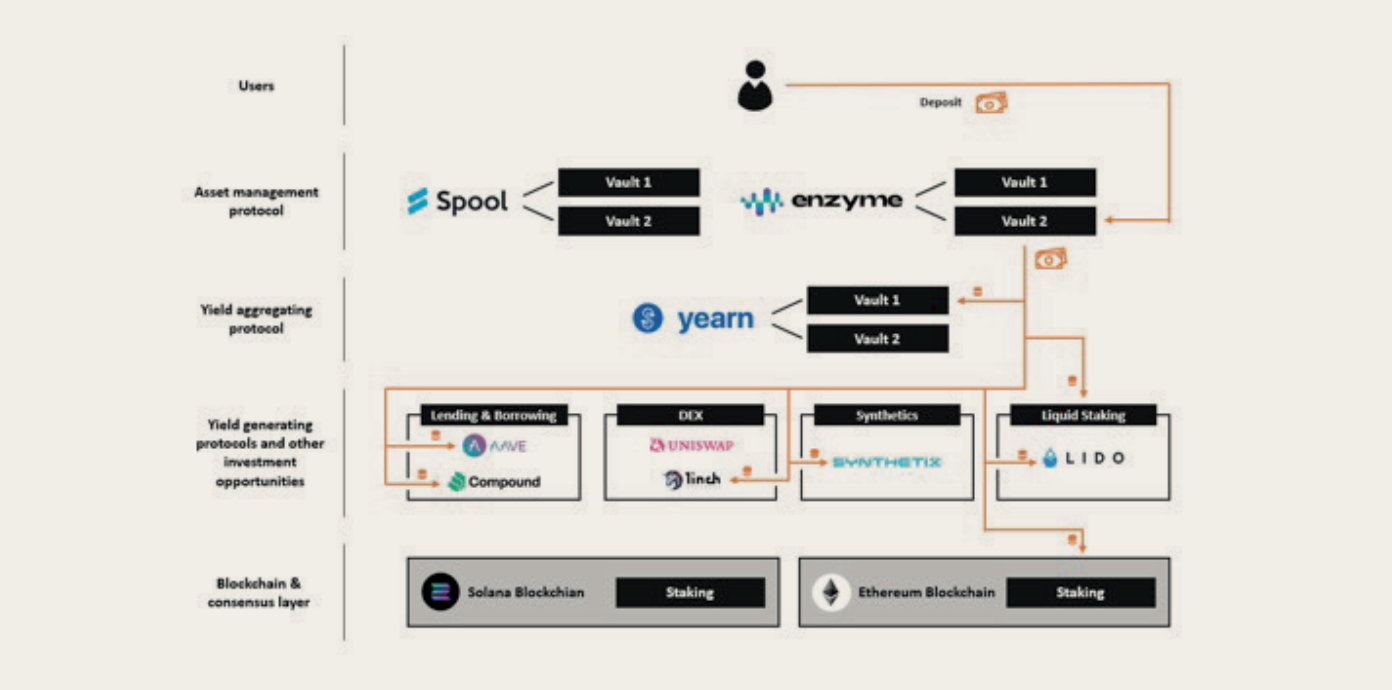


Figure 8: Overview of asset management protocols in DeFi

engage in yield farming, participate in staking protocols to earn rewards, facilitate lending and borrowing operations, create and trade synthetic assets and derivatives, swap assets on decentralized exchanges, deposit into vaults in yield aggregating protocols and contribute to liquidity pools to earn fees. They can also use bots for specific tasks, such as arbitrage, to exploit price differences and even create and manage their unique indices.

A vault manager possesses the authority to set fees in various forms, ranging from management and performance fees to entrance and exit fees. They can design rules specifying who can invest in the vault, under

which terms, like setting minimum investment amounts. This includes the discretion to decide who can invest in their vaults. With the built-in accounting tools, investors are provided real-time insights into the vault's performance. Meanwhile, the manager can utilize risk management tools to ensure the vault operates within defined risk parameters.

Innovative platforms like Spool are constantly emerging, with Spool notably offering a comprehensive asset management solution with built-in functionalities, e.g. whitelisting for KYC, and enough flexibility to potentially enable the development of MiCAR & MiFID II compliant products.

Chapter V – Case Study (Tokenization of Fund Shares by Bankhaus Metzler)

This chapter will delve into a practical application of DLT and tokenization in the asset management industry through a detailed case study. Bankhaus Metzler will explain the process, challenges, and outcomes experienced as they pioneered the issuance of tokenized fund shares in Germany. This case study will exemplify the real-world impact of DLT on traditional asset management operations.

TOKENIZATION OF FUND SHARES

Tokenization of fund shares: a topic that is increasingly discussed in the fund industry. There are different opinions circulating about the added value of digitally representing the fund wrapper. In this article, we would like to delve into the topic in more detail and report on our pilot project, which involved tokenizing Germany's first fund share.

The BaFin's definition of tokenization is as follows: „the digital representation of an (asset) value, including the rights and obligations contained therein, and its thereby enabled transferability." [2]

2 https://www.bafin.de/SharedDocs/Veroeffentlichungen/DE/Fachartikel/2019/fa_bj_1904_Tokenisierung.html

In simple terms, one can say that values are digitally mapped through tokenization. Implementation typically takes place on the blockchain, an immutable digital database that only allows the addition of new information. To represent assets on a blockchain, so-called tokens are issued. Each of these tokens represents a specific share of the corresponding value. This usually involves the creation of a contract (a so-called smart contract) that defines the rights and obligations associated with a token. The transfer of these tokens to another party can take place entirely on the blockchain, thus transferring all rights and obligations from the contract as well. Tokenization enables the fully digital transferability of assets. Once an asset becomes transferable and is largely standardized, it is classified by BaFin as a security in a regulatory sense. These tokenized assets are therefore also referred to as digital securities. From a legal perspective, they are treated differently than cryptocurrencies like Bitcoin, which also utilize blockchain technology.

Fund shares can also be tokenized. The fund shares are digitized and converted into tokens, which are represented on a blockchain platform. Additionally, a so-called smart contract is created—a digital contract that includes the terms of the prospectus and automates the conditions for trading the tokenized fund shares and verifies them.

This creates so-called "crypto fund shares". The name can be somewhat misleading. The term „crypto" might lead one to assume that cryptocurrencies are included in the allocation, which is incorrect. In this context, the term „crypto" merely refers to the issuance being conducted on a blockchain-based infrastructure.

The issuance of these crypto fund shares is made possible by the Regulation on Crypto Fund Shares (Kryptofondsanteilsverordnung – KryptoFAV), which came into effect in June 2022 and sets forth the relevant requirements.

Previously, the Electronic Securities Act (elektronische Wertpapiergesetz - eWpG), which came into effect in June 2021, first enabled the issuance of crypto securities. These two laws, together with the provisions of the Capital Investment Code (Kapitalanlagegesetzbuch – KAGB), form the regulatory framework for the issuance of crypto fund shares.

BENEFITS OF TOKENIZED FUND SHARES

But why should one issue crypto fund shares at all? What are the advantages associated with this innovation?

From a business perspective, an innovation must either reduce costs or generate revenue. Therefore, we pose two questions:

1. Can the digitized representation of funds lead to cost reductions?

2. Do tokenized fund shares open up new sources of revenue?

Let's first focus on the cost aspect and take a look at the current situation:

Examining the current state of the fund industry highlights the issues and cost drivers in the current process chain. In fund processing, numerous intermediaries are involved (see figure 9). This leads to a high number of interfaces and coordination requirements. Additionally, there is a lack of a unified data foundation, which reduces automation and digitization potential and results in significant coordination efforts. The outcome is high costs and long processing times, which in practice can result in settlement times of up to T+4 in some cases.

This situation also contributes to the fact that fund distribution remains relatively non-innovative and digitally underdeveloped. These characteristics do not meet the needs of younger generations.

As part of the tokenization of fund shares, smart contracts are utilized, which are digital, self-executing contracts based on blockchain technology. They enable the automated representation, execution, and verification of processes, leveraging the data tamper-proof security benefits of blockchain. They are automatically activated when specific conditions are met.

The use of such smart contracts in conjunction with a digitally represented product, the tokenized fund share, can significantly reduce coordination efforts in the process chain and thus achieve efficiency gains. Tokenizing the fund wrapper is the first step that paves the way for the incremental digitization of the entire value chain (see figure 10)[3]:

3 Source: Volker Braunberger: Tokenisierung von Investmentfonds: Unnötiges „Technikzeugs" oder (Über-) Lebensversicherung für die Fondsindustrie? „https://academy.bsdex.de/tokenisierung-von-investmentfondsunnoetiges-technikzeugs-oder-ueber-lebensversicherung-fuer-die-fondsindustrie"

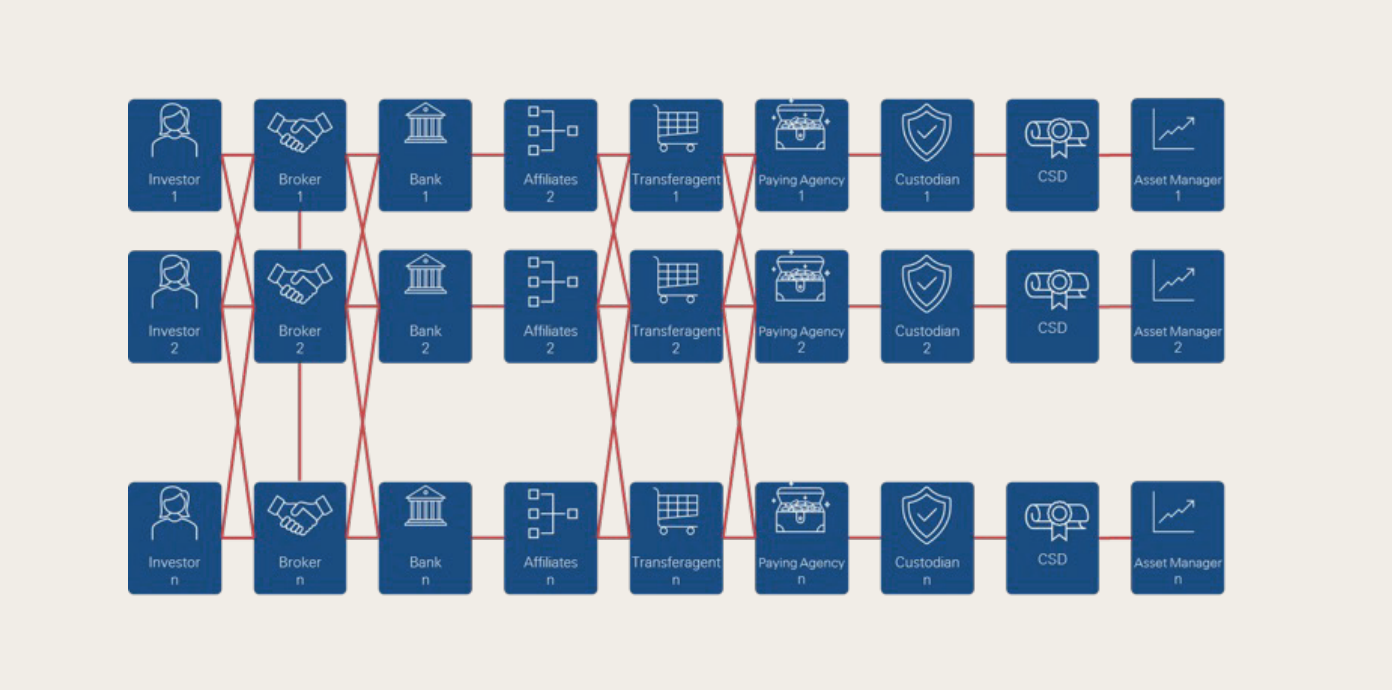


Figure 9: Illustrative status quo of the fund industry

According to this, tokenization can yield efficiency advantages and sustainably reduce costs, which could be of particular interest to institutional investors given the growing cost pressure in the industry.

But does it also enable new revenue sources?

Currently, in fund distribution, two paths are known: the raditional OTC distribution channels through distribution partners and distribution through exchanges (in the case of ETFs).

In the tokenization of fund shares, share certificates are digitally registered and maintained on a DLT-based share register. This replaces securitization within the global certificate. The tokenized fund shares are thus fully dematerialized and can be transferred via DLT. In this context, one can refer to so-called Blockchain-Traded Funds (BTFs)[4] – funds that provide another distribution option. Because the resulting tokens can, from a technical standpoint, be traded on any blockchain-based platform that meets the technical standards. Any custody structures are technically not required.

Especially in relation to the next generation, which operates in a significantly more digital manner and is highly receptive to token-based investments, this distribution channel can be very attractive. With retail investors, the demand for funds will shift to independent investment platforms (e.g., crypto exchanges or exchanges for digital assets), thereby opening up an entirely new distribution channel for the fund industry – globally! These platforms will significantly streamline BTF trading for investors, without involving intermediaries such as banks, brokers, and exchanges, which will ultimately lead to cost reductions.

Additionally, studies show that the acceptance of digital assets is increasing. In the medium term, a portfolio allocation of 5.6% by institutional investors and 8.6% by HNW investors in tokenized assets is projected by 2026.[5] Long-term forecasts suggest that by 2030, 10% of all assets will be tokenized.[6]

Therefore, new revenue sources through new distribution channels are also conceivable, which can be exploited in the future.

The above-described advantages have prompted us to delve deeper into the topic and gain initial practical experience as part of a Proof of Concept (PoC).

PILOT PROJECT: TOKENIZATION OF FUND SHARES AT BANKHAUS METZLER

In 2022, we extensively delved into the theory. In collaboration with fundsonchain GmbH, we conducted initial transactions within the scope of a Proof of Concept (PoC) in a test

5 https://assets.ey.com/content/dam/ey-sites/ey-com/en_us/topics/financial-services/ey-driving-meaningful-opportunity-tokenization-in-asset-management.pdf?download

6 https://icg.citi.com/icghome/what-we-think/citigps/insights/money-tokens-and-games

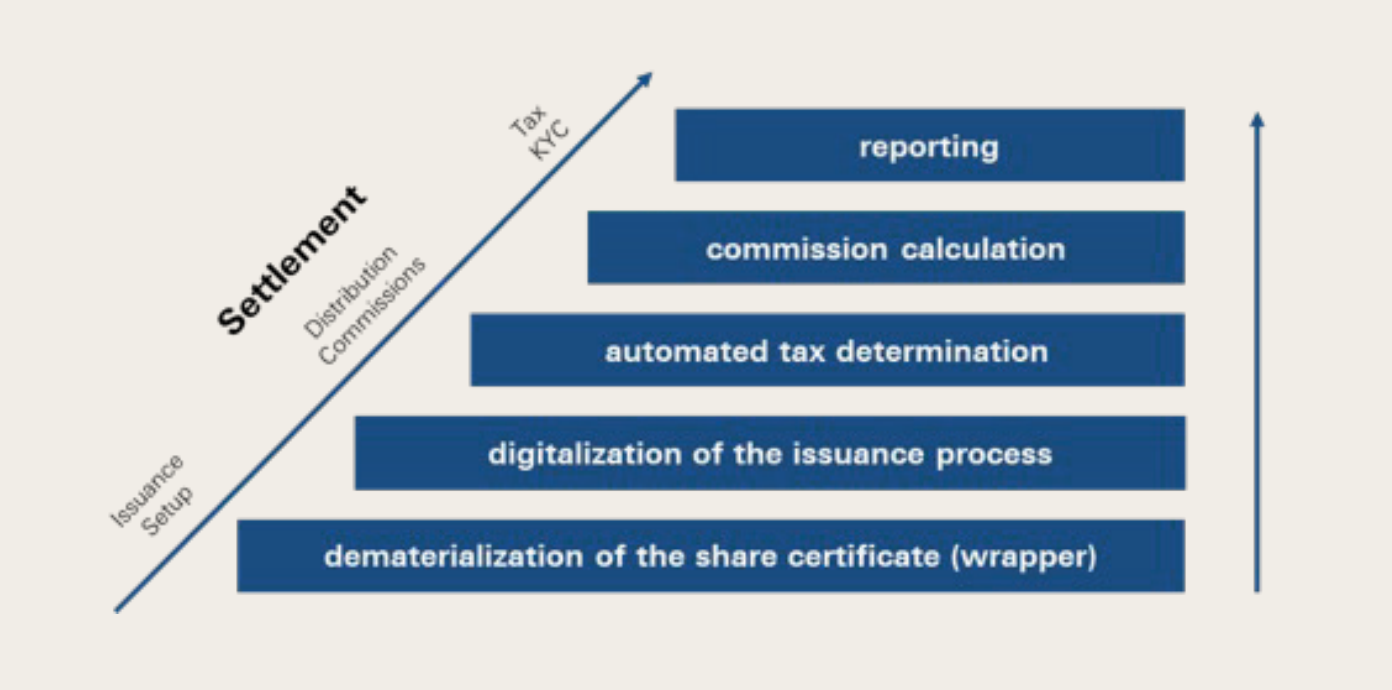


Figure 10: Incremental digitalization of the investment fund lifecycle through tokenization

environment. The insights gained helped us identify where efficiency gains could be achieved through tokenization in the future. Another advantage was that the PoC provided a significant amount of education to a broad base of employees who deal with the fund lifecycle on a daily basis. Any apprehensions about the technology were dispelled. The employees, all experts in their respective fields, were able to gain a good understanding of the potential processes and were introduced to the topic. At the end of the project, all parties involved were of the opinion that embarking on the journey was necessary, even though the destination was not yet 100% clear.

This prompted us to move to the next stage and conduct tokenization within the scope of a time-limited pilot project in the live environment to gain further insights.

For this purpose, we created a new share class for the Metzler Global Growth Sustainability Fund, which was tokenized using blockchain technology. This represents a groundbreaking development in the asset management industry, as Metzler Asset Management became the first and so far only German institution to issue crypto fund shares in accordance with the KryptoFAV and eWpG regulations. Each token represents ownership of the fund share and enables it to be easily and almost real-time traded, transferred, and managed.

The successful implementation of the pilot project is overseen by Metzler Asset Management GmbH (MAM) as the Capital Management Company (KVG). Bankhaus Metzler as the custodian. Cashlink GmbH and fundsonchain GmbH handle these transactions within their strategic partnership and jointly act as a regulated one-stop-shop for MAM. The platform provider fundsonchain takes care of the end-to-end technological processing of the tokenized fund shares, and Cashlink serves as the crypto securities registrar.

As part of the pilot project, various types and volumes of transactions were executed and settled. Bankhaus Metzler serves as an investor in Stage 1 of the pilot project to gain the customer's perspective and learn from it.

In Stage 2 of the pilot project, we opened the tokenized fund share for external investments through Union Investment. In October 2023, Union Investment successfully completed the first subscription of the tokenized fund share and integrated it into its own umbrella fund. The asset management company utilized Metzler's existing project architecture for this purpose.

With the smooth execution, external crypto fund shares were acquired for the first time in Germany. This marks another significant milestone on the path to introducing blockchain solutions in asset management. With the addition of the new partner, Union Investment, and the associated project partners (DZ Bank as custodian bank and Attrax S.A as fund platform), Metzler has elevated its initially primarily internal blockchain project to a new level.

The pilot project has provided us with valuable insights. We involved departments from the front, middle, and back office, all of which gained practical experience. This allowed for a much better comparison between processes in the old world and the new world. It became apparent where potential efficiency gains can be realized and also where potential pitfalls exist. It must be mentioned that the efficiency gains and distribution channels described above can only be achieved with a high level of market adoption and a high degree of infrastructure maturity. This requires substantial investments by many market participants in technology, the maturity of technical platforms, and process transformation. Additionally, the monetary side (mentioning CBDCs) needs to move on the same infrastructure tracks as the asset side (tokenized fund share) to maximize the benefits. In the short term, no significant advantages will be apparent. However, in the long term, we are convinced that blockchain will profoundly change asset management. Therefore, we believe it is crucial for the industry to thoroughly engage with the topic of tokenized fund shares and create the appropriate infrastructure for it.

Chapter VI – Recommendations for Asset Managers

This section will consolidate the insights gathered throughout the paper into a set of actionable recommendations for asset managers. This includes maintaining regulatory compliance, managing operational risks, staying updated on market and liquidity positions, ensuring cybersecurity and data protection, and educating investors about digital assets. These recommendations provide a roadmap for asset managers to successfully navigate the upheaval posed by DLT and digital assets.

Integrating digital assets and DLT into the business of asset managers represents a transformative shift in the financial industry. While these innovations offer a plethora of opportunities, they also introduce significant challenges and risks that must be diligently addressed. Here's an in-depth look at how asset managers can mitigate these challenges and risks while successfully integrating digital assets, blockchain, and DLT into their business operations. We would like to emphasize that as regulations evolve, technology adoption increases, and understanding of its implications deepens, the associated risks also shift. Asset Managers need to continually monitor these developments to determine when the opportunity cost of not embracing these fundamental changes surpasses the risks associated with engaging in this technology.

- **Regulatory Compliance**: One of the foremost challenges is navigating the ever-evolving regulatory landscape. Asset managers need to engage regulatory and legal experts specializing in digital asset regulatory frameworks. They should stay informed and updated on local and international regulatory requirements and adapt compliance procedures accordingly. Also, adherence to anti-money laundering and countering terrorism financing (AML/CFT) rules is crucial for maintaining trust and mitigating the financial integrity risks raised by digital assets.

- **Operational Risks**: Operational challenges within a tokenized system can vary from human error to infrastructural vulnerabilities. This spectrum includes the mismanagement of cryptographic keys. Ineffective handling of these keys can lead to significant security breaches, or the irreversible loss of access to digital assets. To mitigate this, implementing robust key management procedures is essential. Measures such as employing multi-signature wallets, which require multiple key approvals, adds a critical level of security. In addition, the use of hierarchical deterministic wallets simplifies key management, allowing the generation of multiple addresses from one seed without compromising security. Balancing access against stringent security is also crucial - cold storage solutions provide a secure, offline location for most assets, while hot wallets cater to immediate transactional needs. Regular training and updating of procedures can ensure staff are well-versed in key management, mitigating the risk of human error.

- **Scalability and Performance**: The scalability and performance of the blockchain or DLT network supporting digital assets should be closely monitored. Asset managers need to continuously evaluate the performance of these networks and consider alternatives or optimizations when necessary. Diversifying digital asset holdings across different networks can help reduce the risk of network congestion and performance issues.

- **Market and Liquidity Management**: Some tokenized assets could face liquidity challenges, especially in emerging or specialized markets. Also, tokenized markets' nascent status may make them prone to price manipulations and unforeseen volatility. To manage these risks, diversifying digital asset holdings across different networks and establishing clear procedures for asset liquidation in exigencies is an effective strategy. Staying informed about market conditions affecting liquidity is crucial for making informed decisions.

- **Counterparty Risk**: The potential default or insolvency risk of a third-party service provider in the tokenization process, such as a crypto exchange or a wallet service provider, constitutes a significant counterparty risk. Mitigating this involves thoroughly vetting and continuous monitoring of third-party service providers.

Additionally, the use of smart contracts or escrow services can reduce counterparty risk by ensuring simultaneous exchange of assets and payments.

- **Investor Education and Communication**: Considering the relative novelty of tokenized systems, investors and stakeholders may lack sufficient understanding of these assets and their associated risks. To counter this, asset managers should follow a robust communication strategy with investors. This could include dedicated educational initiatives and frequent interactions to ensure that investors are accurately informed and well-equipped for informed decision making related to digital assets.

- **Continuous Monitoring and Reporting**: Real-time monitoring of digital asset portfolios is essential to identify anomalies or security breaches promptly. Asset managers should provide regular and transparent reporting to clients on the performance and risk metrics of their digital asset investments. Complying with industry best practices for reporting and disclosures is crucial, and asset managers should be prepared to adapt reporting standards as the industry evolves.

- **Cybersecurity and Data Protection**: The digital nature of tokenized systems makes them susceptible to cybersecurity threats, including hacking and data breaches. Robust cybersecurity measures, including encryption and multi-factor authentication, are essential for mitigating these risks. Regular security audits and penetration testing can further strengthen the systems by identifying and addressing potential vulnerabilities promptly.

In conclusion, integrating digital assets, blockchain, and DLT into asset manager's business operations are a profound transformation that comes with challenges and risks. However, with careful planning, ongoing education, robust risk mitigation strategies, and compliance with evolving regulations, asset managers can navigate these challenges and reap the benefits of this technology while providing added value to their clients. Success in this new era of digital asset management requires adaptability, security, and a commitment to transparency and compliance.

Chapter VII – Conclusion

In conclusion, the emergence and adoption of DLT and digital assets are expected to influence the asset management industry significantly. These technologies offer opportunities including improved process efficiency and transparency, and the ability to diversify offerings. However, their integration should be a calibrated process, as it comes with its unique set of challenges. Navigating through the complexity of regulatory environments, ensuring robust security measures, educating investors, and managing the scalability of these technologies are among the critical tasks at hand. A holistic understanding of technological advancements coupled with sound risk management is essential for a successful transition. This change requires more than just embracing new technologies. It calls for a thorough evaluation of their implications, benefits, and potential risks. As the industry evolves to incorporate these advancements, it should do so responsibly, with due respect to established financial management principles while seeking innovation. The future of asset management witnessing the convergence of traditional finance and digital assets remains a strong possibility. Hence, readiness to embrace these changes without compromising on the fundamental tenets of asset management would likely serve industry professionals well. As we move forward, asset managers are encouraged to stay vigilant, be open to continuous learning, and cautiously welcome technological adjustments – all while keeping their clients' needs at the forefront. With a balanced approach, the industry can step into an era where traditional asset management meets digital innovation, offering the potential for a more efficient, transparent, and diverse financial landscape.

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