



The Rise of Digital Asset Registers in the Global Economy

The transformative potential to democratize access to financial markets and digital assets.

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Foreword

In today's world, innovation moves rapidly, including changing how governments, individuals and companies interact with new technology and its applications. Decentralized ledger technology (DLT) or blockchain offers immutability, transparency, and traceability to help solve some of the most challenging real-world problems. Appreciating the benefits of blockchain technology during my time as a federal prosecutor, including representing and supporting survivors of human trafficking, motivated me to support builders and developers in the broader blockchain ecosystem.

Adoption of blockchain technology is driven by a number of factors, including the ability for communities to participate and gain financial independence, engage in transparent, on-chain payment applications with lower fees, establish digital ownership of a piece of art or music, real property, preserve natural resources like trees in the rainforest, and many other uses. Software builders/developers, and even consumers see the opportunity of digital assets not only in the financial sector, but more importantly as the building block and infrastructure for the next stage of the internet.

We have already seen DLT used by people and companies to build solutions for humanitarian aid.ⁱ People have relied on blockchain technology to help protect their privacy - from survivors of domestic violence and human trafficking; to human rights defenders; and others donating to political causes without fear of reprisals. A 2023 World Bank study showed that people sending remittances to sub-Saharan nations paid fees as high as 36% for every \$200 sent in contrast to a fraction of this amount if funds were sent using digital assets. These new payment rails also help communities, who lack access to financial services (living in what I would describe as financial deserts) gain independence over their ability to support their family, obtain an education, and access healthcare.

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We must also understand that having regulatory uncertainty or trying to fit this technology into old legal frameworks can lead to negative social, economic, and national security consequences. As a former federal prosecutor and now lawyer in this space, I believe that it is imperative that the benefits of this technology are embraced thoughtfully. We need to acknowledge that the transparency, immutability, and traceability of the blockchain helps governments and law enforcement meet their goals too. Take, for example, in 2019, the DOJ indicted the owner and operator of Welcome to Video, a darknet child pornography website that was the largest online child sexual exploitation market at the time of the DOJ's seizure.ⁱⁱ This case also involved global coordination of law enforcement including IRS-CI, HSI, the National Crime Agency in the U.K., and the Korean National Police in South Korea, who together helped identify the wallet addresses of at least 337 users of the website through the use of blockchain data.ⁱⁱⁱ



Jane Khodarkovsky

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Innovation can also attract skeptics or critics, who focus on the bad actors, who use the underlying technology to commit ransomware attacks, hacks, social engineering crimes, and in certain cases launder funds to fund terrorist activity. These are serious critiques and issues that should be addressed appropriately. The solution, however, should not be to throw the baby out with the bathwater – we do not ban financial institutions because someone used cash or wired funds to commit human trafficking offenses; we do not ban cars because there are drivers who cause motor vehicle accidents; and we do not ban cell phones because they can be used to facilitate or commit fraud.

And importantly over the course of the last year, we have seen an increase in adoption of blockchain technology by more traditional actors in the financial sector, including bringing real world assets (RWAs) onto both private and public networks through tokenization. JPMorgan announced that it had launched programmable payments or automatic execution of payments on its permissioned blockchain-based payments system, JPM Coin.^{iv} Citi announced a pilot, Citi Token Services, for cash management and trade finance, where the bank uses blockchain and smart contract technologies to deliver digital asset solutions for institutional clients. These examples are only a handful of the growing real-world use of this technology.

As the technology continues to evolve so should the discussions around how to ensure increased cyber security standards and audits, education, and mitigation to combat social engineering and financial grooming crimes, and building risk management systems that leverage this technology, including decentralized policy smart contract implementation.

This Paper: ***The Rise of Digital Asset Registers in the Global Economy***, will be a catalyst for the robust dialogue and analysis the industry can have with policymakers and regulators about the value of blockchain technology as the solution to the many challenges facing society today as both the public and private sector work to address the needs of communities and constituents around the globe.

It is through Papers and perspectives like these that will drive the important discussions that on chain risk management tools will be built more securely; zero knowledge proofs and other blockchain advancements will help protect personal information; digital identity can be made available for everyday people and the government to use to protecting vulnerable populations (including refugees); cross border payments will be settled instantaneously using mobile devices in secure, affordable, and consumer protected ways; and much more, including what we have not yet imagined.



Introduction



Today, individuals over the age of 40 have witnessed two major technological developments that have dramatically impacted their daily lives. The first innovation was the internet's mass adoption in the mid-1990s, with users leveraging its first practical application, email. The Satoshi Nakamoto White Paper (SNWP) introduced the "digital asset," Bitcoin, which utilizes foundational technology blockchain, launching in 2008 and sixteen years later has moved from its first practical application, digital asset Bitcoin, to areas such as physical asset tokenization, anti-corruption, and supply chain transparency.

When the revolutionary ideas emerging from the SNWP began to take hold, many early adopters of the technology believed the digital asset at the SNWP core (Bitcoin) would take over the world and ultimately dominate the central bank-based economy. Technological transformations mimic real life in that they are never binary but nuanced and sometimes complicated. The Traditional Finance (TradFi) infrastructure that relies on a significant number of intermediaries to complete end-to-end transactions has had over half a century to grow and embed into our daily financial transactions. Decentralized Finance (DeFi), a system performing simple monetary transactions to more sophisticated financial functions without intermediaries, will act as a complementary technology to the TradFi infrastructure. This will improve global economic conditions for all, including economies that TradFi historically overlooked by not providing financial infrastructure for local populations to obtain access to financial tools.

For DeFi to continue its appeal to global populations, it will depend on a fusion of technologies that are all (concurrently) reaching a level of maturity that will provide an infrastructure with the ability to rapidly scale DeFi globally. DeFi can grow in remote, economically depressed regions due to the establishment of many communication satellites in low earth orbit, the distribution of low-cost and even free smartphones to populations within those economically struggling regions, and the increased functionality of global cloud (information) storage facilities. Combining all three technologies (satellite communication, smartphone proliferation, and increased cloud computing functionality) allows regions to participate in DeFi (virtually) without costly intermediaries and the creation and maintenance of significant physical infrastructure exposed to natural and manufactured disasters.

Balancing or enhancing an outdated TradFi infrastructure with DeFi will bring portions of centralized control that will provide order to what, at times, people have referred to as "Wild West DeFi," with criminal elements exploiting that chaos for their illegal means. A digital asset centralized registry (containing fully verified and trusted assets belonging to registrants) provides a centerpiece to the entire DeFi ecosystem in creating a "go-to" authority or oracle, a transparent and fully verified population of registrants, and a "common denominator" across all sectors within the expanding decentralized economy.

This paper provides an overview of the evolving landscape of DeFi and its intersection with regulatory frameworks, focusing on the role of Digital Asset Registers (DAR) in facilitating the adoption and regulation of digital assets.

The authors emphasize the importance of regulatory clarity and the need for DARs to bridge the gap between decentralized and centralized systems, ensuring compliance while unlocking opportunities for innovation and financial inclusion. It explores global perspectives on DeFi regulation, highlighting examples from countries like the UAE, El Salvador, and Vanuatu, which have embraced digital assets to drive economic growth.

Additionally, we will discuss the significance of DARs in enhancing transparency, trust, and accountability in financial transactions, particularly in areas like real estate tokenization. The paper concludes by outlining the operational framework for DARs to support regulatory development and compliance, emphasizing the importance of public-private partnerships in addressing potential risks while facilitating legitimate financial activities.

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Bridging Decentralization and Regulation: The Role of Digital Asset Registers

In the transformative landscape of finance and technology, Digital Asset Registers (DAR) will emerge as fundamental and critical infrastructures, poised to reshape the way we align with regulatory frameworks, while we look to manage and interact with assets in the digital age. These specialized registers will serve as immutable ledgers that record the ownership and transfer of various digital assets, ranging from cryptocurrencies to tokenized securities and beyond.

The records to be contained within the DAR's will be centralized with certain data distributed across different nodes, and the information captured across the DAR's may not necessarily be appropriate for blockchain storage, for some of the fundamental reasons:

- 1 The immutability of blockchain storage does not conform to the "right to be forgotten" legislation featured in the General Data Protection Regulation (GDPR)
- 2 Immutability requires information to be loaded into a blockchain to be fully vetted to guarantee the information is as exact as possible.
- 3 Centralized organizations will always demand some form of control of information – making the DAR's an excellent compromise between centralization and decentralization.
- 4 With respect to sensitive information (i.e. voter), many jurisdictions maintain stringent privacy and confidentiality regulations.

The significance of the DAR's lies not only in providing a secure and transparent record of asset ownership but also in unlocking unprecedented opportunities for innovation, efficiency, and inclusivity in the global financial ecosystem.

The Importance of Digital Asset Registers:

At the heart of their importance lies the transformative potential of the DAR to democratize access to financial markets and assets. By leveraging blockchain technology, these registers eliminate the need for intermediaries and facilitate peer-to-peer transactions, enabling individuals and institutions around the world to transact and invest in assets with greater efficiency, security, and autonomy. In doing so, they pave the way for financial inclusion by breaking down barriers to entry and expanding access to previously inaccessible markets and investment opportunities.



Moreover, DAR's will play a pivotal role in driving innovation and experimentation within the financial industry and beyond. By legitimizing, the tokenization through verification of numerous types of assets; including real estate, art, and commodities, these registers will facilitate transactions of fractional ownership, liquidity enhancement, detailed provenance, and new forms of asset-backed financing. They will empower entrepreneurs and developers to create decentralized applications (dApps) and financial products that leverage programmable assets and smart contracts, opening up a myriad of possibilities for DeFi's, decentralized autonomous organizations (DAOs), and the broader Web3 ecosystem.

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Furthermore, DAR's are poised to be instrumental in promoting transparency, trust, and accountability in financial transactions. By blending on-chain and off-chain information, they will provide enhanced verifiable and auditable records of asset ownership and transfer, reducing the risk of fraud, manipulation, and disputes. This transparency fosters confidence among market participants, regulators, and investors, laying the groundwork for the responsible growth and adoption of digital assets in mainstream finance.

As the digital asset ecosystem continues to evolve and expand, the importance of robust and interoperable digital asset registers cannot be overstated. They will serve as the foundational underpinning of the infrastructure necessary for the widespread adoption and integration of digital assets into our financial systems. Whether facilitating cross-border remittances, enabling peer-to-peer lending, or powering decentralized exchanges, these registers are catalysts for innovation, efficiency, and inclusivity in the global economy. As such, they represent a cornerstone of the digital revolution that is reshaping the future of finance and commerce.

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Tech Innovation Meets Financial Regulation: Lessons from Unlikely DeFi Pioneers

An interesting phenomenon is taking place with the maturing of the digital asset ecosystem. Countries previously overlooked as centers for technological innovation are suddenly in the spotlight when creating innovative digital asset infrastructures. Jurisdictions such as the United Arab Emirates (UAE) are looking for an opportunity to diversify away from petroleum industry dependence and have found many opportunities around exploiting financial technology (Fintech). El Salvador has taken the lead as the first nation to adopt Bitcoin as legal tender. The island nation of Vanuatu has named one of its 83 islands Satoshi Island (after the mysterious entity that created Bitcoin) and dedicated that island to growing the global DeFi ecosystem.



Several general technological developments and advantages embedded into blockchain technology have made it possible for these regions to embrace digital assets and other DeFi applications. The recent developments include companies and their products such as SpaceX's Star Link and Amazon's Project Kuiper, deploying thousands of satellites in low earth orbit that can broadcast WiFi into the most remote regions on earth, and the proliferation of low-cost and even free smartphones to populations throughout emerging economies worldwide. Finally, the advances in cloud-hosted computing mean regions wanting to participate in DeFi no longer must import heavy mainframe infrastructure susceptible to natural and human-made disasters and require regular onsite maintenance. All these technological advancements combine to provide end users with comprehensive access to global DeFi-related financial services using a virtual infrastructure versus a heavy physical TradFi infrastructure.

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The other factor allowing these areas to enter DeFi technology innovation is regulation. The 2023 Crypto Oasis Ecosystem report states that the UAE government proactively created a regulatory environment “that is both robust and flexible.” The UAE uses common sense regulation to attract global businesses focusing on digital assets. UAE member nation Abu Dhabi published digital asset regulatory guidance in 2018^v, with many jurisdictions using that early regulation as a benchmark. Because Abu Dhabi entered the digital asset regulatory ecosystem so early, they adjusted (over time) their regulations to adapt to decentralized autonomous organizations (DAOs) and blockchain foundations that require lawmakers to think about regulation in what would have previously been considered “unconventional” ways.^{vi}

In early 2022, the Vanuatu legislature created the Financial Dealers Licensing Act, which provided coverage for the trading of digital assets. The digital asset initiative was built on Vanuatu’s reputation as an offshore TradFi financial haven. International financial watchdog organization the Financial Action Task Force (FATF) highlighted what they saw as weak anti-money laundering controls. In 2016, Vanuatu was placed on the FATF Gray List of countries. This poor performance designation forced Vanuatu banking correspondent partners, primarily based in New Zealand and Australia, to cut ties with Vanuatu-based financial institutions. This move essentially cut Vanuatu from the TradFi financial “rails” worldwide. Although Vanuatu has since been removed from the FATF Gray List, the problem highlighted the country’s dependence on financial institutions outside its borders. DeFi and ways to participate in the global economy with little to no physical infrastructure became a rallying cry for transition to economic independence.

In summary, we have nations not (previously) known for their technological innovation becoming DeFi innovation labs for the rest of the world to study and adapt developing best practices. Absorbing the DeFi ecosystem by countries known for their expertise at TradFi conventions (Singapore, Canada, United States, and European Union) have created regulatory regimes that will guarantee widespread innovation throughout the rest of the world and the mass global adoption of digital assets.

To compete with these adaptive and independent jurisdictions, more “traditionally” innovative regions have built upon many regulations created in these non-traditional innovative jurisdictions and combined them with the financial reputational “power” achieved during their time as TradFi “hubs.” Singapore is undoubtedly one of those jurisdictions where, in 2022, the Monetary Authority of Singapore (MAS) launched Project Orchid, creating a technological infrastructure to establish a retail central bank digital currency (CBDC). The Payment Services Act (PSA) was amended by Singaporean lawmakers in 2019 to address risks and potential harm to retail investors participating in digital asset trading.

An example of more developed nations building off their pre-existing TradFi infrastructure is the creation by the Canadian Securities Administrators (CSA) and the Investment Industry Regulatory Organization of Canada (IIROC) of what Thomson Reuters called a “clear registration regime for trading platforms that offer custodial services to Canadian clients.”^{vii} Canada was also responsible for releasing spot Bitcoin exchange-traded funds (ETF) in February 2021, three years before the US. This form of ETF allows retail investors to easily increase their exposure to Bitcoin via regulated financial institutions and into their retirement funds versus purchasing and holding Bitcoin on their own. Centralized crypto exchange Binance, attempting to stay one step ahead of strict regulatory requirements shifting its concentration of operations (the company denied it had a headquarters) from China in July 2017 to Japan^{viii}, and finally in Malta^{ix}, pleaded guilty to the US Department of Justice to charges of money laundering, unlicensed money transmission, and sanctions violations in November 2023. Before those charges, in May 2023, Binance announced that it was pulling out of Canada due to increased regulations. According to Binance, “the new (Canadian) regulator guidelines related to stablecoins, as well as limits on how much investors could place with crypto exchanges, mean the Canadian market was no longer tenable for Binance.”^x

According to filings made by the eleven US-based financial institutions that received approval from regulators to provide their retail clients a spot bitcoin ETF, just for the month of February 2024, US-based bitcoin spot ETFs have accumulated over \$11 billion^{xi} in bitcoin. This demand for units of bitcoin helped push the price of bitcoin over \$60,000 per unit on February 28, 2024, for the first time in over two years.



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Taking effect in 2024 is the European Union's Markets in Crypto Assets regulation (MiCA). These are rules explicitly tailored to digital assets versus TradFi-centric regulations that have been amended to incorporate digital asset regulations. Commenting on MiCA, France's Finance Minister Bruno Le Maire called it a landmark "that will put an end to the crypto Wild West." This regulation aims to clearly outline rules for companies operating in the digital asset space and create a "passport" that will allow DeFi companies abiding by the rules to operate unencumbered across all 27 independent EU member states.

Regulations make it clear to retail investors and institutions how to invest in DeFi and make it safe for those participants in the DeFi ecosystem. Compared to nations that technically have nothing to lose (cut off from TradFi rails, too dependent on foreign fiat currencies, or looking to diversify from outdated industries), primary economic regions must be faster to adopt DeFi regulatory conventions.^{xii}

Rapid technological adoption by developing economies has taken place prior to this moment in the prior two decades with the proliferation of mobile phone usage in developing economies. The advent of mobile telephony allowed nations with no heavy on-prem telecommunications infrastructure to participate in global communications. As the internet matured, it provided emerging economies with a way to participate in the Internet economy. A study published by Exploding Topics found that on the continent of Africa, the share of mobile internet traffic is 69.13 percent, 12.24 percent greater than the global average. This illustration shows the reliance on smartphones by the African public in everyday internet activities that most of us operating in more developed economies access via laptop or desktop computer.

A perfect alignment between technological advances (satellites, smartphone proliferation, cloud computing) and DeFi has led to unconventional laboratories of regulation. These regulatory "testing sites" have advanced regulation in regions that can attract the masses to participate within DeFi, proving that common sense regulation does lead to mass DeFi proliferation.

Beyond Borders: Digital Assets and Centralized Registries in Financial Innovation



Servicing customers in areas deemed "high-risk" by developed nation TradFi entities is not cost-effective for those TradFi entities as the supporting infrastructure exists today. Paraguay, Turkmenistan, and Papua New Guinea, citizens of those countries would have to "pass" Know-Your-Customer (KYC) checks required by regulators overseeing those TradFi entities. If TradFi entities could resolve issues related to identity confirmation and perform checks on monetary asset flows, the servicing of those customers could be undertaken.

Blockchain technology is an electronic distributed (virtual) ledger stored by unaffiliated parties on a decentralized network. Transactions are confirmed by a consensus mechanism agreed to by participating (unaffiliated) participants. The white paper that established blockchain as a technology was released in 2008 and highlights replacing trust with cryptography and mathematics. This scientific certainty can establish foundational personal identification, giving TradFi entities confidence that they know who they are conducting business with. Monetary assets used to improve the lives of these customers would be digital asset monetary units that are fully transparent with comprehensive provenance traced on blockchain.

Centralized registries can enhance overall blockchain functionality by verifying information to be uploaded to a blockchain to protect and segregate information that should not be loaded onto a blockchain. Centralized registries add order to the (at times) chaotic blockchain ecosystem. Datapoints such as personally identifiable information (PII) that fall under right-to-be-forgotten statutes, sensitive information requiring more control by centralized governments, yet to be fully vetted information all require a centralized registry for the purpose of administration. Just as portions of DeFi are infiltrating the pre-existing TradFi infrastructure, so will administrative finance-related operations such as registries. Centralized registries for a decentralized economy bring order to decentralization. The relationship between DeFi and TradFi is not zero-sum.

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Use Case Highlight: Real Estate as a Digital Asset - A View into Property Tokenization and Fractional Ownership

In the ever-evolving environment of real estate investment, a compelling use case has emerged at the intersection of digital assets and property ownership: real estate tokenization. This method has grown in popularity as it offers increased liquidity, broader access to investors, and more efficient processes. However, one of the main challenges in its widespread adoption has been the regulatory landscape, with many jurisdictions classifying these tokens as securities, which brings about various regulatory implications.^{xiii}

Earlier in this paper, we defined DeFi as a system that reduces the need for intermediaries to carry out sophisticated financial transactions. Purchasing a home is one of the largest and most complicated transactions anyone can make. Following is just a sampling of intermediaries involved in a common real estate transaction, Escrow Agent, Title Company, Lender, Loan Originator, and Listing Agent. Property tokenization can significantly reduce the number of intermediaries involved in a real estate transaction therefore not only making the transaction more efficient but also much more economical. Because the transaction would also be visible on a blockchain, a new detailed level of transparency is also achieved.

With a lens into the application of digital asset registers within the domain of real estate tokenization, there are several various types and applications, from equity tokens, debt tokens, asset-based, profit share, to development tokens. The DAR can work to facilitate these types of fractional ownerships and ensure regulatory compliance in this evolving market segment, while providing protections to investors and property owners alike.



Real Estate Tokenization: A Paradigm Shift

Real estate tokenization represents a transformative approach to property ownership, enabled by blockchain technology. Through tokenization, real-world assets such as properties are digitized and divided into tradable tokens, allowing investors to purchase fractional ownership in these assets. This fractional ownership model democratizes access to real estate investments, breaking down barriers to entry and unlocking liquidity in traditionally illiquid markets.



The Need for Digital Asset Registers

As real estate tokenization gains momentum, the role of digital asset registers becomes increasingly pivotal. These centralized registers will serve as comprehensive record-keeping platforms, leveraging blockchain's transparency and immutability to document ownership rights and transactional histories of tokenized real estate assets. By providing a secure and auditable ledger, digital asset registers ensure the integrity of property ownership data and facilitate transparent transactions between buyers and sellers.

The application of the Digital Asset Register will offer a range of functionalities tailored to the needs of real estate tokenization. Utilizing blockchain technology, these registers record ownership transfers, tokenize assets, and execute smart contracts automatically. Through decentralized consensus mechanisms, such as proof of work (PoW), they enable stakeholders to verify the authenticity of property records, ownership validations, and enforce compliance with regulatory requirements, such as Anti-Money Laundering (AML) regulations. Additionally, digital asset registers enhance market liquidity by facilitating secondary trading of tokenized assets and providing real-time transparency into asset performance.

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Protection to Investors and Property Owners

For investors, digital asset registers provide essential safeguards, ensuring transparency and accountability in real estate transactions. By offering visibility into asset performance and transactional histories, investors can make informed decisions and mitigate risks associated with traditional real estate investments. Similarly, property owners benefit from increased market liquidity and efficiency in asset management, with digital asset registers providing mechanisms for transparent and auditable property transactions.

While tokenization of real estate offers numerous benefits, it also faces several challenges that must be overcome to unlock its full potential. Navigating complex and disparate legal frameworks, ensuring the security of smart contracts, and integrating with traditional land registries and legal systems are some of the key challenges market participants face in this emerging industry.^{xiv}

One of the primary concerns is the lack of a consistent regulatory framework that governs the market. Different jurisdictions have varying rules and regulations surrounding digital assets, leading to confusion and uncertainty for both investors and issuers. Moreover, the absence of a centralized reporting system for tokenized real estate transactions can hinder transparency and make it difficult for regulators to monitor and enforce compliance.^{xv}

Regulatory compliance enforced through DARs can offer key protections the interests of both investors and property owners, fostering trust and confidence in the real estate tokenization ecosystem. By providing a secure and transparent infrastructure for managing tokenized assets, these centralized registers contribute to the democratization of real estate investment and the evolution of property ownership models. As the adoption of real estate tokenization continues to grow, digital asset registers will become the indispensable tool for stakeholders seeking to harness the benefits of blockchain technology in the real estate market.

An Operational Framework in Support of Regulatory Development and Compliance

The operational framework for a digital asset register can play a crucial role in informing the development of and aligning to the regulatory compliance and legislation evolving across key jurisdictions in several ways:

- 1 Transaction Monitoring/Chainanalysis:** By providing detailed transaction histories and real time monitoring capabilities, digital asset platforms can offer valuable insights into the behavior and patterns of market participants. This data can inform regulators about potential risks, illicit activities, and emerging trends within the digital asset space.
- 2 AML Compliance:** The DAR will integrate through API's to Know Your Customer (KYC) solutions as well as ensuring Anti-Money Laundering (AML) procedures are aligned into to processes in order to support the verification of the identities of users and ensure compliance with the varying regulatory requirements across jurisdictions. Regulators can leverage the DAR platforms and integrated capabilities to access information about user identities, transaction volumes, and compliance with regulatory standards.

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- 3 Regulatory Reporting:** Digital asset registers can generate comprehensive reports on transaction volumes, asset holdings, and user activities, which can be submitted to regulatory authorities for compliance purposes. These reports can help regulators monitor the market, detect potential violations, and assess the effectiveness of existing regulations.
- 4 Smart Contract Auditing:** The DAR rely on smart contracts to automate transactions and enforce business logic. Auditing these smart contracts can help regulators understand the underlying code, identify potential vulnerabilities, and ensure compliance with regulatory standards such as consumer protection and financial stability.
- 5 Market Surveillance:** Digital asset registers can facilitate market surveillance by providing regulators with real-time access to trading data, order book information, and liquidity metrics. Regulators can use this data to monitor market manipulation, insider trading, and other abusive practices, thereby safeguarding the integrity of the market and protecting investors.
- 6 Engagement with Industry Stakeholders:** Digital asset platforms will collaborate with industry stakeholders, including regulators, policymakers, and law enforcement agencies, to address regulatory concerns and promote best practices. By fostering dialogue and cooperation among these stakeholders, digital asset platforms can contribute to the development of informed and effective regulatory frameworks.



Overall, digital asset platforms and registers serve as valuable sources of data, transparency, and compliance tools that can support the development of regulatory compliance and legislation in the rapidly evolving digital asset ecosystem. By leveraging these platforms and through private-public sector participation, regulators can enhance their oversight capabilities, mitigate regulatory risks, and foster a more secure and trustworthy environment for digital asset market participants.

Contrary to common belief, digital assets are not a widely used or effective tool for terrorism funding due to its transparency, traceability, and immutability. Nonetheless, even small amounts of funds sent to terrorists can have devastating consequences. Public-private partnerships play a fundamental role in identifying, analyzing, and validating potential terrorist financing risks.^{xvi}

Absent this collaboration, private sector firms struggle to make informed, risk-based decisions, which could result in either mistakenly blocking legitimate funds or inadvertently allowing funds to reach the hands of terrorists. Bridging this gap requires cooperation between public and private sectors, with financial institutions, exchanges, and blockchain analytics companies contributing to lead generation and insight sharing.

Additionally, the public sector's communication around campaigns with potential terrorist financing risks is critical. Such cooperation ensures that the financial ecosystem does not inadvertently support terrorism, while also facilitating the flow of legitimate, critical humanitarian aid to its intended recipients.

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Forging the Path: Trends and Considerations in Digital Asset Registers

The evolution of digital assets and decentralized finance (DeFi) has marked a significant paradigm shift in the global financial landscape. From the emergence of Bitcoin to the tokenization of real-world assets, such as real estate, blockchain technology has enabled innovative solutions that offer greater efficiency, transparency, and inclusivity in financial markets. Centralized registries, such as the Digital Asset Registers (DAR), play a crucial role in bridging the gap between traditional finance and the decentralized economy, providing a framework for regulatory compliance, asset verification, and transaction transparency.

As the authors have represented in this paper, the adoption of DeFi and digital assets has seen remarkable growth, driven by technological advancements and regulatory developments. Nations previously overlooked as centers for innovation are now leading the way in creating regulatory environments conducive to digital asset adoption.

The importance of Digital Asset Registers cannot be overstated. They bridge the gap between decentralized and centralized worlds, providing transparency, security, and accountability in the burgeoning digital asset ecosystem.

As we look to the future, several key themes are emerging:

- 1 Regulatory Innovation:** Governments and regulatory bodies are adapting to the rise of digital assets by developing new frameworks and regulations. Countries like the UAE, El Salvador, and Vanuatu are leading the way in creating regulatory environments that support innovation while ensuring consumer protection and financial stability. This regulatory clarity is essential for fostering trust and confidence in the digital asset ecosystem.
- 2 Interoperability and Collaboration:** The future of digital assets lies in interoperability and collaboration between different stakeholders. Centralized registries, like the DAR's, must work seamlessly with blockchain networks and traditional financial systems to ensure compliance and facilitate cross-border transactions. Public-private partnerships are also essential for addressing regulatory challenges and mitigating the risks associated with digital asset transactions and oversight.
- 3 Transparency and Security:** Trust and transparency are foundational pillars of the digital asset ecosystem. DARs play a critical role in providing transparent and auditable records of asset ownership and transfer, thereby reducing the risk of fraud and manipulation. Security measures, such as KYC/AML procedures and smart contract auditing, are also essential for protecting investors and maintaining market integrity.
- 4 Financial Inclusion:** Digital assets have the potential to democratize access to financial markets and assets, particularly in underserved regions. By leveraging technologies like blockchain, smartphones, and satellite internet, individuals and businesses in remote and economically disadvantaged areas can participate in DeFi and access new investment opportunities.

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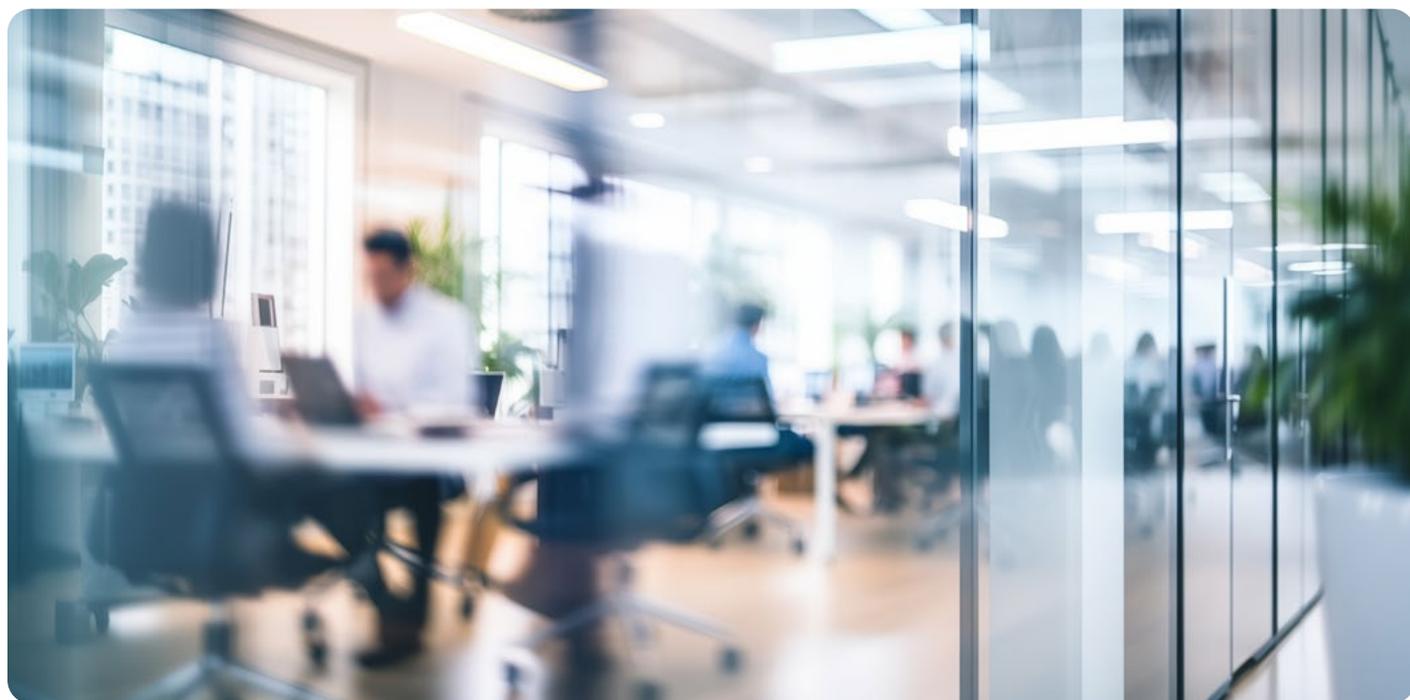
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The authors contend the role of DARs will continue to expand and provide value as the digital asset ecosystem matures. These registers will be instrumental in supporting the evolving regulatory frameworks, facilitating compliance, and fostering trust among all market participants.

Furthermore, the integration of digital asset registers into emerging sectors, as we highlighted in the real estate tokenization use case, presents new opportunities for innovation, growth, and inclusivity. Regulatory developments, guided by collaboration and evolving best practices, will pave the way for responsible innovation and sustainable growth in the digital asset space – taming of what is viewed as the “*Wild West*” - there is significant value and opportunity to be achieved.

The future of finance is digital, decentralized, and inclusive. Centralized registries, supported by robust regulatory frameworks and public-private partnerships, will play a pivotal role in shaping this future. By embracing innovation, fostering collaboration, and prioritizing regulatory compliance, we can build a more resilient, efficient, and equitable financial ecosystem.

In the next Paper in our Series, we will look into the crucial role the Digital Asset Register will play in informing the development of and aligning with the regulatory compliance and legislation evolving across key jurisdictions.



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Teranet® is Canada's leader in the digital transformation, delivery, and operations of statutory registry services with extensive expertise in land and corporate and personal property registries. For more than three decades Teranet has been a trusted partner to governments and businesses in building stronger communities and economies. Teranet developed and currently operates Ontario's Electronic Land Registration System and Writs System, Manitoba's Land Titles and Personal Property Registries and Canada's largest integrated Collateral Management System.



Chrysalis DAE - The Chrysalis Digital Asset Exchange provides technology and business process innovations to the digital asset ecosystem to manage risk, create operational efficiencies, secure transactions, and prove asset provenance and ownership. Utilizing a patented approach, Chrysalis provides the technology and business process innovations to bring trust to digital assets and enabling that critical bridge between cross chain, off-chain and on-chain data.



Foster Moore®, a Teranet company, - is a global leader and specialist registry software company focused on digital services for modernizing government. For two decades the team at Foster Moore has developed and maintained online business registry systems, and a host of other smaller electronic registries across the globe.



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Glossary

Application Programming Interface (API) – a means by which two or more computer programs can communicate with each other.

Artificial Intelligence (AI) - leverages computers and machines to mimic the problem-solving and decision-making capabilities of the human mind.

Central Bank Digital Currency (CBDC) - a virtual version of a country's sovereign/ fiat currency that is supported by the central bank of a country.

Chivo Wallet – provided by the El Salvadorian government allowing users to send and receive Bitcoin without a commission.

Decentralized Applications (dApps) - is a type of distributed, open source software application that runs on a peer-to-peer (P2P) blockchain network rather than on a single computer.

Decentralized Finance (DeFi) – uses emerging technology to remove third parties and centralized institutions from financial transactions. The components of DeFi are cryptocurrencies, blockchain technology, and software that allow people to transact financially with each other.

Decentralized Exchanges (DeEx) - A decentralized exchange (or DEX) is a peer-to-peer marketplace where transactions occur directly between crypto traders. DEXs fulfill one of crypto's core possibilities: fostering financial transactions that aren't officiated by banks, brokers, or any other intermediary.

Developed Economy – a country with a high level of wealth and resources available to its residents/citizens.

Developing Economies – a country that (in relation to other countries) has a lower average standard of living.

Emerging Economies – the market economy of a developing nation that is gradually engaged with global markets as it grows.

General Data Protection Regulation (GDPR) - is the toughest privacy and security law in the world. Though it was drafted and passed by the European Union (EU), it imposes obligations onto organizations anywhere, so long as they target or collect data related to people in the EU. The regulation was put into effect on May 25, 2018. The GDPR will levy harsh fines against those who violate its privacy and security standards, with penalties reaching into the tens of millions of euros.

With the GDPR, Europe is signaling its firm stance on data privacy and security at a time when more people are entrusting their personal data with cloud services and breaches are a daily occurrence.

Financial Action Task Force (FATF) - The Financial Action Task Force (FATF) is the global money laundering and terrorist financing watchdog. The inter-governmental body sets international standards that aim to prevent these illegal activities and the harm they cause to society. As a policy-making body, the FATF works to generate the necessary political will to bring about national legislative and regulatory reforms in these areas.

FATF Gray List – a list of nations with what FATF considers maintaining substandard regimes combatting money laundering and terror financing.

Interoperability is the ability to share information and services or the ability of systems or components to exchange and use information or provide and receive services from other systems.

ISO – International Standards Organisation.

Know Your Customer (KYC) - is the aspect of due diligence that deals with the identity verification of customers' credentials.

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Legal Tender – coin and currency issued by a central government, used for payment of goods and services.

Lightning Network – a peer-to-peer infrastructure for making micropayments of digital assets through a network of bidirectional payment channels, without any custody of funds.

Machine Learning (ML) - is an AI technique that teaches computers to learn from experience.

Open Data - is defined as structured data that is machine-readable, freely shared, used and built on without restrictions.

Register – a statutory register that persists legal entity records within a legislative base.

Registry Domain – a single grouping of similar legislative bases of register operators such as Land or Business.

Remittance Payments – electronic money transfer from a laborer in a developed nation to a recipient in a developing nation.

Robotic Process Automation (RPA) - is an optimisation method that uses AI, machine learning, or virtual bots to execute tasks humans would otherwise handle.

Satoshi Nakamoto – the anonymous publisher of the Satoshi Nakamoto White Paper, and could be a female, male, or group.

Satoshi Nakamoto White Paper (SNWP) - scientific paper published by Satoshi Nakamoto in 2008 that created Bitcoin and established blockchain technology.

Traditional Finance (TradFi) - traditional financial systems (legacy) to be enhanced by DeFi.

Web3 - being touted as the future of the internet. The vision for this new, blockchain-based web includes cryptocurrencies, NFTs, DAOs, decentralized finance, and more. It offers a read/write/own version of the web, in which users have a financial stake in and more control over the web communities they belong to.

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Endnotes

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ⁱⁱ Press Release, U.S. Department of Justice, South Korean National and Hundreds of Others Charged Worldwide in the Takedown of the Largest Darknet Child Pornography Website, Which was Funded by Bitcoin (October 16, 2019), <https://www.justice.gov/opa/pr/south-korean-national-and-hundreds-others-charged-worldwide-takedown-largest-darknet-child>.

ⁱⁱⁱ Id.

^{iv} Yogita Khatri, JPM Rolls Out Programmable Payments via JPM Coin, The Block (November 10, 2023), <https://www.theblock.co/post/262595/jpmorgan-jpm-coin-programmable-payments>.

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^{vi} <https://cryptooasis.ae/ecosystem-report-2023/>

^{vii} <https://www.reuters.com/technology/binance-worlds-top-crypto-exchange-center-us-investigations-2023-03-27/>

^{viii} <https://crypto.news/the-journey-of-changpeng-zhao-how-chinas-crackdown-propelled-binance-to-the-worlds-largest-crypto-exchange/>

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^x <https://www.pymnts.com/cryptocurrency/2023/binance-canadian-market-no-longer-tenable-after-new-regulations/>

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^{xii} <https://medium.com/@ChrysalisDAE/bringing-order-to-regulatory-uncertainty-7f2d944eddd1>

^{xiii} <https://beeders.com/en/real-estate-tokenization-and-regulatory-landscapes/>

^{xiv} <https://medium.com/all-about-tokenization/real-estate-tokenization-in-2023-unlocking-a-trillion-dollar-market-4e9c5498a847>

^{xv} <https://www.forbes.com/sites/forbestechcouncil/2023/05/22/the-future-of-real-estate-tokenization-and-its-impact-on-the-industry/?sh=20e8035246bf>

^{xvi} <https://www.chainalysis.com/blog/2024-crypto-crime-report-introduction/>