United Arab Emirates
CENTRE FOR THE FOURTH INDUSTRIAL REVOLUTION

مؤسسة دبي للمستقبل
DUBAI FUTURE FOUNDATION

Tokenisation and Digital Assets

A Transformative Approach Towards Investments

November 2020

Contents

Executive Summary

In the last few decades, the UAE has developed a robust ecosystem of pro-business regulatory frameworks, tax laws, and free zones, established to encourage business start-up and economic growth. These strides have positioned the country as a regional and global hub for commerce and investment.

Furthermore, the UAE continues to advance its national mandate of leveraging emerging technologies to enhance economic growth, social development, and government efficiency. As digital transformation and business restructuring becomes even more important, particularly post COVID-19, it is critical to continuously assess the emerging technology landscape to identify novel opportunities for economic and social advancement.

Tokenisation and digital assets have emerged as one such opportunity, and the Centre for the Fourth Industrial Revolution UAE (C4IR UAE), a collaboration between the Dubai Future Foundation and the World Economic Forum, together with Accelliance, have been actively working at the Emirate and Federal level to evaluate the potential. As an outcome of these efforts, this report summarises the findings from a combination of research and analysis, supported by a survey of over 100 industry stakeholders and 25 in-depth interviews.

Tokenisation and digital assets can be evaluated in two separate settings for two distinct purposes:

Improving Existing Financial Systems:

Applying the technology to modernise existing financial market infrastructure, for purposes such as advancing the dematerialisation of securities and streamlining the clearing and settlement of securities transactions.

Creating New Financial Systems:

Applying the technology where it can address shortcomings in existing capital markets through providing new platforms, improving access to funding and credit facilities, tokenising assets to unlock liquidity, and creating new opportunities for both issuers and investors.

This report was developed to answer the following key questions:

- What are **tokenisation and digital assets** and how are they being utilised?
- What are the **implications** across industries?
- What are the **opportunities and challenges?**
- How could this be applied in a **local context,** and what **actions** should the UAE take?

Ultimately, anything that has the potential to advance the accessibility, security, transparency, and efficiency of capital markets is a welcome development. While the C4IR UAE found that there are a number of remaining obstacles and prevailing risks to mainstream adoption, tokenisation may present an opportunity to enhance the UAE's existing financial infrastructure. It may also, in turn, create new opportunities to further position the country as a hub in areas such as capital market issuances, secondary markets for digital assets, and digital asset custodial services.

Furthermore, findings showed that such an ambitious venture to create a significant tangible impact can only be accomplished through concerted efforts, requiring close collaboration between regulators and regulated entities.

Foreword: Investments, Then and Now

Over the last few centuries, humankind has become more industrious and productive. This global jump in productivity was preceded by the emergence of capital – the concept of investing in the future. Whereas historically economies were generally seen as stable and unchanging, as political conflict and economic competition were seen to result in a 'zero-sum game' – the current foundations of the global economy are built upon the continuous expectation of future growth, which has opened the floodgates for investment.

The platforms built to support these systems have developed greatly since the initial emergence of financial centres – including the formation of joint-stock companies, bond markets, and investment funds. These represented the earliest capital markets, where entities issued bonds and shares that could be divided into smaller representations of ownership, with shares accessible to a wide range of investors. Prior to this, ambitious business ventures were generally restricted to a limited number of wealthy individuals and institutions. With the emergence of effective investment tools across several financial hubs, business ventures could pool capital from many investors to finance their initiatives. We can refer to this as the **first wave of accessibility**, where illiquid assets and claims were converted into tradeable securities. This wave ushered in the rapid growth of exchanges and market liquidity, paving the way for the rise of early European financial centres such as Amsterdam and London.

Looking back, we have come a long way from early capital markets. Advances in technology and the digitisation of global markets have led to unprecedented global accessibility and liquidity, and markets continue to evolve rapidly. This dematerialisation of securities over the last century, replacing physical certificates with electronic records, led to a **second wave of accessibility**, bringing markets into the digital realm from the stock exchange floor to the personal computer. This has accelerated the development of global liquidity and market access, and it is now commonplace to diversify one's investment portfolio across a variety of geographies, sectors, and asset-classes.

Yet, there is still plenty of runway left. Financial market infrastructure has aged, with operational costs and other challenges persisting. While markets are more connected than ever, there are still gaps in accessibility of capital and market integration. Many areas remain relatively illiquid, and barriers continue to exist for the average investor in accessing various investment opportunities. Indeed, many opportunities continue to remain limited only to wealthy investors and investment funds, whether by regulation, accessibility, or otherwise. Simultaneously, there persists a global pool of capital that remains largely inaccessible to most small businesses, and even to corporates or governments seeking investment.

Enter 'tokenisation' – a novel approach of recognising either existing securities or completely new assets on blockchain or distributed ledger technology (DLT) – creating opportunities to modernise existing financial infrastructure and develop new investment platforms and opportunities. New forms of tokens could promise a new take on raising capital, where in return for investing, investors receive digital 'tokens' representing a stake in an asset, such as a commodity, equity, or debt. For example, this approach can be used to 'tokenise' a right in a fund, a right to an underlying asset, or a representation of a financial asset.

Many have proposed that this could usher in the **third wave of accessibility,** with the potential to streamline existing infrastructure as well as integrate global markets and investment opportunities, leading towards truly flat, globally interoperable platforms for the issuance and exchange of various assets and securities.

Financial market infra-structure has aged

Within the context of blockchain and distributed ledger technology, tokenisation is most broadly defined as the representation of a particular asset, such as equity or bonds, through the issuance of tokens representing fractional shares of the underlying asset.

Like a coupon redeemable for an item, a token can represent a share of any tradeable asset, such as equity, debt, real estate, commodities, and more. These tokens are issued on a blockchain or distributed ledger. For simplicity, this report will use these terms interchangeably to refer to the technology layer underpinning tokens, leaving aside architectural differences between the two.

TOKENISATION: ADVANCING FINANCIAL MARKET INFRASTRUCTURE (FMI)

Distributed ledger technology (DLT) first appeared in the financial industry mainstream in 2015, where it quickly gained traction in financial industry circles as a way to apply elements of blockchain technology to streamline the clearing and settlement of securities transactions by using a shared ledger among market participants. DLT was proposed as a new type of financial infrastructure to reduce operational processes and costs associated with reconciliation and dispute resolution. Its approach to asset provenance and mutualised financial infrastructure has held great potential appeal for some industry stakeholders such as the American Depository Trust & Clearing Corporation (DTCC) and Australian Stock Exchange (ASX), who have developed distributed ledger systems in recent years.

INITIAL COIN OFFERINGS: THE GRASSROOTS PHENOMENA

The origins of asset tokenisation with blockchain technology can be traced back to the concept of 'coloured coins' in 2013 that marked certain coins to represent assets in the real world on the Bitcoin blockchain.

In the meantime, a new trend was surfacing. In 2017, demand skyrocketed for what became known as initial coin offerings (ICOs), a new take on crowdfunding, sidestepping traditional venture capital and financing tools. A plethora of initiatives emerged, issuing various coins and tokens to raise capital for projects, often with little consideration for the application of regulations and securities laws. Many fell in a grey area when it came to compliance, and a number of scams and frauds began to emerge. As demand slowed and regulators began to regulate ICO activities, a new concept emerged, the 'security token'.

SECURITY TOKENS: A MIDDLE PATH?

Security tokens entered as a go-between positioned between the 'wild west' of unregulated tokens and the tokenisation and blockchain projects that were tackling the lumbering legacy infrastructure and intimidating processes of capital markets.

A security token can represent a share of a company, an investment fund, a debt instrument, real estate, or other assets. As such, security tokens generally fall under the classification of a 'security' and are thus subject to much more stringent regulatory scrutiny.

At a high level, this has three functions:

Facilitating Access to Capital

Organisations finding existing capital markets options inadequate could raise funds via issuance of security tokens representing a particular asset.

Fractionalisation

Traditionally fixed, illiquid assets such as real estate or fine art could be broken down and represented as tokens, thereby fractionalising the underlying asset and offering new investment opportunities and liquidity.

Facilitating Access to Investments

The accessibility and Fractionalisation of assets through tokens could lower barriers relating to minimum investment requirements and geographies, opening up a global pool of capital.

Definitions and Token Taxonomy

Due to the early stage of these technologies, no unified nomenclature has yet emerged for various tokens and therefore some definitions are required. For the purpose of clarity in this report, the following definitions shall apply:

Tokenisation:

the general process of representing an asset with a blockchain-based token.

Tokenised Securities:

existing securities such as equities and fixed income that are dematerialised via a DLT-based system or transferred to such a system. This represents an infrastructure and architectural departure from the status quo, but as it is applied within existing networks of financial institutions, it generally falls within existing regulations. **This is a new approach to existing financial systems.**

Security Tokens:

tokens issued in a security token offering, often resembling an IPO or bond issuance – rather than tokenising a security that already exists. Security tokens, also known as asset tokens, are meant to represent the underlying asset – both financial (eg: equity, debt, funds) and non-financial (eg: real estate, art). **This is a new approach to new financial systems with emerging service providers and secondary exchanges.**

Although this report primarily focuses on the impact of security tokens (asset-backed tokens), these tokens are also part of a broader classification of **digital assets, also often referred to as 'crypto assets' and 'virtual assets' as a generic term for tokens.** While there is currently no globally standardised classification of token types, many regulators have been moving towards establishing categories and definitions of tokens.

Classifications are highly dependent on the regulatory approach – tokens can be evaluated from the perspective of securities, or from their economic functions. As such, tokens are generally split into three categories: security tokens, payment tokens, and utility tokens.

Figure 1

Token Taxonomy Overview

The classifications have been derived through synthesising the various definitions and approaches of several authorities and regulators across Switzerland, Lichtenstein, the United States, Singapore, Malta, and Hong Kong, including organisations such as the European Central Bank, International Monetary Fund (IMF), Financial Action Task Force (FATF), and Financial Stability Board (FSB).

DIGITAL ASSETS

Security Tokens (Asset / Asset-backed Tokens)

These tokens represent the ownership of real economic assets or securities. Tokens that enable physical assets to be traded on the blockchain fall into this category, along with contracts. Asset Tokens can range from the representation of ownership of certain amount of gold, to a share in future earnings, to the ownership of equity in a company. Therefore, in terms of their economic function, many asset tokens are considered analogous to securities.

Payment Tokens (Exchange / Currency Tokens)

Payment tokens (also equivalent to cryptocurrencies) are tokens that are intended to be used as a means of payment or exchange. This includes payment for acquiring goods or services, or as a means of value transfer.

Utility Tokens

Utility tokens are tokens that leverage blockchain infrastructure in order to provide access digitally to a product, application, or service.

Hybrid Tokens

This definition encompasses tokens that combine features of more than one category. For example, a token could serve as a means of payment, while simultaneously be used as a mechanism to provide access to certain products, services, or applications.

CENTRAL BANK DIGITAL CURRENCY (CBDC)

Wholesale CBDC

Wholesale CBDCs are meant to be used as a settlement instrument for domestic and cross-border transactions but cannot be used in retail. These are being explored primarily for the purposes of boosting the resilience of the financial system and enhancing the efficiency of the central bank.

Retail CBDC

Retail CBDCs are meant to be made available to the general public, meaning households and corporates. Key drivers behind the exploration of retail CBDCs are for reducing the cost of management of physical money, a general trend towards cashless societies, and creating a means to more effectively to serve the public.

How Does Tokenisation Work?

In the case of a tokenised security, the process is generally simpler than the issuance of a security token, as tokenised securities are representing an existing security as a token on a distributed ledger. For example, private placements can be notarised and represented on a distributed ledger custody platform to improve processes around checking, searching, or verifying transactions. In this scenario, tokenisation is being applied to augment existing processes.

The process of issuing a security token differs from a tokenised security and could be similar to a traditional Initial Public Offering (IPO), depending on the asset being tokenised. For example, an organisation decides to issue a token for the purposes of funding a project. After the proper strategic, operational, technical, and legal assessment and planning, it launches a token offering to approved international investors, often through a service provider that provides support in the investor outreach, onboarding, and token issuance process. Investors invest funds in return for digital 'security tokens' representing an equity stake in the organisation. After the conclusion of the security token offering, the tokens are listed on a secondary exchange, where others will be able to buy and sell them. Lastly, depending on the terms and rights associated with the token, the organisation may pay out a dividend to token holders over the course of regular operations. A similar process can be extended to issuing tokens to represent other asset classes, such as real estate or bonds.

This tokenisation process creates space for new players to appear on the market, such as token issuance platforms, new digital asset custodians, and secondary exchanges, placing pressure on legacy institutions to improve their own operations and provide new services to meet market dynamics and demands.

How Does Tokenisation Work?

How Does Tokenisation Work?

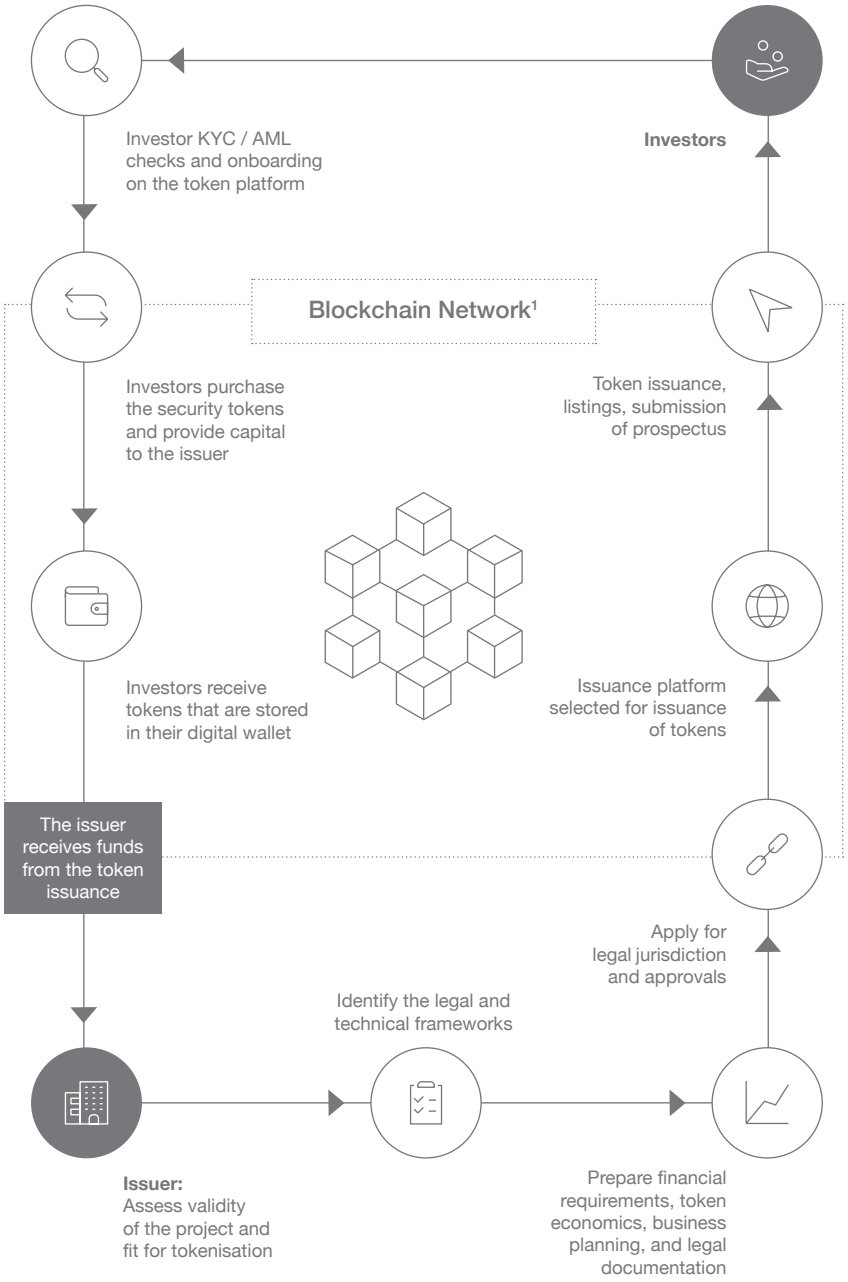
Figure 2
Security Token Offering Process Overview

The process is called a Security Token Offering (STO) and is created, allocated, transferred, and managed through its life cycle on the blockchain platform.

Organisations directly or indirectly involved across tokenisation value chain[2]:

- Issuance Platform / Investment Banks
- Courts and Arbitrators
- Regulators
- Custodial and Non-custodial Exchanges
- Third Party Digital Assets Custodians

Source: C4IR UAE analysis and expert interviews



1. The blockchain network acts as the platform for the issuance and exchange of security token transactions.

2. The tokenisation process involves multiple parties along the value chain. The process overview selects a group of the key organisations for the illustrative purposes and is not exhaustive.

Potential Implications

Tokenisation and digital assets – whether to modernise existing financial market infrastructure as a more effective platform for the trade and settlement of securities, or as a mechanism to create new financial systems entirely – could have many implications. These opportunities could yield substantial benefits and advance global capital markets, from improving current systems to creating new solutions that address existing shortcomings. On the other hand, the development of new parallel platforms and marketplaces may involve new risks that would need to be appropriately addressed through legal and regulatory frameworks.

OPERATIONAL EFFICIENCIES AND TRANSPARENCY

As noted previously, tokenised securities and security tokens emerged as a by-product of blockchain technology, applied in myriad ways. As such, they stand to benefit from the same benefits of blockchain as the financial industry – namely, operational efficiencies and transparency.

From a back-office perspective, **the application of tokenisation and a shared ledger could reduce the need for reconciliation challenges and engagement of intermediaries through streamlining the execution and settlement of transactions.** Currently, completing a securities transaction from execution to clearing and settlement can take days. Maintaining a shared ledger of transactions among market participants has potential to achieve absolute certainty over ownership and origin. Such systems could benefit from instant transaction execution and atomic settlement, eliminating counter-party risk. Assets, or tokens, can instantly be exchanged between recipients if a transaction is validated. The process introduces new efficiencies and agility, potentially saving billions of dollars in processing time and costs. The same could also be applied to new infrastructure for security tokens and other digital assets on similar infrastructure and platforms.

FRACTIONALISATION AND LIQUIDITY

While the underlying concept of fractional ownership is not new, as demonstrated in the initial formation of joint-stock companies in Europe and the evolution of capital markets thereafter, there are still substantial limitations in today's world. For example, certain assets such as real estate, art, or partnership shares in investment funds are still characterised by high barriers to investment and limited liquidity. With the use of security tokens that could represent fractional ownership of these assets, investment opportunities in certain areas of real estate, fine art, and other sectors that would traditionally require significant capital and longer investment horizons may become more accessible to a wider group of investors.

Smaller investment firms and retail investors could be able to diversify to a greater degree and acquire returns from investments that were previously inaccessible.

The arrival of secondary exchanges for these tokens can facilitate one of the most widely endorsed advantages of tokenisation in the form of increased liquidity across asset classes as well as reduction in the cost of trading traditionally illiquid assets. Investment in tradeable tokenised assets could enable investors to enter into transactions at a lower investment level while reducing the average holding period and enabling token owners to trade and exchange without fear of penalty discounts or high commissions.

GLOBAL ACCESSIBILITY OF CAPITAL AND INVESTMENT OPPORTUNITIES

As the ecosystem and underlying infrastructure develops, technology platforms can enable investor access, issuance of tokens, regulatory compliance and trading at scale. The programmability of smart contracts on a blockchain or distributed ledger for security tokens could allow for automated payments, contractual processes for ownership transfer, reduced need for intermediaries when trading tokens and automated life cycle management. This could substantially reduce the need for administrative operations, simplifying and streamlining deal execution.

In a mature, robust ecosystem for tokenised securities and security tokens, a global marketplace could emerge for issuers to raise capital and investors to access new investment opportunities. Requirements and processes for issuers could be standardised, simplifying reporting and compliance requirements for raising capital and investor management. **This could significantly decrease the costs associated with raising funds and thus make the process more accessible, particularly for small and medium-sized enterprises (SMEs).** It would need to be accompanied by proper regulation, along with investor protections, to encourage the growth of retail and institutional investment in such enterprises. Depending on regulation and capital controls, tokenisation could potentially balance compliance and innovation to unlock a global pool of capital and investment opportunities, available at anytime, anywhere in the world.

INTEGRATION OF NEW GLOBAL MARKETS AND SECTORS

By extension, tokenisation **could also be a means to achieve market efficiencies, both domestically and globally.** This is due to the ability to integrate traditionally illiquid assets, investments, and markets. For example, by enabling a more accessible global platform to raise and invest capital, tokenisation could usher in more robust frameworks for capital markets in developing countries or provide access and liquidity to niche projects and assets across the globe.

With minimised barriers to investment, programmable compliance measures and enhanced digital transparency, the investment market could become ‘flatter’ and more accessible to any kind of issuers and investors, from institutional to retail. Investments would no longer be restricted by geographies, asset classes, or sectors, instead being undertaken via a fully accessible global platform for the issuance and exchange of any asset or security.

Industry Applications

Tokenisation has been steadily gaining traction as a means of Modernising financial market infrastructure and creating new alternative investments. As outlined previously, tokens can represent equity, debt, or existing assets, which by nature makes them applicable to virtually all industries for a variety of different purposes – from raising capital to fractionalising assets to unlocking liquidity. Some notable examples have already emerged across industries.

Figure 3
What Can Be Tokenised?

Analysis derived from public announcements, reports and initiative overviews provided by the respective institutions.

Real Estate

ST REGIS

US $18 million was raised in a tokenised real estate offering that gave investors an ownership stake in the St. Regis Aspen Resort.

BTGPactual

BTG Pactual launched the first tokenised investment fund in South America, aimed at investments into distressed Brazilian real estate in the urban areas of Rio de Janeiro and São Paulo.

Financial Services

SOCIETE GENERALE

In 2019 Societe Generale issued the first covered bond (EURO 100 million) as a security token on a public blockchain.

Santander

Banco Santander issued a tokenised US $20 million bond on a public blockchain.

Government

The World Bank, in partnership with Commonwealth Bank of Australia, raised approximately US $108 million after completing two rounds of tokenised bonds issuance (Bond-i).

The Government of Austria, with the assistance from the Oesterreichische Kontrollbank (OeKB) issued EURO 1.15 billion of government bonds on a public blockchain.

Venture Capital and Start-ups

SPiCE VC launched in 2017 in the United Kingdom and sold tokens to investors representing the first fully tokenised venture capital fund.

The Global Opportunity Philadelphia Fund 'GO Philly Fund' has announced plans to raise US $35 million by selling GO Philly Fund tokens.

Commodities

Norlisk Nickel (NorNickel) has received approval from the Central Bank of Russia for its digital asset tokenisation platform that will be used to tokenise commodities such as gold and palladium.

JPMorgan Chase & Co. is planning to tokenise gold bars on their blockchain network.

Case 1: Real Estate

REITBZ FROM BTG PACTUAL
Investing in distressed Brazilian real estate

BACKGROUND

One of the fastest growing markets in Latin America is the distressed real estate market. With the economic difficulties that Brazil has experienced in recent years, there are many properties that can be considered undervalued, with high growth potential. There are two noteworthy real estate drivers in this market. The first is that the Brazilian real estate market is maturing, with improving regulation and government oversight, increasing investment appeal. Secondly, there is a large housing shortage in Brazil that needs to be filled, with an estimated shortage of over seven million homes. This presents a potential investment opportunity that would traditionally be out of reach for the average retail investor, especially those situated outside of the Latin American markets.

DESCRIPTION

The largest independent investment bank in Latin America, BTG Pactual, launched the first tokenised investment fund in the region in 2019: REITBZ. Focusing on distressed Brazilian real estate in the urban areas of Rio de Janeiro and São Paulo, REITBZ's aim is to increase access to such assets by changing the real estate investment landscape. The first security token offering for Brazilian real estate raised over US $3.3 million from retail investors in its initial round. Typically, BTG Pactual offers its services to wealthy institutional investors, and this was its first foray into enabling smaller investors to participate through a digital asset token[3].

IMPLICATIONS

REITBZ is a cutting-edge example of the potential of digital assets being realised. The backing of a well-capitalised investment bank with US $44 billion in assets is encouraging for the future and legitimacy of digital assets.

- It may create a way to bring liquidity to traditionally illiquid Brazilian real estate and provides investment accessibility to retail investors globally.
- The investment information can be shown through a transparent dashboard that provides constant up-to-date information at any time. The profits obtained from the sale of the assets will be distributed via dividends to token holders through the blockchain.
- Regulatory compliance will be supported through the use of an AI-powered system called Jumio. The service will use facial recognition to verify the identity of investors, process documents, and carry out other administrative tasks.
- These technological improvements will speed up the onboarding process and provide greater security for users.

3. 'White paper – ReitBZ powered by BTG Pactual', ReitBZ, 2020.

Case 2: Venture Capital

SPICE VC
One of the first fully tokenised venture capital funds

BACKGROUND

Venture capital has typically been a space that is closed off to the average investor with an interest in taking stakes in start-ups and new technologies. Venture capital funds tend to be restricted to high net worth investors and there are also challenges around start-up investment liquidity. Once a venture capitalist or early-stage investor places their money in such an investment, it is typically locked in for several years until the start-up goes public or is acquired. This is a further barrier to entry for retail investors and remains an issue for many investors of all levels. Moreover, this also restricts the source of capital for start-ups seeking funding to a smaller group of people and firms.

DESCRIPTION

SPiCE VC was launched in 2017 as one of the first tokenised venture capital funds, using tokens to represent its shares. On 31 March 2018, the firm closed its first fund and built up its initial investment portfolio of 12 companies. SPiCE invests in companies within the blockchain sphere, with the aim of further developing the digital asset ecosystem of which it is itself a part. Its security token is listed on the OpenFinance network, a US regulated trading platform[4].

IMPLICATIONS

SPiCE VC represents a promising start to applying tokenisation in the venture capital space. It is one of the furthest along in the implementation of the technology, and the companies involved have been reported to be showing 'significant growth' since the inception of the fund.

A tokenised fund could present several advantages over traditional venture capital funds.

- Venture capitalists can lock in the capital they require, without locking in the investor for an extended period. In a tokenised fund with the availability of a secondary market, investors can buy and sell tokens at any time.
- With Fractionalisation, tokens representing the investment can be divided into miniscule denominations and traded on secondary markets. Beyond initial investments this further reduces the barriers to entry for smaller traders.
- A smaller minimum investment could give venture capital firms the option to be more inclusive with their funds, and access new capital from retail investors.
- The addition of smart contracts can further benefit the industry, helping ease the administrative burden on venture capital firms by enabling more effective portfolio management.

4. Self-reported from the SPiCE VC website, https://spicevc.com

Case 3: Financial Services

VANGUARD
Modernising Financial Market Infrastructure

BACKGROUND

The blockchain technology mechanisms behind tokenisation and digital assets can be applied to modernise or upgrade existing financial market infrastructure and address the limitations of legacy systems. In particular, asset-backed securities (ABS) are an attractive candidate for transformation. Currently, the processes around the securitisation and formation of ABS offerings are time consuming, complex, and inefficient. ABS are generally not transparent with pricing, and loss of information on trading can lead investors to miss out on valuable information as well as on identifying adequate performance of the underlying assets. These issues complicate the creation and trading of ABS.

DESCRIPTION

The Vanguard Group is one of the largest investment companies in the world, with over US $6.2 trillion in global assets under management as of 31 January 2020. Vanguard has been exploring ways to integrate blockchain technology in capital markets since 2017, working closely with blockchain start-up Symbiont, and American ABS issuers and institutions from the financial sector such as BNY Mellon, Citi, and State Street on the modernisation of the ABS securitisation process. In June 2020, Vanguard completed the first phase of its blockchain pilot project, which was focused on the use of a blockchain platform to issue digital asset-backed securities[5].

IMPLICATIONS

Digitising ABS with the use of distributed ledger technology offers numerous advantages over the traditional method of issuance in areas of operational efficiency, transaction speed, and transparency.

- With the use of smart contracts, the process of pooling the assets to form the final financial product can be partly automated, saving time and bringing additional efficiency into structuring the offering.

- Additionally, applying blockchain to the improving of settlement time of ABS can reduce the processing time from days or weeks to hours. This reduction in transaction time could provide further cost optimisation and minimise exposure to risk for investors.

- Transactions are recorded on the blockchain, providing an immutable record for reference and auditing. This provides greater security and protection for ABS holders, as well as providing additional clarity for investors on the quality, value and performance of the underlying assets and financial instruments that were pooled to create the ABS.

5. 'Vanguard Advances Blockchain Technology Pilot To Streamline Asset-Backed Securities Markets', Vanguard Pressroom, 2020.

Regulatory Landscape

Naturally, the response of regulators to digital assets has varied around the globe. While several have become actively engaged in the opportunity and introduced progressive regulations to foster the development of the nascent industry, others have taken a 'wait-and-see' approach. Virtually all regulators, however, are united in ensuring a risk-based approach commonly in line with the Financial Action Task Force (FATF) guidance on Virtual Assets and Virtual Assets Service Providers.

Regulators are unified in their emphasis on consumer protections, as well as critical anti-money laundering (AML), 'know-your-customer' (KYC) and other requirements, and these principles are applicable regardless of the regulatory position taken. Any platforms that take part in issuance, trade or exchange of tokens must thus comply with rigorous regulations on the screening and onboarding of assets, issuers, and investors.

An increasing number of start-ups, corporates, and governments have been investigating the core concept of tokenisation to apply it within the framework of existing or novel regulations. Recently, a notably increasing interest in applying regulatory frameworks to tokens has taken place and a shift in approach towards active legislation can be seen across the globe. For example, countries like Liechtenstein and Switzerland have issued tokenisation regulation, while China is working on a digital currency that could potentially pave the way towards further adoption of digital assets.

Whereas cryptocurrencies native to a blockchain and not necessarily connected with any asset can be grouped into areas such as payment tokens and utility tokens, security tokens represent an attempt to merge new tokens with traditional finance and regulation.

As such, we define the current global regulatory engagement into the following categories:

Figure 4
Regulatory Approaches

C4IR UAE – Developed based on analyses of global regulatory activity and industry interviews.

Active Approach

Retrofitted Regulation

Jurisdictions that have adjusted and created amendments to existing laws to accommodate the activities related specifically to the issuance, trade, and exchange of tokens.

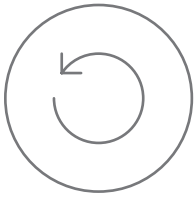
Dedicated Regulatory Framework

Jurisdictions that have created a novel regulatory framework to address digital assets and the tokenisation process from the perspective of all involved stakeholders and processes.

Passive Approach

No Action

Jurisdictions where no regulatory framework has been developed or guidance issued regarding digital assets and related activities.



Application of Existing Regulation

Jurisdictions where tokenisation is fit into the existing realm of the regulatory frameworks with little to none modification. This approach could as well take a case-by-case evaluation method.

UAE Insights

UAE Insights

The United Arab Emirates (UAE) continues to further its national mandate of adopting and developing emerging technology for economic growth, social development, and government efficiency. This is reflected in initiatives and strategies such as the National 4IR Strategy, National AI Strategy and Dubai and Federal Blockchain Strategy, as well as the emergence of national priorities such as the digital economy and AI, under the Minister of State for Artificial Intelligence, Digital Economy and Remote Work Applications, and the newly formed Ministry of Industry and Advanced Technologies. This is also seen in the robust ecosystem of pro-business regulatory frameworks, tax laws, and free zones in the UAE, established to encourage business start-ups and economic growth. The UAE was ranked among the top 50 destinations for start-ups, the highest in the MENA region[6], by Zurich-based research firm Start-up Blink, and has ranked 25th globally in the World Economic Forum's 2019 Global Competitiveness Report as the most competitive economy in the MENA region[7]. This ecosystem continues to form the foundations for emerging and innovative opportunities, such as digital assets and tokenisation.

As digitalisation and business restructuring become even more important, particularly post COVID-19, it is vital to continuously assess the technology landscape to understand the value, impact, and other features of new innovations. The first half of this report provides a background on digital assets and tokenisation, including a set of considerations and benchmarks to review. The second half of the report focuses on the context of the UAE.

The C4IR UAE conducted a survey of over 100 industry stakeholders, across start-ups, digital asset service providers and community, government entities, and regulators to understand the current ecosystem and appetite for digital assets in the UAE.

In addition, the Centre conducted over 25 in-depth interviews with key stakeholders across various governmental, regulatory, operational, technical, and strategic roles, to understand how digital assets could affect existing market infrastructure and regulatory policies, and the role these stakeholders play in overseeing, and managing the development of any such digital asset ecosystem.

6. Sharma, A., 'UAE ranks among 50 top start-up destinations, says report', *The National*, 2020.

7. Khan, S., 'UAE remains most competitive Arab economy as it climbs up ranking', *The National*, 2019.

Figure 5
Survey and Interview Composition

When asked about the impact of digital assets across industries, survey and interview respondents cited financial services and real estate as the two key areas that have the most potential to be affected by tokenisation. These two areas play a significant role in the UAE economy, with Dubai being named among the leading global financial hubs according to The Global Financial Centres Index (GFCI)[8], and real estate playing a vital part in the country's development. Initial assessments suggest that these sectors would provide a logical first step to explore in unlocking the value of digital assets.

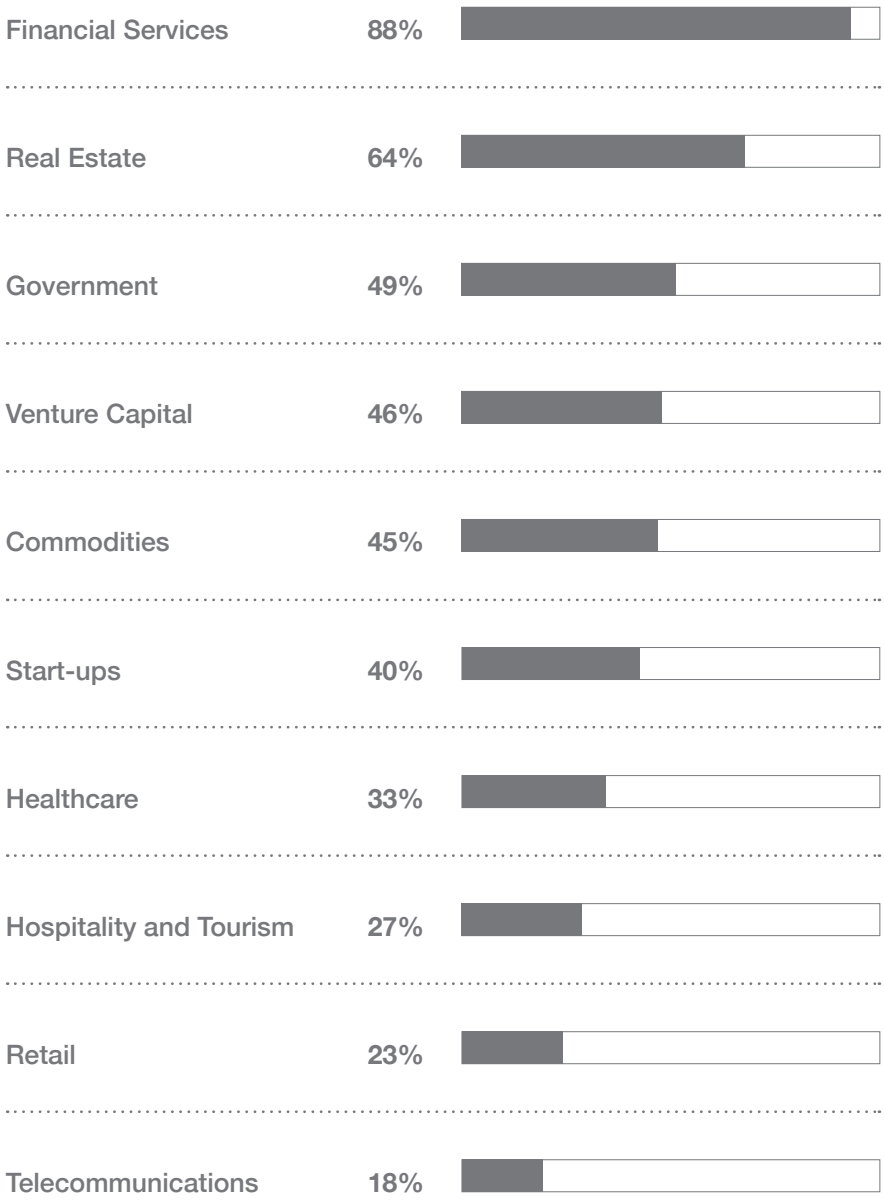
8. "The Global Financial Centres Index 27", Z/Yen & China Development Institute (CDI), March 2020

Financial services and real estate have the most potential to be **affected by tokenisation.**

Figure 6

Which areas do you believe will be most impacted by tokenisation? (Top 10)

Source: C4IR UAE Tokenisation and Digital Assets Survey of industry stakeholders.



FINANCIAL SERVICES

According to 88% of respondents, financial services is expected to be the industry most impacted by tokenisation and digital assets.

First, the financial industry has actively explored platforms to tokenise securities and streamline back-office costs, in areas such as the clearing and settlement of securities transactions. Using distributed ledger technology platforms as a digital custody solution for private placements and tracking other assets has also been cited as an area of opportunity by interviewees. Tokenisation may present a mechanism to tokenise fixed assets such as collateral for loans, with the right infrastructure to tokenise, exchange, and redeem them.

Second, using security tokens, tokenisation may add a much-needed layer to the financial ecosystem, connecting organisations seeking debt or equity financing with prospective investors in a more accessible, efficient, and transparent manner. Investors could invest in tokens representing small fractions of assets, allowing individuals and small investors to finance companies they believe in.

Companies that need an injection of capital immediately must currently go through a challenging process to get the loan they need as sources may be limited. Debt tokens could minimise the time needed to get financing through increased transparency, smart contracts, and reduced numbers of intermediaries. A shared ledger of transactions can connect the lender and borrower directly, cutting out the need for custodians and eliminating transaction costs. Smart contracts can pay out dividends and interest automatically.

When asked which areas of the financial sector could capture the most value from security tokens, the area most often cited by respondents in interviews

was SME financing. According to the UAE Ministry of Economy, SMEs are the major driver behind job creation in the country (86% of the private sector workforce), representing 94% of the total number of the companies operating in the country[9]. At the same time, this segment of companies faces several challenges in terms of financial liquidity and access to the capital needed to scale their business. Furthermore, SMEs are amongst the most heavily affected by the deteriorating global market conditions due to the COVID-19 pandemic.

In this regard, **digital assets may play a crucial role as a catalyst in accelerating the standardisation and accessibility of equity and debt financing for start-ups and SMEs.** Such steps could be a key factor in driving down the complexity and cost of capital for SMEs, as a by-product of digital asset ecosystem maturity. However, to achieve the full value of tokenisation for SMEs, respondents emphasised that clearer financial reporting guidelines would need to be put in place to reduce complexity for enterprises, as well as to protect investors. As security tokens could enable this new marketplace for financing, new opportunities along with new risks would become available to smaller investors, potentially causing financial vulnerability if smaller investors lose a substantial amount in the buying and selling of a token. It is thus crucial to ensure adequate disclosures and the protection of investors in such a scenario.

9. 'The impact of SMEs on the UAE's economy', UAE Government, 2019.

REAL ESTATE

Real estate has been cited by proponents of tokenisation as one of the highest potential areas of application for the technology, and survey stakeholders corroborated this, noting potential advantages in fractional ownership and improving liquidity. The real estate sector has historically been one of the strategically most important areas for the UAE, with its activities listed among top contributors to the country's GDP. In 2018, real estate and construction activities contributed 14.4% of the Gross Domestic Product (GDP) of the Emirate of Abu Dhabi[10] and 13.6% of the GDP of the Emirate of Dubai[11].

Ergo, both residential and commercial real estate is a top candidate for security tokens driven by fractional ownership of properties. Tokens can represent a relatively small portion of owner equity that could be purchased by an individual investor, enabling new investment opportunities and an inflow of new capital. With appropriate secondary markets for these tokens, tokenisation could greatly increase liquidity for the sector, with accessibility for smaller investors who were traditionally not able to enter due to investment barriers and relatively low liquidity as an asset-class.

It is worth noting that tokenisation does not mitigate traditional risks of real-estate investment. For example, investors may face risks related to construction operations, such as delays, structural risks related to project financing, or general systemic risks and market changes related to the economy, inflation, or demand.

10. 'Statistical Yearbook of Abu Dhabi', Statistics Centre, Abu Dhabi, 2019
11. 'Annual Report: Real Estate Sector Performance 2019', Dubai Land Department, 2019.

OTHER AFFECTED SECTORS

GOVERNMENT

Government was ranked third among all sectors in terms of the potential impact of tokenisation and digital assets. Central Bank Digital Currencies (CBDCs) are currently a topic of interest for many central banks around the world. Most applications are related to the use of either wholesale or retail CBDCs. Wholesale CBDCs can be used as settlement instruments for domestic and cross-border transactions, accessible only to certain organisations, whereas retail CBDCs are designed for the general public, further advancing a cashless society. Retail CBDCs could also yield efficiencies in government services, such as distribution of government support and financial aid.

Digital assets could also be applied to restructure or issue new sovereign debt. Alternatively, governments could issue utility tokens representing a tax credit, essentially an income tax cut, reducing future tax revenues for immediate inflow of capital. Tokens could be also used to pay debts that the government owes to domestic businesses, preserving its cash position.

In debt restructuring, creditors could swap their debt instruments for tokens containing revised terms. New participants could also purchase tokens in the offering. This is closer to traditional debt restructuring that has underlying economic implications beyond the scope of this report.

The core implication is that issuing such tokens, either as a utility or debt token, is the equivalent of injecting liquidity into the economy if the tokens themselves are liquid, without altering the monetary supply. This has many economic implications and potential risks that would have be evaluated further prior to deciding on implementation.

VENTURE CAPITAL

Tokenisation of venture capital funds was also ranked highly in terms of potential impact, selected as significant by 45% of respondents. By tokenising funds, venture capital firms can raise and lock in the necessary capital required to fund new investments, without locking in the liquidity, yielding two key benefits. The first is a more inclusive opportunity to small and large investors to diversify their investment portfolios or invest in start-ups. The second is to offer liquidity to their investors, given that traditional venture capital funds typically have at least a five to seven-year lock-in period. A tokenised fund could list tokens on a viable secondary exchange where investors could liquidate their holdings much earlier, providing them with more flexibility.

In the UAE, several initiatives have been formed to develop leading innovation and technology ecosystems, such as AREA2071 and Hub71. According to a 2019 MAGNiTT report, the UAE received the largest share of total start-up funding in the MENA region, with 59%[12]. As venture capital continues to evolve in the country, the development of tokenised venture capital funds could be a strategic priority to advance the development of early-stage start-ups and the innovation ecosystem.

As tokenised venture capital funds could enable new investment opportunities for smaller investors, it is important to note that investment in start-ups and early-stage companies carries potential risks, such as delayed return on investment and potential failure. While experienced angel investors and venture capitalists have a greater awareness and tolerance of such risks, smaller new investors may not have the same familiarity. Thus, risks and conditions corresponding to such investments must be adequately disclosed and managed appropriately for new investors to mitigate outsized exposure to such investments.

COMMODITIES

The UAE is a leading regional hub for the international exchange of commodities, particularly crude oil and precious metals such as gold. The value of the UAE's trade in raw and semi-worked gold and diamonds amounted to AED 258.4 billion in 2018[13]. According to the Ministry of Economy, the UAE was ranked first in the Arab world and fifth globally in terms of value of exports and re-exports of precious metals. For this reason, there is an opportunity to assess the impact of tokenisation on the commodities markets.

Tokenisation could be applied to commodities in various ways. For example, gold can be represented as a tokenised asset, where gold sourced from more sustainable miners could yield a premium on the market. JP Morgan is actively exploring the tokenisation of gold by electronically tagging tamper-proof cases of gold and tracking their journey across the value chain[14].

12. '2019 MENA Venture Investment Summary', MAGNiTT, 2020.

13. 'UAE gold, diamond trade in 2018 totals AED258.4 billion', Emirates News Agency, 2020.

14. 'JP Morgan's Quorum blockchain opens new world of trading opportunities', *The Australian Financial Review*, 2018.

One of the main aims of the research conducted was to assess the specific opportunities around tokenisation and digital assets for the UAE, and what steps can be taken to apply the underlying technologies. This was done from the perspective of both business-cases: 1) Modernising existing financial market infrastructure; and 2) developing new platforms for investments and advancing liquidity in certain sectors. The following ranking illustrates the top four opportunities for the UAE as indicated by survey respondents.

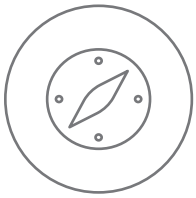
Opportunities for the UAE

Figure 7
What are the top opportunities for the UAE? Which part of the ecosystem should the UAE participate in? (Ranked)

Source: C4IR UAE Tokenisation and Digital Assets Survey of industry stakeholders.

Utilise the Technology

Asset tokenisation could be applied in key areas in the UAE such as financial services and real estate in order to capitalise on potential digital asset benefits such as wider access to capital and investments, liquidity, and transparency.



Attract Companies

By developing regulatory and operation foundations for tokenisation early on, the UAE could position itself as an attractive destination for foreign companies – whether for token issuers, or digital asset service providers and exchanges.

Attract Capital and Investors

By developing a robust digital asset ecosystem, with favorable regulations, consumer protections, enforcement and other measures; the UAE could enhance its position as a secure and transparent regulated financial hub, attracting retail and institutional investment and providing sophisticated digital custody services.

Attract Talent

In line with the UAE's vision of becoming a vibrant hub for cutting-edge innovations and R&D, initiatives to attract talent and start-ups around providing digital asset services may position the UAE as a hub for digital asset platforms, exchanges, and custodians, advancing an ecosystem that can yield synergies in other opportunity areas such as attracting token issuers and investors.

By nature, tokenisation entails a digital asset marketplace of issuers, investors, and many stakeholders. Consequently, both survey respondents and government officials raised important questions around the development of clear regulations and standardised end-to-end tokenisation processes. These would need to ensure that all parties involved in the value chain have fit-for-purpose regulatory assurances and requirements for issuers, compliance requirements for service providers and exchanges, and protections for investors. While to a certain degree this will also rely on how digital assets are dealt with in other jurisdictions, the UAE can position itself as a leader in this regard, pursuing several of the above opportunities simultaneously.

Currently, tokenisation still remains a largely unexplored opportunity for the UAE, but given its positioning and ability to attract companies from the region and globally, deploying innovative approaches to investments and financing could reap the benefit of attracting issuers, service providers, and investors, developing a thriving digital asset ecosystem.

Taking Action to Encourage Digital Assets Development

The survey also asked respondents to note what actions they saw as necessary to encourage the development of this field. Over 96% of respondents believed that the UAE should explore and encourage digital assets. Even as comprehensive regulation evolves, the sentiment was that policymakers and regulators should work more closely with other public and private sector stakeholders to understand the full direct impact and the secondary consequences of digital assets. This could be done through the development of a ring-fenced ecosystem, such as a 'sandbox' where use cases and scenarios could be explored in a controlled environment. It could also be done via other incentives for talent and companies. Through the know-how and expertise developed during these exercises, regulation would be key to ensuring the long-term opportunity and growth prospects for a digital asset ecosystem. This was also corroborated in several interviews with various industry stakeholders.

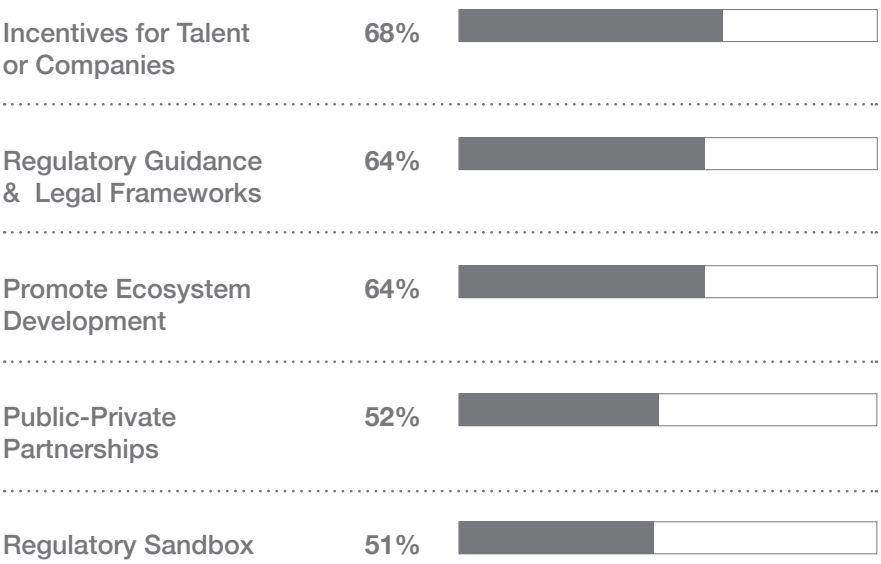
Both approaches above are relatively straightforward low-cost initiatives, especially considering the potential upside. Thus, it can already be seen that initial efforts are already underway to engage the digital asset community and service providers, through financial centres such as Abu Dhabi Global Market (ADGM) and the Dubai International Financial Centre (DIFC), with their regulatory agencies – the Financial Services Regulatory Authority (FSRA) and the Dubai Financial Services Authority (DFSA), respectively. The Securities and Commodities Authority (SCA) has recently approved its draft law after consultations on the matter, and the UAE Central Bank is also assessing tokenisation and other financial technologies to various degrees. These steps should be expanded and strengthened in the near future. While the secondary order consequences of developing a digital asset ecosystem are not yet fully clear, these will be among the defining elements of any ecosystem development. It will be key to expand the scope of collaboration to look beyond areas of regulation, compliance, and company licences, to questions such as the impact on existing financial infrastructure, the integration of existing industry stakeholders, and marketplace awareness among both investors and issuers.

Figure 8
What actions, if any, would you recommend the UAE take?

Source: C4IR UAE Tokenisation and Digital Assets Survey of industry stakeholders.

96%

of survey respondents believed that the UAE should explore and encourage digital assets:



As part of an exercise to determine the critical path for developing a digital asset ecosystem, respondents were surveyed on the priority order of key milestones – regulation, issuer interest, and availability of service providers and exchanges. The three milestones were numbered by respondents by order of importance. **The first main step identified as critical by a majority of respondents – 58% – was that clear regulations must precede any meaningful development of a digital asset ecosystem.** In terms of token taxonomy (see Figure 1), there must be clarity around the classification, recognition, and regulation of various types of tokens prior to any large-scale activity in the open market. This is an area in which several initiatives by UAE authorities are already underway that could be supplemented by some of the proposed activities in Figure 8.

Ranked second was the importance of awareness and demand from organisations to tokenise equities, debt, and other assets. While less unified than in their opinion of regulation, 43% of ecosystem stakeholders voted that that early buy-in from organisations that would be candidates for the issuance and exchange of tokenised securities and security tokens should follow regulation. Building on the two steps that set the foundations for wider adoption, **the third step seen as next was the proliferation of digital asset service providers and secondary exchanges** (voted in third place by 46% of respondents), attracting stakeholders across the value chain to further develop and standardise the digital asset ecosystem.

Respondents were particularly split on the second and third steps – namely on which was the greater priority between developing market infrastructure and market demand. Too much focus on one without the other would lead either to strong issuer demand without the necessary market infrastructure or robust platforms and exchanges without a market. However, rather than serving as a prescriptive order of activities, this exercise should serve to illustrate that while regulation is a clear first priority, the surge of new digital asset offerings and growth in underlying market demand can subsequently evolve together provided they are kept in balance. As with any new technology, a significant investment must also be made in education and alignment with prospective beneficiaries.

While it is clear that these three activities must develop in tandem with one another, and in parallel with growing investor appetite, the following figure provides an indicator of where the initial focus should lie.

Figure 9

What needs to come first for the UAE to develop a digital assets ecosystem? (Ordered)

Source: C4IR UAE Tokenisation and Digital Assets Survey of industry stakeholders.

Step 1

1

Comprehensive Regulation

- 60% of interviewed stakeholders have named formation of clear regulatory guidelines, frameworks, and compliance requirements as the first step towards developing a digital assets ecosystem.
- Regulations must strike a balance to ensure that barriers are realistic enough for new entrants and innovative offerings, without compromising on compliance requirements.

Step 2

2

Awareness and Interest from Companies Looking to Issue Tokens

- Once the right regulatory infrastructure and guidelines are in place, there must be awareness and appetite from companies looking to issue tokens in order to drive the market for digital assets.
- Adoption will be highly dependent on the time and cost associated with token issuance and compliance.
- On the other hand, there must be a level of awareness and comfort around digital assets from investors in order to make the market.

Step 3

3

Proliferation of Digital Asset Service Providers and Exchanges

- The third step in developing the digital asset ecosystem is the proliferation of service providers and exchanges, driven by favourable regulations and market demand.
- This could begin a positive feedback loop by simplifying the costs, processes, and assurances associated with a token issuance, attracting more talent, companies, and investors.

UAE Initiatives

Several initiatives are already underway in the UAE to explore, develop, and regulate the emerging digital asset ecosystem. These encompass both onshore and offshore activities and regulations. Both regulators and regulated entities in the UAE have already initiated regulatory frameworks, guidance and consultation, sandboxes, pilots, and in-principle approvals for operations.

ABU DHABI GLOBAL MARKET (ADGM)

The Financial Services Regulatory Authority (FSRA), responsible for issuing licences and regulating entities in ADGM, first launched a virtual asset (formerly crypto asset) regulatory framework in June 2018. In May 2019, this guideline was further updated, with increased detail and increased scope. The free zone is actively working to support the development of digital assets by creating a dedicated regulatory framework for digital asset service providers, exchanges, and other stakeholders.

DUBAI INTERNATIONAL FINANCIAL CENTER (DIFC)

The DIFC has been actively engaged in encouraging developments in financial technology, with the creation of the FinTech Hive, a start-up accelerator for financial technology. The DIFC also recently launched the DIFC Innovation Licence to support cutting-edge technology companies, including digital asset service providers. In June 2020, the Dubai Financial Services Authority (DFSA), the regulatory body of the DIFC published ‘A Market Overview of Custody for Digital Assets’, a discussion paper expanding on the growth of the digital assets market and evaluating implications on digital asset custody and regulation, emphasising the need for close collaboration between regulators, providers, and consumers.

DUBAI MULTI COMMODITIES CENTER (DMCC)

The DMCC was launched in 2002 by the Government of Dubai to establish a hub for the global commodities trade. As of 2018, it was recognised as the largest free zone in the UAE. In January 2020 at Davos, it announced the launch of the DMCC Crypto Valley, in partnership with CV VC and CV Labs, with the aim of fostering a blockchain and digital asset ecosystem. The Free Zone already has a Blockchain Licence and Proprietary Trading Crypto Licence activity to make operations easier for new entrants and is actively exploring what other licence activities may be offered to support the ecosystem.

UAE SECURITIES AND COMMODITIES AUTHORITY (SCA)

On 15 October 2019, the UAE Securities and Commodities Authority (SCA), which is responsible for regulating and monitoring financial markets, released a first draft of a framework for the regulation of issuing and offering crypto assets. One year later, on 21 October 2019 the SCA formally approved regulation for the issuance and exchange of digital assets. This is a promising step for the UAE in developing an ecosystem for digital assets and regulated onshore activities.

UAE CENTRAL BANK

The UAE Central Bank is currently experimenting with a digital currency called Aber through a joint effort with the Saudi Arabian Monetary Authority (SAMA). A joint statement released by SAMA and the UAE Central Bank stated the project 'is for use in financial settlements between the Kingdom of Saudi Arabia and the UAE through blockchains and distributed ledgers technologies'. The UAE Central Bank also works closely with other authorities within the UAE on such matters, and recently announced it was launching a FinTech lab in 2019 to support innovation in the banking sector.

Market Sentiment: Confidence in UAE Ecosystem Development

From both regulatory and ecosystem perspectives, initiatives in the UAE appear to be positively influencing market sentiment. Respondents expressed confidence that regulatory guidance and ecosystem development for digital assets will mature in the near future – 81% of respondents believe that established regulation will emerge within two years, and 78% believe that with the right conditions, initial mainstream adoption could be reached within four years. With the recent approval of digital assets regulation by the UAE Securities and Commodities Authority, regulation and ecosystem development is well underway. While this data represents a valuable indication of general sentiment, tangible impact will be heavily influenced by factors beyond regulation, such as:

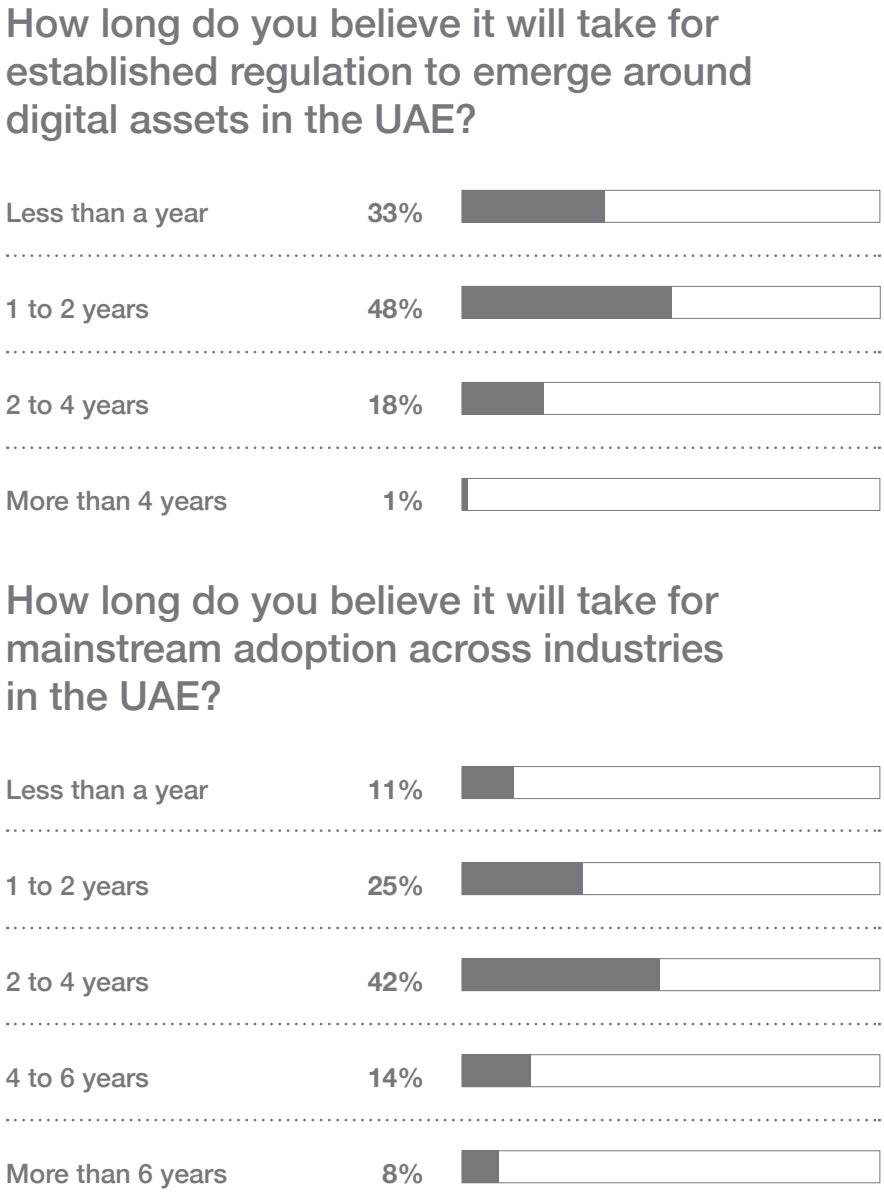
Operational factors: development of digital-asset specific licences, processes and guidelines for digital asset issuance and exchange;

Legal factors: ownership rights and transfer, compliance, enforcement, and arbitration; and

Technical factors: interoperability, security, digital asset custody solutions, potential integration and / or competition with existing financial infrastructure.

Figure 10
Market Sentiment

Source: C4IR UAE Tokenisation and Digital Assets Survey of industry stakeholders.



Challenges to Adoption

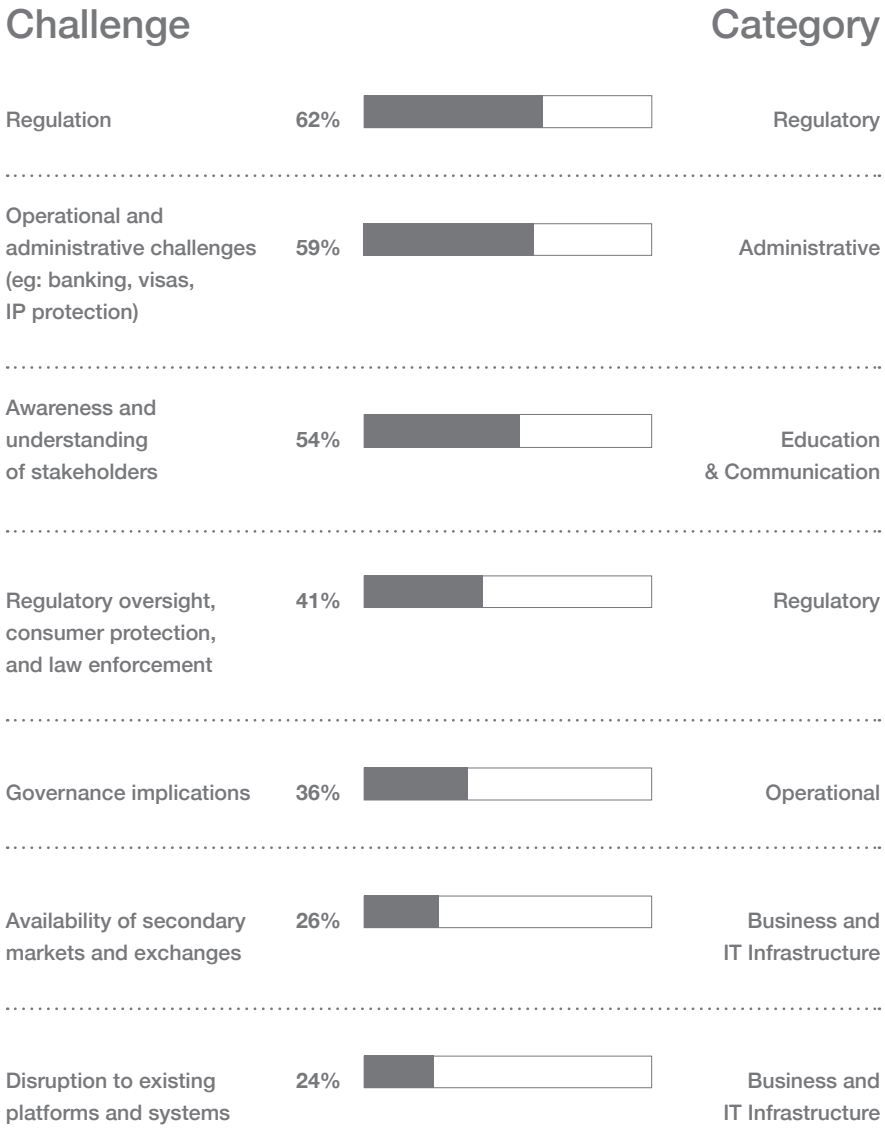
While the considerable potential of tokenisation is clear for several applications, the path forward will require a number of areas to be addressed, with several questions in domains such as regulation, governance, and infrastructure remaining unanswered. As regulation remains unclear in many jurisdications, token offerings have applied a conservative approach, limiting their own risks and liabilities, often to the detriment of investors. In many cases, these tokenisation initiatives are operating with limited legal and business frameworks, which do not necessarily confer ownership or certain rights to investors and may not be providing clear security and protections. This applies to voting rights allocation, financial reporting, how returns will be calculated and distributed, and more.

For asset tokenisation to evolve and scale up to the institutional market, there must be a clearer conversation about the structure and compliance of such token generation deals, the risk involved, and how investors and their money can be protected. Investors must know what they are investing in, if the token in question possesses legally binding ownership rights, and how these functions may overlap with existing civil and corporate law. Other classifications of digital assets such as payment tokens also face open questions around their exchange and usage. For the time being, many of these questions are still in the exploration phase.

For asset tokenisation to evolve and scale up to the institutional market, there must be a clearer conversation about the structure and compliance of such token generation deals, the risk involved, and how investors and their money can be protected.

Figure 11
What are the top challenges to digital asset implementation and adoption?

Source: C4IR UAE Tokenisation and Digital Assets Survey of industry stakeholders.



Challenges to Adoption

Within the context of the UAE, there was a clear indication that regulatory and structural challenges remain to realising the potential of digital assets. These challenges include the need for regulatory clarity and defined frameworks for oversight and governance, as well as operational and administrative questions specific to the UAE, such as banking matters, visas, protection of intellectual property, and other concerns. Resolving these challenges is a prerequisite to the development of any digital asset ecosystem. On the positive side, there are a number of Emirate- and Federal-level initiatives underway to support the continuous improvement of these operational and administrative requirements. Moving forward, it would be beneficial to identify overlaps with these existing initiatives when considering activities to undertake from Figure 8.

Although tokenisation promises many advantages and leaps forward in terms of improving existing financial systems and developing new platforms, there are several hurdles to overcome in terms of achieving broader adoption and attaining these potential benefits.

INFRASTRUCTURE AND ECOSYSTEM READINESS

The challenges in the infrastructure and ecosystem for tokenisation can be explored within two domains, business and technical. The business factors are related to market dynamics and the business rationale behind embracing digital assets, while the technical factors are around the readiness and maturity of the technology platforms.

The underlying infrastructure required for these systems to succeed is not yet as mature as it needs to be. Regulatory requirements are often unclear and stringent existing compliance measures for financial institutions can act as a barrier to new service providers.

Furthermore, many of the potential benefits of security tokens cannot yet be realised as fundamental aspects of the ecosystem are in their early stages, one example being robust secondary markets for the trading of digital assets.

Most importantly, there must be a certain degree of scale in order for the development of a robust ecosystem. If a critical mass of adoption cannot be reached, then many of the potential benefits of tokenisation cannot reach their full potential. For example, increased liquidity will not be achieved if retail and institutional investors have no access to platforms where tokens can be purchased and traded. If tokenisation is to gain traction and evolve, it needs widespread adoption and infrastructure.

As tokenisation is an emerging technology, awareness and understanding of what the technology entails is limited and this can create a psychological barrier to adoption that needs to be worked through. Some may have doubts, while others may overestimate the capabilities of the technology and expect benefits that may not be feasible. Tokenising securities and use of security tokens do not fix every challenge and limitation of current securities that exist. Neither do they add liquidity on their own; rather they serve as a technological enabler to new operational and business models.

This risk of unrealistic expectations can also inhibit the adoption of tokenisation, and as with every emerging technology, there are strengths and weaknesses. In some areas, tokenisation may prove very beneficial, while in others it may not yield the benefits that are expected.

REGULATION AND GOVERNANCE STRUCTURE

Regulatory considerations remain at the top of the list of challenges to the adoption of tokenisation. Tokenisation will need regulatory frameworks and mechanisms to be adopted for the mainstream market. Legal documentation and structures will need to be created to link physical assets to digital tokens. Furthermore, legal regulation needs to shape the landscape around these tokens, so they can function as securities with all of the benefits that digitisation brings. Naturally, the challenge here is markedly larger than simply that of tokenising existing securities to streamline existing clearing and settlement processes.

However, the global regulatory landscape still remains uncertain. If digital assets are not seen as property under the eyes of the law, then they cannot be owned; and if they cannot be owned, they cannot be traded or exchanged. Tokenisation and digital assets are moving at a rapid pace, but regulatory systems around the world have not all moved at the same velocity, leaving a gulf between what could be possible and what is possible. Additionally, although free zones are in place outside of the main UAE jurisdiction, for mass adoption of tokenisation to succeed, the evolution of onshore activities as per the recent UAE SCA regulation will be a key aspect of ecosystem maturity.

The uncertain landscape means that many companies remain hesitant to explore tokenised securities as a funding mechanism. The new environment can be intimidating for those who may not know where to start or how to ensure a compliant and successful security token issuance. **A risk-based approach towards key areas such as KYC and AML requirements, as well as ownership and tax implications, remains at the top of the agenda for concerned regulators,** though significant changes in regulations could hamstring future development. Generally, greater regulatory clarity is needed globally for digital asset ecosystems to develop further.

There must also be additional clarity when it comes to the governance of tokenised securities. When an asset is potentially divided between thousands of owners, what is the governance model, and how do stakeholders align? For example, in an apartment complex that has been tokenised, who pays the maintenance fees? Who deals with the tenants? If the building is burnt down in a fire, how will compensation be dealt with? Governance frameworks need to clearly define rights and responsibilities of investors and owners, much as they do today with traditional securities.

These are examples of issues that regulation could provide clarity on – if a framework is developed, these challenges can be managed.

A risk-based approach towards key areas such as KYC and AML requirements, as well as ownership and tax implications, remains at the top of the agenda for concerned regulators.

INDUSTRY TRANSFORMATION AND DISRUPTION

Another major question around the proliferation of digital assets is the disruption to existing platforms, systems, and processes. The real estate sector can illustrate some of these challenges. Larger investors have economies of scale and can use their vast resources to physically inspect properties and value purchases. Smaller investors who do not possess such resources will benefit the most from the transparency that tokenisation brings, though this does not negate broader conditions and risks associated with such investments. Larger investors may feel threatened from this change in the status quo and might be reluctant to support such a technology.

Major players in the industry whose business models could be challenged include intermediaries such as debt servicers, brokers, appraisers, and lawyers. Automated payment streams through tokens could significantly reduce the need for debt servicers. The power of brokers could also be reduced as increased data transparency would drastically cut their workload. Immutable and comprehensive record keeping reduces workload and the corresponding need for appraisers and auditors. Smart contracts may require more time to set up from lawyers but would need less follow-up once implemented. This could change the pricing structure for legal firms in the industry.

TECHNICAL LIMITATIONS

There remain technical hurdles to overcome to bring tokenisation into the mainstream, such as the limitations of smart contracts, interoperability between blockchains, potential errors on an immutable platform, and stability in a hyper liquid market.

- So far, it has been near impossible to have smart contracts that are completely comprehensive. Currently, it is not physically possible to record every conceivable situation that could arise and have an airtight contract. Therefore, there may be inherent limits to the effectiveness of the smart contract.

- Another issue is interoperability between blockchains. There needs to be one cohesive standard adopted by the tokenisation community. If multiple platforms are used to tokenise assets, a transfer can only take place and be recorded on the platform where it was initiated. This fractures the market and may negate some of the benefits of using the technology in the first place.

- There are also questions around how operational errors will be handled. If a transaction is mistakenly carried out, how will it be reversed? Can it be reversed if one of the parties disputes the transaction? These are questions that will need to be discussed.

- Tokenisation could increase liquidity in certain asset-classes and there are questions around whether markets could become 'hyper-liquid', as similar concerns have already been raised in commodities markets. As barriers to entry and market inefficiencies are eliminated, will hyper-liquidity be a risk? Will platforms require additional management and governance measures to prevent this issue?

These are some of the major technical challenges that will need to be addressed if widespread adoption is to occur. It is notable that technical challenges may vary depending on legacy systems and the state of financial markets within any given country.

Digital Assets Consideration

Although the application of blockchain and distributed ledger technologies to modernise financial market infrastructure is well underway, these remain largely limited to back-end processes that stakeholders such as issuers and investors rarely see.

New investments in the form of security tokens and other digital assets are likely to entail new regulations, service providers, and secondary exchanges. Stakeholders must therefore be cognisant of the differences between new systems and those that they are used to. Hence, as organisations forge ahead with digital asset products and services, there are several questions potential stakeholders must ask about the opportunities, risks, and processes involved.

ISSUER

- How does the process of raising equity or debt financing through a token offering differ from existing methods?
- Is there a practical and feasible business case for my organisation to issue a security token to raise funds? What are the costs and benefits of this approach versus others?
- What kind of planning is required to understand how tokens could affect my capitalisation table, balance sheet, or tax obligations?
- How can I ensure proper regulatory compliance and reporting across jurisdictions?
- Is there a sufficiently developed digital asset ecosystem to ensure enough investor demand?

INVESTOR

- How can I educate myself to understand the real opportunities and risks of security tokens and other digital assets?
- How are my investment contracts structured? How can I be sure that prospective investments are legitimate and legally tied to an asset?
- What regulatory jurisdictions are involved? Are there stringent regulations and safeguards in place to protect investors?
- How does the process of investment, ownership, and trading change in this new ecosystem?
- How will the value of my assets be established and managed moving forward? Do I clearly understand what my digital asset entitles me to?
- What secondary markets will be available to liquidate my holdings? Will my digital assets be tradeable on other platforms?
- How long will I have to wait until a mature secondary market develops where I can trade my digital assets?

REGULATOR

- How do security tokens work, and what regulated entities are involved in the process? What are the major risks or gaps that regulation would need to fill?
- What are the business, technical, operational, and legal implications – where does our role fit in?
- When considering global networks of issuers, service providers, and investors in the ecosystem, how do we account for the roles and responsibilities of several regulatory jurisdictions?
- How should we regulate new service providers, exchanges, and custodians? Do we apply or amend existing rules, or create new ones entirely?
- How can we develop regulations that will be comprehensive, but also align with international standards?
- What potential governance issues can be expected? Who will be legally responsible in heavily fractionalised investments, and will this affect any other government bodies or authorities?
- How will regulations be implemented and enforced? Are there any legal precedents to deal with digital asset litigation?

While the future direction of tokenisation is still contested, regulators, start-ups and corporates alike have already started to explore the technology. Despite the relative nascency of the market for tokenised assets, enterprising service providers and token issuers have forged ahead with their own innovative offerings. From Modernising legacy financial market infrastructure, to tokenising commodities, real estate, and investment funds, real-world applications of tokenisation are already in play.

Conclusion: Future and Recommendations

The UAE private and public sector stakeholder see the opportunity in asset tokenisation

From an assessment of market sentiment through the UAE digital asset survey, as well as from in-depth interviews with industry stakeholders and regulators who are actively engaging with the technology, a general consensus is apparent that asset tokenisation presents an growing opportunity for the UAE as one of the technology enablers of the future of finance. From discussions with government and regulators, anything that enhances the security, transparency and accessibility of the financial markets in the UAE is welcomed, as long as regulation, security, compliance, and enforcement are effectively implemented.

The gradual evolution of the tokenisation ecosystem, from regulation to live applications, will enable UAE organisations to steadily evaluate and adopt the right approach

As initiatives across the UAE continue to evolve, the emphasis will gradually shift from developing regulatory frameworks to developing the ecosystem itself. As regulation matures, stakeholders will encounter second-order consequences with regards to new and existing financial infrastructure, digital asset custody, arbitration and enforcement, and other areas. Where not all consequences can be identified up front and ‘unknown unknowns’ may exist, many implications and challenges around digital assets may only become apparent as end-to-end tokenisation projects and operations begin to take place in a live setting.

Potential unforeseen barriers to tokenisation may still arise, even in an ideal regulatory environment. Hence, closer collaboration between regulators, licensing authorities, financial institutions, service providers, and corporates will be critical.

RECOMMENDATIONS

As this report indicates, digital asset stakeholders are eager to collaborate with regulators and financial institutions to advance the development of digital assets. Correspondingly, regulators and financial institutions are actively exploring the technology and its implications. This is reflected in the existing initiatives underway at Abu Dhabi Global Market, Dubai International Financial Centre, and Dubai Multi Commodities Centre. These Free Zones are already developing programmes and licence structures to enable digital asset operations and to attract digital asset service providers, issuers, and investors.

Identification and engagement of the right stakeholders early on is a crucial for ecosystem development

To take such an approach forward, a concerted strategy is needed. One of the key challenges is identifying, gathering, and onboarding the right stakeholders. Tokenisation entails a marketplace or ecosystem – one of issuers, investors, digital asset platforms and exchanges, financial institutions, banks, custodians, and courts, among others. All of these entities have a role to play along the process, and proper understanding of tokenisation and digital assets along with the implications on their operations will be critical to ensure success. As regulations mature, the engagement of all these stakeholders early on is an important aspect of addressing secondary order consequences and ensuring ecosystem development.

UAE should leverage initiatives to identify and evaluate the potential of digital assets

At a high level, the UAE has several options. Industry stakeholders have expressed interest in collaborative ecosystem development through pilots, sandboxes, incentives, and public-private partnerships (PPPs) to develop the right infrastructure and processes for digital asset issuance and trading. Throughout this process, the UAE should evaluate the impact of tokenisation in terms of both domestic and international opportunities to guide an overarching strategy. Key questions include:

- To what extent can a regulated digital assets ecosystem generate tangible economic impact?
- How can the UAE benefit from utilising the technology, position itself more broadly as a hub for the future of finance, and also incentivise companies to choose the UAE?

The emphasis needs to be put on building awareness around digital assets

Answering questions related to the implications of digital assets is particularly important because the impact of the developing infrastructure and ecosystem will be limited without awareness and understanding from existing enterprises and investors. Without a strong business case for tokenisation, or the right knowledge around the process and compliance requirements, potential issuers will remain cautious of digital assets. Without the right awareness, protections, and liquidity, retail and institutional investors will also remain cautious.

Closing: The intersection of regulation and market infrastructure is crucial

Globally, regulators tend to prioritise compliance over the finer details of how exactly rules and requirements are met. Clear regulations will certainly advance the digital assets ecosystem, but the true value will be unlocked in practice through close collaboration between regulators and regulated entities – not only to ensure regulatory compliance, but also to develop effective processes and solutions to advance issuances, secondary markets, and custody solutions.

With the right strategy, regulation, ecosystem development, and positioning, the UAE can maximise the opportunity of tokenisation in line with its vision of advancing its position as a regional and global financial hub on the forefront of fintech innovation. Future research and hands-on initiatives by the C4IR UAE will aim to answer such questions around end-to-end business processes and stakeholder implications, strategic positioning, and ecosystem development.

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