FUNDAMENTALS AND THE GUIDING PRINCIPLES OF THE VDA INDUSTRY

VOL II

NAMASTE WEB3
Making India Web3 Ready

Preface

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As the CEO of CoinDCX, it's a privilege to share the second edition of Namaste Web3 with you alongside our partners, Bharat Web3 Association (BWA) and Forbes. In our ubiquitously connected world, Virtual Digital Assets (VDAs) are transforming the very idea of value. Yet, in India, there is a vast sea of unexplored potential. Understanding and embracing this digital frontier is not just an opportunity, it's an imperative, and that's why we've started this initiative. With "Namaste Web3 Volume.2," we aim to further demystify the complex world of VDAs, and my earnest hope is that this volume will deepen your understanding, inspire you to explore further, and empower you to be part of the revolutionary wave of Web3. This book is part of a larger movement – it's a leap towards an inclusive, well-informed, and vibrant VDA community in India. Thank you for joining us on this exciting journey. Let's together unfold the future.

Warm Regards,

Sumit Gupta CEO, CoinDCX

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Investment Landscape in India

1. Web3

India is poised to establish itself as a leading force in the global Web3 ecosystem.

India's economic growth story is a source of inspiration for the world. A mere ten years ago, India was the 11th biggest economy in the world. Today however, it's ~ $3.5 trillion dollar economy is the 5th largest, behind only the US, China, Japan, and Germany. The World Bank notes that India is today better positioned to navigate global shocks compared to most other emerging markets.[1] Further, robust demand for information technology and financial services have allowed India to maintain a high services trade surplus (around 3.7% of its GDP).

These developments provide an optimistic outlook for the growth of its domestic Web3 ecosystem. Indeed, India has achieved several Web3 specific milestones as detailed below.

▶ The "India Web3 Startup Landscape" report by NASSCOM released in October 2022 suggested that venture capital funding of $30.5 billion was invested in the blockchain market in 2021, signifying a remarkable increase of 15 times in VC funding for blockchain startups since 2015. The report also revealed that India currently hosts over 450 Web3 startups, providing employment to approximately 75,000 skilled professionals. It is predicted that the market size will increase by 25 times by 2028, which would result in the creation of over 50,000 jobs by 2025.[2]

▶ Cointelegraph reported that of the 450 startups in India's Web3.0 industry, four have achieved unicorn status and 60% percent have expanded their operations to a global level. As the Web3 and crypto industries have grown exponentially, India is all set for a powerful revolution.[3]

▶ According to the "*Global Cryptocurrency Adoption index*" by Chainalysis, India is one of the top five countries in terms of crypto adoption and ranks sixth in terms of DeFi adoption. Web3 evolution is occurring at a much faster rate than anticipated.[4]

▶ Another report, "*India's $1 Trillion Digital Asset Opportunity*", published in 2022 by USISPF mentioned that embracing and fostering Web3 technology in India could contribute $1.1 trillion of economic growth to its GDP over the next 10 years.[5]

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[1] India Development Update : Navigating the Storm (worldbank.org)

[2] https://community.nasscom.in/communities/productstartups/india-web3-startup-landscape-emerging-technology-leadership-frontier

[3] https://cointelegraph.com/news/report-india-ranks-third-in-the-world-in-terms-of-web-3-0-workforce-size

[4] https://blog.chainalysis.com/reports/2022-global-crypto-adoption-index/

[5] https://crosstower.com/wp-content/uploads/2021/12/Indias-1-Trillion-Digital-Asset-Opportunity.pdf

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2. Traditional Finance

India's capacity for retail investment and consumption has grown multifold over the last decade, and this trend is here to stay.

Despite COVID 19, India had the best performing equity market in 2021. The country's securities market crossed the USD 3 trillion mark in terms of total market capitalisation in that year, on the back of a robust regulatory framework and a 3x year-on-year growth in retail investor participation.Along with rising numbers, domestic investors are also maturing and increasingly entering rapidly evolving tech markets.

Rising investment levels in the economy may be attributed to the rising consumer expenditure by India's expanding middle-class of over 400 million.[6] According to the World Economic Forum, consumer spending on goods such as apparel and gadgets is expected to double and while spending on services such as healthcare and entertainment is expected to triple over the next seven years.

Another catalyst is the simplification of the business ecosystem by the Department for Promotion of Industry and Internal Trade (DPIIT), which allowed up to 100% foreign direct investment (FDI) under the automatic route across most industries and sectors. In FY22, India received the largest amount of FDI equity inflow from Singapore (27%), with the US (18%) and Mauritius (16%) following closely behind. India improved its erstwhile rank of 142 to 63 in the World Bank's Ease of Doing Business rankings due to these enabling policies.

According to the 2022 '*India Investor Personality Report*' released by ET Money, 35% of Indian investors willing to take calculated risks while 31% are willing to take decisive action quickly.[7] Indian investors on average, are comfortable taking risks when investing, which corroborates with how investors are moving away from traditional investment products like fixed deposits.
The rise in new asset classes such as mutual funds perhaps best embodies the above trends in investor behavior.

Over January 2013 to January 2023, there was a 5 fold increase in assets under management (AUM) of the mutual fund industry in India.[8] AUM levels grew by 5.7% over 2021-22 alone.[9]

Retail contribution through systematic investment plans (SIPs) underline the impact of digital penetration. Among stock brokers such as Zerodha, the average number of daily transactions are 9-10 million, translating into a daily turnover of INR 2000 crores.[10] In order to accelerate investor adoption for such platforms, factors such as integration of AI tools for predictive analysis, discount brokerage and prioritisation of social media management also stimulated financial proficiency.

3. India's Potential in Web3

▶ Despite ongoing regulatory uncertainty, the Indian Web3 industry has flourished, with over 200 Indian or Indian origin Web3 entities having raised more than $1.5 billion in the last two years.

[6] https://timesofindia.indiatimes.com/business/india-business/middle-class-nearly-1/3rd-of-indias-population-to-be-2/3rds-by-2047-report/articleshow/95239621.cms#:~:text=%E2%80%9CGiven%20that%20estimates%20range%20from,this%20category%2C%E2%80%9D%20he%20says.

[7] https://www.etmoney.com/blog/india-investor-personality-report-2022-insights-on-investor-behaviour/

[8] https://www.amfiindia.com/indian-mutual

[9] https://www.business-standard.com/article/markets/mutual-funds-see-muted-growth-in-2022-expect-better-days-in-new-year-122122500177_1.html#:~:text=As%20per%20the%20data%2C%20the,the%20end%20of%20December%202021.

[10] https://www.weforum.org/organizations/zerodha#:~:text=As%20a%20broker%2C%20Zerodha%20handles,capital%20market%20participation%20in%20India

According to similarweb.com, a website analytics platform, India is already the fourth highest contributor of web traffic to Binance and the fourth highest contributor of web traffic to Metamask.io, which is a popular wallet used for accessing various DeFi applications.

Although India taken great strides in realizing its potential to shape the future of Web3, there remain several avenues for further growth.

▶ **India's new generation**: Investment in infrastructure, digitalization, and the expansion of internet and smartphone access, alongside increased consumption by younger generations like millennials and Gen Z, have laid the foundation for more sustainable and long-term growth especially in new and emerging sectors such as fintech and online gaming.

▶ India's young and skilled workforce is a crucial factor in its growth engine, with a median age of 28.4 years, much lower than countries like China, Japan, and the US.

▶ By 2030, India is expected to have the largest pool of developers in the world, (estimated to be around 10 million), and will have approximately 900 million internet users. Despite ongoing regulatory uncertainty, the Indian Web3 industry has flourished, with over 200 VDA/DLT firms either in India or of Indian origin that have raised more than $1.5 billion in the last two years.

▶ **Strong foundations for diverse Web3 use cases:** Web3 is closely related to the information technology (IT) sector which is India's ultimate strength. Sectors like IT, Big Data, Cloud, AI already contribute well over USD 250 billion and has generated over 4 million jobs in FY22-23.

▶ India can leverage this strong foundation in IT to develop use cases that take decentralized ledger technologies beyond the financial sector. Web3 concepts of immutability and verifiability of secure databases can lend value in healthcare, education, and public administration.

▶ **Global recognition of India's investment potential**: Global Web3 investors have begun to identify India's potential in this field. Coinbase Ventures, Alpha Wave, Animoca Brands, etc are some of the leading Web3 organisations that have set up operations in India and plan to scale up going forward. This puts India in good stead as more global as well as local enterprises will be keen to invest in the Indian market in future.

The future of Web3 in India is promising however, regulatory uncertainty continues to be a key challenge.

The recognition of VDAs by the Indian government is still ambiguous. At the same time, India levies high taxes on VDA transactions, and any gains from the transfer of VDAs.

As a result, the Indian Web3 ecosystem witnessed a number of Indian users migrating from domestic VDA exchange platforms to foreign platforms which operate outside the Indian regulators' line of sight.

Looking ahead, the government should approach the Web3 ecosystem from the perspective of its goal of attaining 'A*atmanirbharta*' or self reliance. It should allow the growth of small businesses and the development of local talent. To this end, it may look to replicate what it did to support the software industry in the early 1990s, where it introduced enabling measures such as tax holidays, Special Economic Zones (SEZs), software technology parks etc.

B.

VDAs and fiat currencies

Key Themes Covered:

India is poised to establish itself as a leading force in the global Web3 ecosystem.
Features, Advantages and Challenges
Current Landscape across Countries
Wholesale and Retail CBDCs
Use Cases and User Stories

1. VDAs are not currencies

The term 'currency' is typically understood to mean legal tender which is an accepted store of value, unit of account and medium of payment backed by the government.

As per the Reserve Bank of India Act, 1934, currency is a payment instrument which is guaranteed by the central government to be usable as a lawful means of discharging any payment obligation in India. VDAs have been recognized as legal tender by any statute. In fact, the RBI has often clarified that VDAs are not legal tender. Further, unlike currencies, the government does not guarantee that VDAs are tenable for discharging debts or obligations.

Since the value of currency is effectively guaranteed by the government, they are considered a safe, stable, and non-volatile store of value, and hence usable as a consistent unit of account. VDAs do not have these features, and have infamously been a volatile asset class. The volatility in the value of VDAs stems from multiple factors, including the inflation mechanisms deployed by public VDA protocols, the complexity of Web3 ecosystems, and because the market is not yet saturated in terms of adoption or innovation. As mentioned above, the fact that most VDAs operate on a somewhat fixed supply (and often deflationary) schedule further influences volatility, since supply cannot be increased or decreased in response to fluctuating demand.

Accordingly, the term 'cryptocurrency' is a misnomer. The correct term to describe the asset class is 'VDA' – Virtual Digital Asset --, which is reflected in the Finance Act, 2022 and the Income Tax Act, 1961.

2. VDAs as a distinct asset class

While VDAs are a unique asset class, for the sake of comparison, they may be understood to be similar to other assets like gold, and securities.

Unbacked VDAs are *unbacked* by design – allowing a floating exchange rate for the native token of a VDA protocol provides a mechanism to accurately gauge demand for block space (i.e. storage space); the scarce resource people bid for on VDA protocols. Furthermore, the underlying value of VDAs depends on several factors including its fundamental characteristics (such as fungibility, programmability and security), market dynamics (such as scarcity, demand and supply), and the utility it provides. Considerations like whether a VDA has been adopted by enterprises and institutions is also reflective of its value.

Given that the Web3 ecosystem is built on the bedrock of new and emerging technologies, the metrics to measure many of these factors are unique. For instance, demand may be measured through on-chain metrics like exchange wallet flows, adjusted trade volumes, hash rates, funding rates etc. Other factors like supply are relatively easy to ascertain in this space. Most VDAs have defined and open policies regarding their supply. The supply of Bitcoin (BTC), for instance, is fixed and immutable and is based on a proof-of-work consensus mechanism.

3. Pricing of VDAs

The process for valuing VDAs is slightly different from that of traditional assets, owing to unique characteristics such as decentralization and smart-contract based transaction validation.

The underlying value of VDAs generally depend on factors such as its:

▶ **Core characteristics: which includes aspects such as** scarcity, fungibility, programmability, portability, security, and extent of decentralization.

▶ **Demand:** which depends on metrics such as number of active addresses, exchange wallet flows, adjusted trade volumes, hash rates, funding rates. Considerations like whether VDA has been adopted by institutions is also reflective of its value.

▶ **Supply:** The extent of supply, or conversely, the scarcity of a VDA has a direct bearing on its value. Most crypto-assets have defined and open policies regarding their supply. For instance, the supply of Bitcoin is finite and fixed at 21million. A gradually decreasing amount of Bitcoin added to the total supply, which increases the cost of obtaining, and thereby the value of each additional Bitcoin.

▶ **Network effects and utility:** VDAs are the mechanism through which DLTs incentivize users to engage constructively with the network and build applications on top of the decentralized database. The more developed and varied the possible use-cases are of a particular blockchain, the higher the resulting value from its native VDA.

4. VDAs as a medium of exchange

Although VDAs are declared to not be currencies, and display various characteristics to be considered a distinct asset class, it is necessary to evaluate whether they can if at all be used like a currency.

Currency entails a payment instrument which serves as a unit of account, a means of storing value, and a medium for exchange. While the supply of traditional currencies is generally in the hands of the central bank, the supply of several VDAs is fixed (for example, Bitcoin has a fixed supply of 21 million). Central banks use inflation targeting to maintain price stability by providing an adjustable supply of currency. This allows them to use various macroeconomic tools in order to adapt to economic changes and shocks such as the Covid-19 pandemic. However, given the inelastic supply, demand shocks in VDAs have greater inflationary or deflationary impacts, as compared to traditional currencies.

That said, a specific kind of VDAs called 'stablecoins' reflect similar characteristics as currencies. The value of stablecoins is pegged to a fiat currency by maintaining equivalent reserves. As a result of this price stability, these specific VDAs are able to perform as a reliable means of exchange and store of value.

All VDAs have benefits as a means of exchange such as anonymity similar to cash, long-distance transactions, and divisibility. This makes them attractive for micro-payments in the digital economy. Additionally, VDA transactions are fast and don't require intermediaries, making them advantageous for cross-border payments that are often slow, expensive, and unclear. Distributed ledger technology and crypto assets have shortened the time it takes for cross-border payments from days to seconds by bypassing correspondent banking networks. As more transactions occur, banks receive more deposits. This can lead to an increase in the supply of credit in the economy, which can stimulate economic activity and strengthen the overall monetary system of the economy.

5. VDAs and unofficial dollarization

The major concern for monetary policymakers is that VDAs such as stablecoins might lead to currency substitution or 'dollarization'.

Dollarization is a phenomenon where a foreign currency becomes a widely used substitute for a domestic currency in a jurisdiction. In extreme cases the central bank loses monetary power to act as a lender of last resort during a banking crisis. Dollarization may also play out in a specific sector of the economy, such as international trade, thereby making a that economy more susceptible to external vagaries, geopolitical shocks, inflation and financial instabilities regardless of domestic policies.

However, with regard to VDAs, the threat is often of 'unofficial dollarization' as individuals and businesses begin to hold their financial wealth in VDA despite it not being legal tender. These risks are greater for developing nations which lack strong domestic currencies.

In nations undergoing hyperinflation or financial turmoil, the use of unofficial or coerced dollarization is widespread, and it may not necessarily correspond to the level of capital control restrictions. Despite the implementation of rigorous capital controls and discouragement of currency substitution by the central banks of Cambodia and Nigeria, both countries have a considerable level of dollarization. In fact, dollarisation caused by the introduction of VDAs can actually be beneficial for certain developing nations, especially those who are suffering from poor monetary management. The positive role of VDAs in providing quick payment channels in disasters or war, i.e. recently in Syria and Ukraine, has also been widely recognized.

6. Can VDAs be used as monetary policy levers ?

The use of VDAs such as stablecoins can be beneficial for countries suffering from high inflation. VDAs are not subject to inflationary pressures from governments, making them a hedge against hyperinflation. In countries experiencing hyperinflation, citizens can turn to VDAs as a store of value and a means of preserving their purchasing power.

This can reduce the pressure on the traditional currency whose value is diminished as its demand would fall as people would switch to crypto assets which could eventually allow monetary authorities to control inflation without printing access money or altering its key policy rates.

Use of VDAs as a means of payment may not necessarily result in central banks losing control over money supply. If VDAs are legalized as assets, they would be subject to the same regulations as other assets, and central banks would have the ability to influence their price and availability through various policy tools. For example, laws and guidance related to transaction monitoring and KYC for AML/CFT specific to VDAs have already been established at a local (and for the most part), international level – making the use of VDAs more traceable than most traditional financial instruments.

Transactions associated with VDAs are recorded and verified through immutable distributed ledgers which ensures transactions are safe and secure. As more transactions shift over to DLT networks, illicit transactions and deals involving black money will likely see a reduction. Central banks would in turn have greater visibility and control over the flow of fiat currency and value in the economy.

C.

Central Bank digital currencies (CBDC)

A Central Bank Digital Currency (CBDC) is a digital form of a country's fiat currency that is backed by the central bank and guaranteed by the government's credit, and can be thought of as a new slice of 'M0' , high-powered money. CBDCs have gained significant attention in recent years as a potential solution to many long standing issues faced by Central Banks and other financial institutions in managing currency.
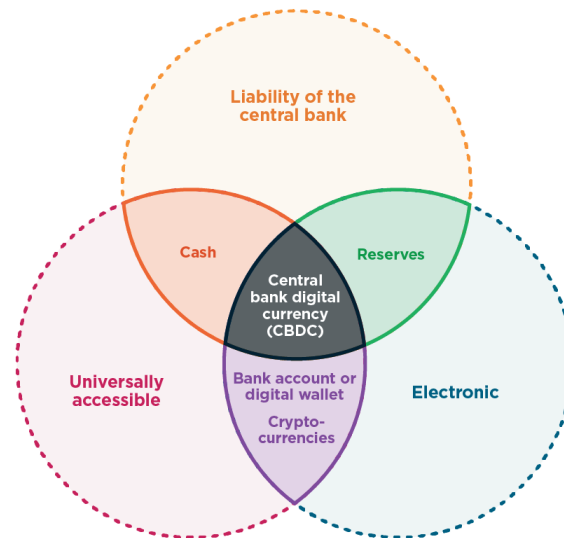
Source: Peterson Institute for International Economics [11]

CBDCs offer various advantages to central banks and governments, however they also present a unique set of costs and challenges, as detailed below.[12]

Advantages	Challenges
• Promote financial inclusion by providing easier and safer access to money for unbanked and underbanked populations. • Create competition and resilience in the domestic payments market, which can lead to cheaper and better access to money.	• The risk of bank runs, where citizens could withdraw too much money from banks at once by purchasing CBDCs, affecting their ability to lend and sending a shock to interest rates. • CBDCs remain vulnerable to cyber-attacks and require a complex regulatory framework that includes privacy, consumer protection, and anti-money laundering standards.

[11] https://www.piie.com/research/piie-charts/how-are-central-bank-digital-currencies-different-other-payment-methods
[12] https://www.imf.org/en/Publications/fandd/issues/2022/09/Picture-this-The-ascent-of-CBDCs

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- Improve efficiency in payments and lowers transaction costs, creates programmable money, and improves transparency in money flows.

- Facilitate monetary and fiscal policy by enabling governments to implement more targeted policies.

1. Current Landscape of CBDC adoption[13]

▶ Over 114 countries, comprising more than 95% of global GDP, are considering or exploring CBDC.

▶ 11 countries have already launched digital currencies, including China's e-Yuan pilot program that covers a large part of the country's population. Currently, there are 9 cross-border wholesale CBDCs under development and 7 cross-border retail projects.

▶ As of 2022, at least 60 countries, Including India, were in advanced stages of CBDC development, such as pilot testing or launching. Over 20 countries plan to pilot a CBDC in 2023, including Australia, Thailand, Brazil, South Korea, Russia, and the ECB.

2. Wholesale CBDCs[14]

Wholesale CBDCs could offer new functions for payment and settlement to a wider range of financial sector intermediaries other than domestic commercial banks. They could allow such intermediaries to access new capabilities owing to programmability of payments.

One example of this is in building conditionality in payments, whereby a payment only settles if certain conditions are met. This could encompass a broad variety of conditional payment instructions across industries. Wholesale CBDCs also allow the possibility of tokenization of assets such as real estate, the ability to denominate them in terms of fiat currency and exchange them on a 24/7 basis.

Payment with tokenised deposits settled with wholesale CBDC — Graph 9
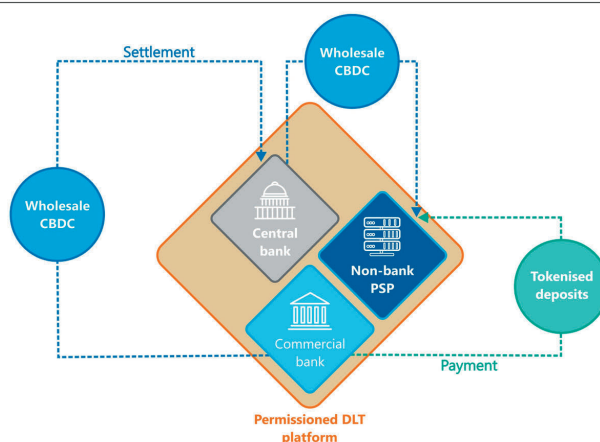
DLT = distributed ledger technology; PSP = payment service provider.
The green arrows indicate the movement of liabilities and the blue arrows indicate the movement of assets.
Source: BIS, adapted from McLaughlin (2021).

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[13] https://www.atlanticcouncil.org/blogs/new-atlanticist/central-banks-are-embracing-digital-currencies-will-the-us-lead-or-follow/
[14] https://www.bis.org/publ/arpdf/ar2022e.pdf

Most significantly, wholesale CBDCs ensure settlement finality thereby mitigating settlement risks in interbank settlements, and allowing for bilateral settlement between financial institutions without the need for a central counterparty. Further, they would also provide coincident benefits such as avoidance of settlement guarantee infrastructure or the need for collateral to mitigate settlement risk, and in turn improve liquidity management in the financial system as a whole.

3. Retail CBDCs:

There are various similarities and differences between retail CBDCs and retail fast payment systems (FPS). Retail CBDCs make central bank money available in digital form to households and businesses, while retail FPS allow for the exchange of claims on private intermediaries.

Both systems are built on public data architecture with APIs that ensure secure data exchange and interoperability between different bank and non-bank PSPs. They also feature high speeds and availability, as transfers occur in real time or near real time on a (near) 24/7 basis.

One of the key advantages of retail CBDCs and retail FPS is their potential to enhance efficiency and inclusion in the monetary system. Unlike VDAs, which often require high transaction fees and face scalability challenges, CBDCs and retail FPS allow for network effects to lead to a virtuous circle of greater use, lower costs, and better services.

Retail FPS such as the Indian united payments interface (UPI) and the Brazilian retail FPS Pix have already made impressive progress in lowering costs and supporting financial inclusion for the unbanked.

Retail CBDCs could play a similarly beneficial role as retail FPS, while offering additional technological capabilities. Tiered CBDC wallets with simplified due diligence for users transacting in smaller values can reduce the cost of payment services to the unbanked while allowing central banks to exercise appropriate monetary controls. Many central banks, including the RBI, are therefore exploring retail CBDC design features that tackle specific barriers to financial inclusion, for instance through novel interfaces and offline payments.[15]

Retail CBDC infrastructure which rests on interoperability of services offered by competing private PSPs can additionally rationalize charge structures in the concentrated fintech sector and improve efficiency in retail payments. For instance, Project Hamilton showed the technical feasibility of a CBDC architecture that could process 1.7 million transactions per second (TPS) – far more than TPS levels of major card networks or the blockchains supporting major VDAs such as Bitcoin or Ethereum. The project drew on functions inspired by VDAs, but did not rely on a DLT infrastructure. Project Hamilton revealed that a centrally controlled transaction processor, when broken up into modular components to initiate and validate transactions, prevent double-spending, etc., may provide superior scalability and flexibility compared with transaction ordering based on blockchain.[16]

In its next stage, Project Hamilton aims to create a foundation for more complex functionalities, such as cryptographic designs for privacy and auditability, programmability, and self-custody. The code for the project is open-source and can be scrutinized by any developer, to maximize knowledge-sharing and expand the pool of experts contributing to the code base, including central banks, academia, and the private sector.

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[15] India explores offline functionality of CBDCs — RBI executive director (cointelegraph.com)

[16] The experiment noted that technical ideas from blockchain technology such as digital wallets storing cryptographic keys and using cryptographic hashes representing unspent funds to make transactions can be applied without creating distributed ledgers operating under the jurisdiction of different actors. See Project Hamilton Phase 1, Executive Summary, Available at: https://static1.squarespace.com/static/59aae5e9a803bb10bedeb03e/t/61fc26416d8ab073983b4533/1643914817636/Hamilton-Exec-Summary-2022-02-02-v1.pdf

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4. Differences between CBDCs and VDAs

▶ **Technology:** CBDCs are typically built on a centralized, permissioned blockchain, while VDAs are built on decentralized, permissionless blockchain. For example, China's retail CBDC, the digital yuan (e-CNY), is issued exclusively by the Chinese central bank on a permissioned blockchain and is circulated to the public only via authorized operators (commercial banks and licensed non-bank payment institutions). On the other hand, Bitcoin operates on a permissionless blockchain that is open to anyone.

▶ **Governance:** As digital forms of fiat currency, CBDCs are issued and backed by a central authority, such as a government or a central bank. On the other hand, VDAs such as Bitcoin not backed by any central authority.

▶ **Purpose:** CBDCs are typically designed to improve the efficiency and security of traditional payment systems, while VDAs are typically seen as an alternate investment product, an alternate store of value or as a tokenized representation of a digital right such as access to, or ownership of a digital product etc.

5. Differences between CBDCs and Stablecoins:

▶ **Backing:** Most stablecoins are backed by privately held reserves denominated in US dollars. In contrast, CBDCs are backed by the issuing central bank or government through its sovereign reserves.

▶ **Governance:** CBDCs are designed to be centrally controlled by a central bank or government, while stablecoins are governed by decentralized protocols.

▶ **Purpose:** The primary reasons for central banks to issue a CBDC are to improve the efficiency and safety of payments, to reduce the reliance on cash, and to increase financial inclusion. In contrast, stablecoins are primarily used for peer-to-peer transactions, as a store of value, and for trading on VDA exchanges.[17]

▶ **Adoption:** The total market capitalization of stablecoins has grown from around $10 billion in early 2020 to over $120 billion in early 2021.[18] In contrast, CBDCs of various central banks are still in the pilot stage and have not yet been widely adopted.

6. CBDCs in operation – identifying distinguishing features and mapping consumer needs[19]

▶ **Trust and Security:** Factors such as the nature of the issuer, the extent of regulatory checks over intermediaries, security of the underlying technology etc. impact trust and security over a form of payment. Trust in central banks over private entities is often the distinguishing feature between fiat currency and other forms of money (such as e-wallet balances). Central banks may in fact seek to adhere to higher security standards to satisfy the above factors.

Reduced Costs: Consumers' utility is affected mostly by the transaction costs of the payment instrument. Although the overall cost of a CBDC system could increase with the complexity of

its design, a key motivation for central banks issuing CBDCs is to reduce in operational costs involved in physical cash management.[20]As a result, it is likely that CBDCs will carry little to no costs to the end user.

▶ **Offline**: A CBDC could allow users to maintain the cash-like experience they are familiar with, together with the additional benefit of participating in the digital economy. This feature might be particularly relevant in environments where internet availability is limited or unreliable.

▶ **Privacy**: Protecting an individual's privacy from both commercial providers and governments has the attributes of a basic right. CBDCs can offer near-cash like anonymity for small value or low-risk payments to users to encourage adoption and use.

▶ **Accessibility**: Accessible design is fundamental for both specific user groups (e.g. people with sensory, motor, and cognitive challenges) and the general population. CBDC linked payment devices can be built to make digital transactions more accessible.

Nature of consumer	Key Need	CBDC Design and Concept
Consumer with bank account and several options for digital payments	High levels of interoperability between CBDCs and other forms of payment	Enhanced interoperability with new features such as measured anonymity and programmability of payments
Consumer with limited budget, and low access to the internet and digital services	Low-cost / free payment method with offline capability	Universal access devices such as CBDC cards having offline functionality
Consumer who does not have a bank account	Enabling access to CBDC wallets without relying on a bank account	Low-cost, universal access devices with a variety of easily accessible end-point solutions
Consumer who is partially sighted	Accessible mean of payment	Payment devices with specialized accessibility features such as haptic feedback
Consumer who prefers privacy and anonymity in payments	A CBDC universal access device	Unregistered wallets with limited functionality issued by regulated money service business
Retailer who wants to accept CBDC payments in store	A way of accepting non-cash payments that is cheaper and more flexible than current solutions	A CBDC designed with low onboarding cost and that does not depend on existing (costly) point-of-sale hardware

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[17] https://www.bis.org/cpmi/publ/d196.htm

[18] https://messari.io/research/state-of-the-stablecoin-market-2021

[19] https://www.bis.org/cpmi/publ/d196.htm

[20] https://rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1218

D.

The Web3 Stakeholders' Stack

The Web3 Stakeholders' Stack is a framework for understanding the various layers of technology and participants involved in the development and implementation of Web3. The stack consists of seven layers, each of which plays a unique role in the ecosystem.

1. Infrastructure

The infrastructure or protocol layer is the foundation of the Web3 Stakeholders' stack. It consists of the underlying technological infrastructure that enables the functioning of decentralized networks and applications. This layer includes various components such as distributed ledgers, peer-to-peer networking protocols, and consensus algorithms, among others.

The infrastructure layer is critical for the success of Web3 technologies because it provides the necessary trust, security, and scalability required for decentralized applications to operate. Decentralized networks rely on a distributed infrastructure to ensure that data is stored securely and can be accessed by users in a timely and reliable manner.

Some of the popular infrastructure technologies used in Web3 include blockchain networks such as Bitcoin, Ethereum, Polkadot, and Cardano, which provide the necessary smart contract functionality for decentralized applications. Other alternative technologies in this layer include InterPlanetary File System (IPFS), a distributed file system that allows for the storage and retrieval of data across a decentralized network, and Whisper, a peer-to-peer messaging protocol that enables secure communication between decentralized applications.

2. Wallets & Other 2nd Level Infrastructure

The platform layer of the Web3 Stakeholders' stack is where the actual building blocks of Web3 are developed. This layer include the platforms that are necessary to facilitate communication, transactions, and interactions within the Web3 ecosystem.

Platforms in this layer are the tools and frameworks that are built on top of these protocols. These platforms enable developers to build decentralized applications (dApps) that interact with the blockchain and other Web3 protocols. Metamask is a good example of an entity in this category.

The platform layer of the Web3 Stakeholders' stack is crucial for the development of Web3 as it provides the foundation upon which all other layers can be built.

3. Middleware

The middleware layer is the third layer of the Web3 Stakeholders' stack. It consists of software tools and services that facilitate the interaction between applications and protocols. The middleware layer provides developers with APIs, SDKs, and other tools to build dApps that can interact with various blockchain networks.

Middleware services include functions such as user authentication, identity management, data storage, and messaging services. They also offer tools for integrating with multiple blockchains, simplifying the development process for dApps.

Middleware is important for Web3 development because it provides a layer of abstraction between applications and the underlying blockchain protocols. This allows developers to focus on building applications without having to worry about the intricacies of blockchain technology. Middleware is also crucial for creating interoperability between different blockchain networks. By providing tools for cross-chain communication, middleware can help to build a more connected and interoperable Web3 ecosystem.

4. Applications and Services

The Applications and Services layer is arguably the most significant layer of the Web3 Stakeholders' stack. It consists of the actual end-user applications and services that utilize the underlying infrastructure, protocols, and middleware layers to provide decentralized and blockchain-based solutions. This layer includes various types of dApps, such as finance, gaming, social media, and other innovative applications. This layer includes applications like Uniswamp and DYDX..

DApps are built on blockchain platforms and use smart contracts to enable trustless, decentralized transactions between users. They offer various benefits such as decentralization, security, privacy, and transparency to users. These applications and services are designed to enable users to interact with the blockchain and the Web3 ecosystem in a user-friendly and intuitive manner.

The Applications and Services layer is critical to the success of Web3 as it is the layer that interacts with end-users and solves their problems, or provides the actual service. This layer is expected to revolutionize the way we use technology, and it holds immense potential for disrupting traditional business models and creating new ones.

5. Users and Communities

The Users and Commodities layer is one of the bottom layers of the Web3 Stakeholders' stack, and it represents the actual users and commodities that are being used in the Web3 ecosystem. This layer includes individuals, organizations, and other entities that are participating in the Web3 ecosystem as well as the assets and commodities that are being traded or used.

The Users and Commodities layer plays a crucial role in the Web3 ecosystem as it drives demand and usage for the underlying infrastructure, protocols, middleware, and applications. Without users and commodities, the Web3 ecosystem would not exist, and it is the responsibility of the other layers to provide services and applications that cater to the needs of the users.

The Users and Commodities layer represents a significant shift from the traditional centralized systems, where users had to rely on centralized authorities and intermediaries for their transactions.

In the Web3 ecosystem, users have more control over their assets, data, and identities, and they can transact directly with other users without relying on intermediaries.

6. Governance and Coordination

The Governance and Coordination layer is another bottom layer of the Web3 Stakeholders' stack. This layer is responsible for creating and managing decentralized governance models for Web3 networks and applications. It consists of organizations, individuals, and communities who oversee and govern the use of Web3 technologies and ensure that they align with the goals and values of the ecosystem.

This layer includes decentralized autonomous organizations (DAOs) that use blockchain-based governance models to make decisions collectively, without relying on centralized authorities. They use smart contracts and voting mechanisms to ensure transparency, accountability, and fairness in decision-making.

The Governance and Coordination layer is crucial to the success of Web3, as it ensures that the ecosystem evolves in a decentralized and democratic manner, with the interests of all stakeholders taken into account. It promotes open participation and collaboration, enabling a diverse set of voices to contribute to the development of Web3 technologies and applications

7. Legal and Regulatory

The Legal and Regulatory layer is the bottommost layer of the Web3 Stakeholders' stack. It is a critical layer that ensures the legality and compliance of the Web3 ecosystem with existing laws and regulations.

As the Web3 ecosystem evolves, it is likely to face various legal and regulatory challenges, such as issues related to privacy, security, consumer protection, and intellectual property. The Legal and Regulatory layer seeks to address these challenges by developing legal frameworks, policies, and guidelines that enable the responsible and ethical use of blockchain technology.

The layer includes legal and regulatory experts, policymakers, and industry associations working together to shape the legal landscape of Web3. These stakeholders create a supportive environment for blockchain and Web3 innovation while ensuring that it aligns with existing legal and regulatory frameworks.

This Web3 Stakeholders' Stack provides a useful framework for understanding the various layers of technology and participants involved in the development and implementation of Web3. By understanding each layer and the interactions between them, we can gain a deeper understanding of the ecosystem and the potential impact of Web3 on various industries and communities.

E.

Secondary markets in VDAs

Key Themes Covered:

Importance of Secondary Markets
Centralized Exchanges
Decentralized Exchanges
Pseudonymity, Tumblers & Mixers

1. Centralised Exchanges

Centralised exchanges (CEX**)** are VDA exchange platforms that are owned and managed by a single entity, thereby requiring traders to trust the authority of the exchange operators to facilitate transactions. Depending on the business model, these exchanges are analogous to existing stock or commodity exchanges , like the BSE or the NYSE, or brokers like Zerodha – with some nuance; for example, the majority of centralized exchanges today provide custody as well as trading & settlement services.

Users must sign up and verify their accounts before depositing crypto to their exchange wallet or using fiat on-ramps to purchase crypto. Sign-up and verification entails a KYC verification process that includes providing identification, address, and biometrics in line with the requirements of other financial institutions. Once verified, users are provided with login information by the CEX to access their accounts, post which they may purchase VDAs using fiat on-ramps and trade on the exchange.

CEXs typically maintain custody over their users' VDA holdings. Traders effectively transfer smart contract based IOUs representing their VDAs when they trade within the exchange. Transactions are managed and logged using order books. Order books keep track of pending transactions, allowing traders to buy and sell securities accordingly.

2. Decentralised exchanges

Decentralised exchanges (DEXs) offer an alternative to CEXs, in that they run on public blockchains like Ethereum or Solana.

DEXs lack a controlling entity in the traditional sense, and rely on smart-contract based orderbooks,

P2P (or similar variations), or automated market makers (AMMs) and liquidity pools to enable VDA trades. Given the lack of centralisation, users transacting on DEXs maintain access, control and custody over their own VDA holdings through third party wallet service providers or offline wallets. Liquidity on DEXs once again depends on the model being used; for example in an AMM scenario liquidity is provided by users who submit their VDAs to liquidity pools in exchange for earnings in the form of VDAs as transaction fees.[21] AMMs set the price of a VDA based on a mathematical formula which is linked to supply of such VDA in the DEX's liquidity pools.

DEXs exhibit a high degree of variance in terms of features and functionality offered, some of which are detailed in the table below

Platform Name	Transaction metrics	Key Features
Uniswap	Year ended as on 31st Dec: 2020- USD 2.04 bn 2021- USD 8.31 bn2 022- USD 3.31 bn USD 4.2bn/day (Mar 2023) 24h Vol- $2,184,387,445.24	Uniswap was the first to introduce the Automated Market Maker approach, where Ethereum token users contribute to Uniswap's "liquidity pools". Market prices are then determined by algorithms based on supply and demand, instead of relying on order books like centralized exchanges such as Coinbase, which match buy and sell orders.[22]
Blur	NFT *Trading Volumes Hit $2B in February, Highest Since LUNA Crash, Thanks to Blur* (https://www.coindesk.com/web3/2023/03/02/nft-trading-volumes-hit-2b-in-february-highest-since-luna-crash-thanks-to-blur/)	Blur.io is a major NFT marketplace built on the Ethereum blockchain that offers a range of professional trading tools and features for NFT traders. Its system is a hybrid of an Ethereum based DEX for NFTs and a centralized architecture for payments. Blur.io allows users to buy, sell, and trade NFTs with no transaction fees, offers instant liquidity. and also provides a secure and reliable platform for users to store their digital assets.
DYDX	Year ended as on 31st Dec: 2020- USD 61.2 mn 2021- USD 1.01 bn 2022- USD 397.77 mn 24h Vol- USD 1,741,516,016[23]	At dYdX, users have access to an off-chain order book that settles on-chain. This offers the benefits of a decentralized exchange, such as enhanced security, alongside the swiftness and convenience of a centralized exchange.
Curve	Year ended as on 31st Dec: 2020- USD 1.25 bn 2021- USD 23.07 bn 2022- USD 3.63 bn 24h Vol- USD 306,448,347.66	Curve lets users and other decentralised protocols exchange ERC-20 tokens (DAI to USDC for example) through it with low fees and low slippage. Unlike exchanges that match a buyer and a seller, Curve uses liquidity pools. Curve offers incentives and rewards to liquidity providers to maintain high levels of liquidity on its platform.[24]

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[21] https://www.bcbgroup.com/centralised-vs-decentralised-exchanges/#:~:text=Key%20Differences,as%20a%20permissionless%20smart%20contract.

[22] https://www.coinbase.com/learn/crypto-basics/what-is-uniswap

[23] https://dydx.exchange/

[24] https://resources.curve.fi/base-features/understanding-curve

F.

Pseudonymity in the VDA ecosystem

1. Obfuscation of VDA transaction trails

VDA transactions allow for greater anonymity using tools such as mixers & tumblers. Although VASPs such as CEXs and wallet service providers deploy Anti-Money Laundering (AML) and Know-Your-Customer (KYC) checks to maintain the identities and logs of transactors and transactions respectively, mixers & tumblers allow users to bypass these checks by obfuscating the trail of transactions.

Mixers & tumblers are typically used to prevent transactions from being traced back to the original sender or recipient. The mixer takes VDAs from the original sender, mixes them with other VDAs from different sources, and then sends the mixed VDAs to the intended recipient. Tumblers, on the other hand, work by taking many VDA funds and break them up into smaller denominations.[25] These smaller denominations are then mixed with other VDAs and sent to different addresses, which further obfuscates the trail of the transactions. The process is repeated multiple times, with the VDAs being split and mixed in different ways each time, making it more difficult to trace the coins back to their original source.

A report by Chainalysis, a leading on-chain analysis company, found that over $10 billion worth of illicit funds have been processed by crypto asset mixing services since 2017.[26] In 2021, the Financial Action Task Force (FATF) published a report on the use of virtual assets for money laundering and terrorist financing. The report found that mixers & tumblers are frequently used for money laundering, especially in countries with weak anti-money laundering regulations.[27] Additionally, a study conducted by the Australian government in 2018 found that over 44% of darknet market vendors used mixers & tumblers to launder their funds.[28]

2. Mixers & tumblers:[29]

Mixers & tumblers may be centralised or decentralised. Centralised mixers & tumblers are run by identifiable service providers, which results in a major disadvantage from the standpoint of anonymity. The service provider is able access the users' logs and IP addresses and may be able to trace the transaction at its end. For instance, Blender.io mixes the user's VDA with other users' VDAs and then sends them to the specified wallet address. It allows users to set a delay time between the time they initiate the mixing and the time their coins are returned.

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[25] More recently, mixers and tumblers have started been used somewhat interchangeably

[26] Chainalysis. (2021). 2021 Crypto Crime Report. https://go.chainalysis.com/rs/503-FAP-074/images/2021-Crypto-Crime-Report.pdf

[27] Financial Action Task Force. (2021). Virtual Assets Red Flag Indicators of Money Laundering and Terrorist Financing. https://www.fatf-gafi.org/media/fatf/documents/reports/Virtual-assets-red-flag-indicators-of-money-laundering-and-terrorist-financing.pdf

[28] Australian Criminal Intelligence Commission. (2018). Illicit Drug Data Report 2016-17. https://www.acic.gov.au/sites/default/files/2021-02/2016-17-IDDR-Full.pdf

[29] https://blog.chainalysis.com/reports/crypto-mixers/

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On the other hand, decentralised mixers & tumblers offer peer-to-peer mixing services. VDA holders pool their holdings and make a single transaction, which is then randomly returned to the pool members. The level of randomization increases with the number of users in the pool. For example, CoinJoin, one of the most popular decentralised mixers, enhances user privacy by combining inputs from multiple users into a single transaction that is split into multiple outputs, obscuring the origin of the VDA.[30]
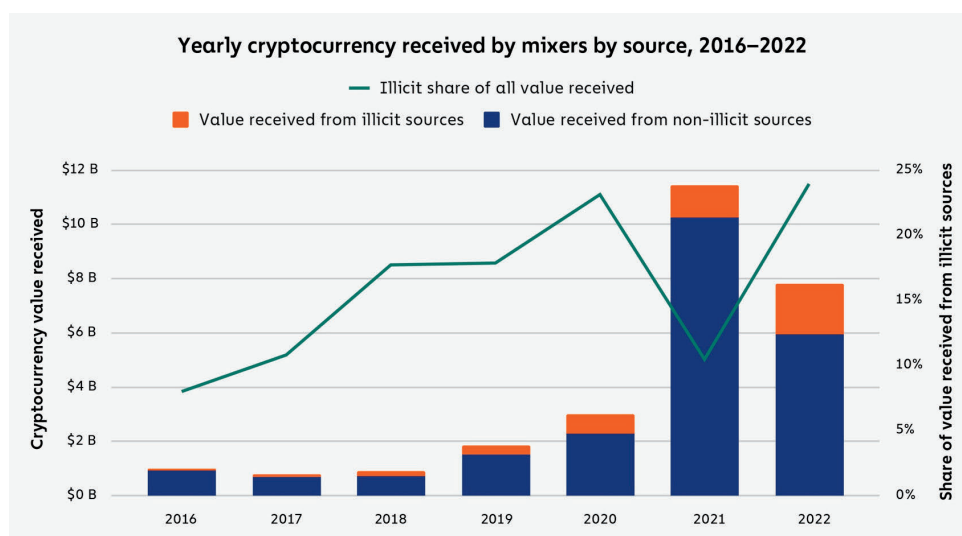
Decentralized services such as Tornado Cash[31] and Samourai Wallet are examples of privacy centric VDA services. Additionally, privacy-focused projects like Zcash and Monero have popularized now widely adopted technologies like Zk-Proofs (zK-SNARKS) and Ring Signatures

Although there are legitimate use cases for mixers & tumblers, related to financial privacy, bad actors tend to leverage these solutions to move illicit funds. As a result, mixers & tumblers have been subjected to various sanctions in recent years; for example Tornado Cash was famously sanctioned in 2022, despite essentially being a software and not a corporate entity.

3. Sanctions on mixers & tumblers and darknet markets

In May 2022, the Office of Foreign Assets Control (OFAC), the financial intelligence and enforcement agency of the U.S. Treasury Department sanctioned Blender.io for its role in laundering VDAs stolen by North Korea hacking syndicate Lazarus Group. This was the first instance of a sanction on a VDA mixer and tumbler. This was similar to the high profile sanctioning of Tornado Cash, also in 2022. Since then, several mixers & tumblers as well as darknet markets such as Hydra marketplace, and Garantex were sanctioned by the OFAC for money laundering and funding various illicit activities.[32]

These sanctions resulted in two trends. First, the total amount of crypto assets sent to mixers fell significantly, and second, a greater percentage of funds that did travel to mixers & tumblers were from illicit sources. Mixers & tumblers processed a total of $7.8 billion in 2022, 24% of which came from illicit addresses, whereas in 2021, they processed $11.5 billion, only 10% of which came from illicit addresses.

Yearly cryptocurrency received by mixers by source, 2016–2022

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[30] https://knowledgebase.merklescience.com/technologies/mixers-and-tumblers-primer

[31] https://www.coingecko.com/learn/what-is-tornado-cash-and-how-does-it-work

[32] https://blog.chainalysis.com/reports/how-2022-crypto-sanction-designations-affected-crypto-crime/

Sources of illicit cryptocurrency sent to mixers, 2022

Darknet market	6.3%
Fraud shop	2.3%
Cybercriminal admin	0.4%
Ransomware	3.0%
Sanctions	0.2%
Scam	2.7%
Stolen funds	85.1%

Source: Chainanalysis [33]

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[33] https://go.chainalysis.com/rs/503-FAP-074/images/Crypto_Crime_Report_2023.pdf

G.

Web3 for public good

> **Key Themes Covered:**
>
> Web3 in healthcare:
> Decentralised Identity
> VDAs as payment rails during Crises

1. Management of healthcare data

The healthcare industry stands to benefit significantly from the integration of Web3. Despite India's recent advancements in telehealth, medical data records suffer from a lack of infrastructure and common standards for safe transfer, particularly in the case of personal health data. In most cases, data is stored in centralized, siloed locations, making it difficult to share or distribute. As a result, healthcare providers may receive outdated information, and researchers may not be able to collaborate efficiently.

DLT has the potential to transform how data in the healthcare sector is stored, managed and transferred. DLT platforms can be used to store and transmit health data using smart contracts and other operations to enable interoperability in healthcare data[34]spanning patient medical records, device data research data, and supply chain data.

The Indian government also recognized the value addition provided by DLT in the healthcare sector, most notably, in the 2021 National Blockchain Strategy, published by MeiTY.[35] The National Blockchain Strategy aims to achieve interoperability outcomes, including through the integration of various components in the India Stack such as Aadhar, Digilocker, and the e-Rupee.

The goal of interoperability in the context of medical records is to improve the quality of care, reduce costs, and improve patient outcomes by providing a more complete and accurate view of a patient's health history to all providers involved in their care. Interoperability enables healthcare systems and technologies to exchange and use electronic health records and related information accurately, and securely, regardless of the systems or vendors involved, or where the data is stored.

Although non-DLT systems can enable API level interoperability, DLT platforms ensure immutability of ledgers, high levels of security, as well as resilience from data leaks and cyber-attacks, all of which

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[34]Bouras, Mohammed Amine, Qinghua Lu, Fan Zhang, Yueliang Wan, Tao Zhang, and Huansheng Ning. "Distributed ledger technology for eHealth identity privacy: state of the art and future perspective." *Sensors* 20, no. 2 (2020): 483.

[35]https://www.meity.gov.in/writereaddata/files/National_BCT_Strategy.pdf

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are major hurdles in medial data management. It also provides a ready solution that enhances privacy and control while simultaneously creating a transparent ledger. Cryptographic tools such as asymmetric key encryption ensure patents control the flow of information, since their healthcare records and other personal information are not accessible to researchers and healthcare providers unless the patient authorizes it to be shared. Further, DLTs enable data to be kept in off-chain storage, thereby allowing for the tailoring of access controls to ensure only trusted peers to access the data.[36]

Innovators have started to build solutions specifically for the storage and management of healthcare information and related use cases.

▶ **Management of medical records:**
VDA-based solutions such as HealthBloc, MyClinic, and MedRec allow users to store medical records on a DLT platform using information from their healthcare provider. The VDAs allow users to exercise control over their information and share it with trusted medical practitioners. Similarly, MIT researchers have developed a blockchain-based system called MedRec, which aims to become a secure and trusted repository of patient health records.[37]

▶ **Management of clinical trial data:**
DLT applications are being built to improve transparency and integrity of clinical trials For instance, immutable trial data records allows researchers and regulators to access and verify trial data, which improves the quality and reliability of clinical trial results. Pfizer and IBM notably collaborated to develop the Clinical Trials Reporting and Results (CTRR) platform, which uses blockchain technology for this purpose.[38]

▶ Similarly, Clinical Trials Intelligence, developed by ClinTex, uses a DLT platform to improve the quality and operation of clinical trials. It incorporates predictive data analytics, machine learning, and smart contracts to address key issues such as operational excellence, site investigators, patient recruitment, vendor management, risk monitoring, and clinical data visualization in clinical trials.[39]

▶ **Traceability of prescription drugs:** Another valuable use case of DLT is in supply chain management of prescription drugs. For instance, applications such as MediLedger and VeChain provide blockchain based solutions for tracking the flow of prescription medications from the point of manufacture to the final customer, thereby reducing the likelihood of fake medicines entering the supply chain.

▶ **Management of medical device data:** Usage metrics from one device need to be monitored and analyzed in conjunction with other devices to lower the likelihood of faults. DLT solutions are being applied to streamline management of data from various medical devices. For instance, Chronicled and Solve.Care provide platforms for the secure storage and sharing of telemedicine data, video consultations, device readings and electronic prescriptions.

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[36] Hang, Lei, BumHwi Kim, KyuHyung Kim, and DoHyeun Kim. "A permissioned blockchain-based clinical trial service platform to improve trial data transparency." *BioMed research international* 2021 (2021).

[37] Ekblaw, Ariel, Asaph Azaria, John D. Halamka, and Andrew Lippman. "A Case Study for Blockchain in Healthcare:"MedRec" prototype for electronic health records and medical research data." In *Proceedings of IEEE open & big data conference*, vol. 13, p. 13. 2016.

[38] https://www.pfizer.com/news/press-release/press-release-detail/ibm_and_pfizer_to_accelerate_immuno_oncology_research_with_watson_for_drug_discovery

[39] https://clintex.io/

▶ **Health insurance:** Finally, DLT based solutions are also being applied to the processing of health insurance claims to increase transparency, efficiency, and speed while decreasing fraud. MetLife uses blockchain to streamline the life insurance claims process, reducing the time required to process claims and improving the overall customer experience.[40]

2. Management of digital identities

Decentralized Identification (DiD) presents a promising solution to the issues of privacy, security, and consent in traditional identity management systems. This innovative technology relies on DLT technology with the goal of putting individuals in control of their own identity, rather than relying on centralized private entities.

The DiD process involves trusted third parties known as "issuers" who verify key identifiers like a digital birth certificate or proof of employment. The issuer creates an identifying credential that is then stored on a blockchain and accessible through the user's digital wallet. When a third party requires identifying information, the user can provide the credential via the blockchain, generating proof in the form of a QR code on their phone. By storing the credential on the blockchain, users control their identifying information, removing the need for third-party siloed databases or federated login solutions. At the same time it is important to note that the implementation of a national level DiD system does not require all services or private data to be migrated to DLT based systems, instead relying on an API layer to access various India Stack / KYC services.

▶ **Synergy with India Stack**
India's National Blockchain Strategy outlines the importance of creating Digital Public Infrastructure (DPI), with a focus on interoperability between various services. In this scenario, a digital, hybrid-decentralized identity would allow users to mitigate redundancy in information sharing (for example, sharing KYC such as Aadhar, PAN etc. multiple times for various financial services), as well as limiting the information shared.

As opposed to signing up and re-uploading KYC documents, a user can verify her identity by sharing a signed message using her DiD, followed by various API calls to India Stack services (Digilocker, Aadhar etc.) to check whether user information matches those on file. Notably, this entire process does not require documents to be shared with any third-party.

Similarly, depending on the service in question, the user may voluntarily share specific documents (in the event that the business model of the service in question relies on data shared by users), after which documents can be secured directly via various India Stack services, or uploaded manually by the user.

A DiD system integrated with India Stack will provide a powerful new dataset for traceability – enabling a granular, timestamped paper trail for 'KYC' transactions, that is, each time a user makes a KYC check. KYC traceability can also prove crucial in flagging KYCs that have been misused, allowing more rapid responses by LEA.

In the above case of DiD, a crucial integration will be the addition of a CBDC wallet into the DiD system. This one integration will allow users to not only access, but pay for services

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[40]https://community.nasscom.in/communities/blockchain/blockchain-insurance-promising-disruptive-innovation

without being directly onboarded. This has important implications – specifically it will enable the use of smart contracts, where a particular transaction is held in escrow until certain publicly (or partially publicly in the case of a government implementation) verifiable conditions are met.

▶ **Global developments**
The deployment of DiD technology has been rapid in other parts of the world. For instance, the Ethereum Name Service (ENS) maps an easily recognizable name onto a machine-readable ENS address, providing a cloud-based login service that allows users to control the information they share. Governments are also embracing DiD, such as the European Commission's project for faster security checks. A similar system has been successfully deployed by Estonia since 2007 using similar technology; migrating government ID and other crucial identifying information to a DiD platform resulting in a dramatic reduction in security breaches, and man-hours.

Looking ahead, the value gains from a deeper implementation of DiD technology would be multifold in context of cross-border transfers of VDAs. Regulators and SSBs have focused on regulatory guardrails such as the FATF's Travel Rule to address concerns around traceability of VDA transfers. Interoperable DiD platforms can serve as foundations for international data sharing to improve compliance with the Travel Rule.

▶ **VDA Donations for Humanitarian Causes**
Traditional channels for fund transfers tend to be inadequate for humanitarian assistance in the event of natural disasters or wars. Communities in the least developed countries (LDCs) are disproportionately affected by the lack of access to traditional finance.

In contrast to traditional donation methods, VDAs offer a more streamlined and transparent means of transferring funds, directly to those in need, even if they lack access to bank accounts. DLTs enable traceability, efficiency, and accountability through the use of smart contracts which ensure that VDAs are released only when predetermined conditions are met. This not only ensures that donations reach the right people, but also provides a sense of security and trust to donors, who can track the source and delivery of their contributions. Further, VDAs embody immutable ledgers which offers a level of transparency that traditional donation methods lack, which is crucial for ensuring donations reach the intended recipients promptly and effectively.

To illustrate, over $56 million worth of VDAs were donated to addresses provided by the Ukrainian government and charitable organizations within a month of the Russian aggression over the region. Similarly, VDAs worth over $5.9 million were donated for relief efforts in the aftermath of the earthquake Turkey. Crypto businesses such as Binance also used innovative methods such as airdrops (i.e., transfer of VDAs without consideration) to affected Turkish users.

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H.

Can VDAs really cause a financial crisis?

Key Themes Covered:

Why is the Indian VDA industry not crisis prone?
What factors can trigger a financial crisis and why the Indian VDA industry not exhibiting these trends?

The likelihood of crisis in the Indian Web3 ecosystem is a function of the level of prudential control deployed by ecosystem participants. Large stakeholders in the ecosystem players such as CoinDCX, WazirX, CoinSwitch have been maintaining stable reserve to liability ratios (of 100% or more) implying that they hold more assets than what they owe to their users. Positive reserve to liability ratios are critical to avoid negative fallouts from unprecedented regulatory moves or external shocks.

The reserve to liability ratio of some of the leading stakeholders in the Indian Web3 ecosystem are detailed below.

CoinDCX[41]		WazirX[42]		Coinswitch[43]	
Reserve to Liability Ratio	1:1	Reserve to Liability Ratio	1:1	Reserve to Liability Ratio	1:1
All Holdings	USD 195.51 mn	All Holdings	USD 287.28 mn	All Holdings	USD 131 mn
Exchange	USD 53.54 mn	Exchange	USD 9.64 mn	Exchange	USD 18.1 mn
Blockchain	USD 141.98 mn	Blockchain	USD 277.61 mn	Blockchain	USD 112.99 mn

It is also evident that VDA exchanges hold a very small portion of assets. This implies that market shocks that may hamper VDAs will not have serious economy wide repercussions as they hold only a small volume of assets compared to other financial assets.

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[41] https://www.coingabbar.com/en/proof-of-reserve/coindcx
[42] https://www.coingabbar.com/en/proof-of-reserve/Wazirx
[43] https://yourstory.com/the-decrypting-story/coinswitch-proof-of-reserves-crypto-exchange-report

On the other hand, mutual funds, which are often (and naturally) regarded as one of the safest forms of investments, hold a much larger chunk of assets. Similarly, other forms of assets hold a larger quantum of funds than VDAs:

Asset class		Assets under Management	
Mutual Funds[44]		INR 39,46,257 crore (March 28, 2023)~ USD 480.20 billion	
Real Estate (Residential)[45]		USD 178.83 billion (2022-23)	
Commodities[46]		USD 1119.50 billion (Feb, 2022)	
Fixed Income Securities (Bonds)		USD 2.29 trillion	
Cash (Public holding of cash)[47]		USD 389.4 billion (Dec, 2023)	
VDA Exchanges	CoinDCX	USD 195.51 million	USD 613.79 million
	WazirX	USD 287.28 million	
	CoinSwitch	USD 131 million	

Further, the volume of transactions provide a useful indication of market performance. Consistent transaction volumes imply market stability. VDAs are charactersied by slightly higher volatility because of their limited supply and hence, the volume of transactions associated with them is also relatively more volatile.

However, one must also consider that the volume of transactions that happen at VDA exchanges is quite less compared to other platforms. Below is the summary of the volume of transactions of three of the leading centralised VDA exchanges in India: CoinDCX, ZebPay, and WazirX.[48]

Time Period	Volume of Transactions (USD Millions)
Jan 2022	4736.7
Feb-March 2022	9126
April-June 2022	5991
Oct 2022	137.6

On the other hand, the quantum of trade (FII and DII) that typically happens in a day is relatively huge. Therefore, even though the volatility of assets traded on VDA exchanges may be relatively higher, they don't witness a huge volume of transactions, or have custody of a significant amount of assets, and hence, are less likely to trigger a financial crisis.

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[44] https://www.amfiindia.com/indian-mutual#:~:text=Assets%20Under%20Management%20(AUM)%20of,a%20span%20of%2010%20years

[45] https://www.mordorintelligence.com/industry-reports/residential-real-estate-market-in-india#:~:text=The%20size%20of%20the%20India,country%2C%20propelled%20by%20rapid%20urbanization.

[46] https://tradesmartonline.in/blog/types-of-commodity-market/#:~:text=The%20total%20size%20of%20the,92.23%20lakh%20crore.

[47] https://timesofindia.indiatimes.com/business/india-business/cash-in-circulation-up-83-since-note-ban/articleshow/96693259.cms

[48] https://static1.squarespace.com/static/5bcef7b429f2cc38df3862f5/t/63b3e553ad8cdb68e72eed40/1672734043690/230103_Esya_Centre_Special_Issue_VDA_Taxation_Architecture.pdf

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In fact, this volume has drastically come down in recent months owing to the 1% TDS regulation by the government. Moreover, the Indian VDA market is still growing, and it has been seen that when a market grows and becomes large, it also becomes quite stable and less prone to a crisis. Something similar can be expected about the Indian VDA industry.

Exchange Platform	Daily Volume of Trades (Apr 2023)
CoinDCX[49]	USD 5.8 million
WazirX[50]	USD 2.3 million
Zebpay[51]	USD 0.5 million
NSE[52]	INR 33,383.62 + 2,35,93,605.72 (in lakhs) ~ USD 28.6 billion
BSE[53]	INR 6039.57 cr. ~ USD 0.73 billion
NSE + BSE	USD 29.33 billion
TOTAL	USD 37.93 billion

[49] https://www.coingecko.com/en/exchanges/coindcx#:~:text=Currently%2C%20there%20are%20447%20coins,has%20%2459%2C500%2C514.64%20in%20Exchange%20Reserves.

[50] https://www.coingecko.com/en/exchanges/wazirx#:~:text=Currently%2C%20there%20are%20229%20coins,has%20%24281%2C040%2C000.00%20in%20Exchange%20Reserves.

[51] https://www.coingecko.com/en/exchanges/zebpay#:~:text=Currently%2C%20there%20are%2084%20coins,is%20currently%20unavailable%20for%20ZebPay.

[52] https://www.nseindia.com/market-data/derivatives-turnover-business-growth

[53] https://www.bseindia.com/markets/Derivatives/DeriReports/DeriArchiveSum.aspx

I.

Taxation of VDAs – Global perspectives

> **Key Themes Covered:**
>
> Direct and indirect VDA tax regulations for countries like the USA, the UK, Canada, Australia, Singapore, Switzerland, etc.

Virtual Digital Assets (VDAs) tax regulations vary significantly from country to country. Some countries have clear and comprehensive guidelines for taxing them, while others are still grappling with how to treat this new asset class. These tax regulations are still evolving and may change significantly in the future. Here is a brief overview of how VDA indirect tax regulations work in different parts of the world.

1. Indirect taxation

▶ **Australia:**

The GST Act of Australia covers the GST position and sets out rules for the sale of digital assets, which is an input-taxed sale for GST purposes. This means that no GST is paid on the sale of digital assets, and GST credits cannot be claimed for the GST included in the price paid for any purchases to make those sales. NFTs do not generally fall within the definition of digital assets and are subject to GST depending on whether the transaction meets the requirements of being a taxable, input-taxed or GST-free supply under the GST rules.

The sale of NFTs to Australian buyers should attract GST, while the sale of NFTs to overseas buyers is GST-free in most cases.

A crypto asset may be input-taxed (exempt) if it falls within the definition of other financial services, and NFTs fall within the definition of ESS/remote services. If a supply of an NFT is made from outside Australia to an Australian consumer through a marketplace, the operator of the marketplace has the obligation to account for GST on the supply of the NFT.

There are no specific GST rules or tax authority guidance for De-Fi or virtual events.

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▶ **Canada:**

In Canada, the taxation of VDAs is governed by the country's Excise Tax Act (ETA), which includes the Goods and Services Tax/Harmonized Sales Tax (GST/HST). The Canada Revenue Agency (CRA) is responsible for enforcing these regulations.

The CRA has classified VDAs as either "commodity" or "financial instrument" for tax purposes, depending on their characteristics. Commodity VDAs, are subject to GST/HST, while financial instrument VDAs, such as security tokens, are exempt from GST/HST. For commodity VDAs, the CRA considers their supply to be a taxable supply, which means that the supplier is required to charge GST/HST on the sale of the VDA. Additionally, the purchaser is required to pay GST/HST on the purchase of the VDA. However, if the supplier is a small supplier (i.e., their sales are less than $30,000 per year), they are not required to charge GST/HST.

The CRA also requires businesses that accept VDAs as payment for goods or services to record the value of the VDA at the time of the transaction, convert it to Canadian dollars, and include it in their sales revenue for GST/HST purposes. Similarly, businesses that use VDAs to pay for goods or services must record the value of the VDA at the time of the transaction, convert it to Canadian dollars, and claim input tax credits for the GST/HST paid on the purchase. It's worth noting that the CRA has issued guidance on the use of VDAs in charitable donations, stating that VDAs donated to a registered charity are not subject to GST/HST.

NFTs are generally subject to GST as the supply of intangible personal property, and the rate of tax would depend on the provincial place of supply rules. If a marketplace is involved in the sale of NFTs, the marketplace has the obligation to account for GST. The Excise Tax Act contains a definition of a 'specified distribution platform' and a 'distribution platform operator.' There are no specific De-Fi GST rules or tax authority guidance.

Finally, there are no specific rules for virtual events, but a fee charged to attend a virtual event would likely be consideration for a supply of intangible personal property for GST/HST purposes and would be GST/HST taxable if supplied to a resident of Canada.

▶ **United States for America**

In the United States, various states have provided sales and use tax guidance for crypto assets. They are generally treated as intangible property or a medium of exchange, with no sales tax due on digital asset exchanges. However, sales tax is due when crypto assets are used to purchase taxable property and services, with state guidance varying on how to compute the tax base. NFTs have not been uniformly defined by state taxing authorities, but various states have provided definitions through general tax department guidance, and the Multistate Tax Commission has begun a project to make uniformity recommendations. In states that have issued guidance, NFTs may be taxed under different approaches.

Marketplaces are generally required to collect tax on sales made through the marketplace, and certain marketplace fees may be taxable. Peer-to-peer online marketplaces for exchanging NFTs may not fall within the states' definitions of 'marketplace facilitator.'

There are no specific De-Fi GST rules or tax authority guidance, and financial instruments and financial services generally are not subject to US sales tax. However, businesses selling technology used to render those services may be taxable. Certain states impose sales tax on 'amusements,' admissions, or other event-based charges that may apply to virtual events.

▶ **United Kingdom**

In the United Kingdom, trading in crypto assets is treated as exempt from VAT. HMRC has provided some limited guidance on the issue, but it is not comprehensive.

NFTs are subject to VAT at the standard rate of 20% for domestic transactions. Intermediary services related to buying and selling crypto assets may also be exempt if it falls within the intermediary definition. NFTs fall within the definition of ESS/remote services. If a marketplace is involved in the sale of NFTs, the marketplace may have the obligation to account for VAT, depending on how they act. There is no definitive definition of a marketplace for ESS/remote services purposes. NFTs sold in exchange for crypto assets are considered a barter transaction, but the crypto asset payment leg is disregarded for UK VAT.

There are no specific De-Fi VAT rules or tax authority guidance in the UK, and there are no specific rules for virtual events. However, proposed changes from the EU may affect the UK position on B2C supplies.

▶ **Thailand**

In Thailand, the indirect taxation of digital assets is primarily governed by the Value Added Tax (VAT) and the Specific Business Tax (SBT). In May 2018, the Thai Revenue Department released a draft bill that proposed imposing VAT and SBT on the sale and purchase of digital tokens. The bill was passed into law in June 2018 and went into effect on July 1, 2018.

Under the current law, VAT at the rate of 7% is applicable to the sale of digital assets, including digital tokens and crypto assets. The VAT applies to both domestic transactions and imports, and the tax liability rests with the seller. However, if the seller is not based in Thailand, the buyer is responsible for paying the VAT to the Revenue Department.

However, in May 2022, Thailand enacted two Royal Decrees to exempt Value Added Tax (VAT) on the transfer of crypto assets or digital tokens on digital asset exchanges approved by the Securities and Exchange Commission of Thailand until December 31, 2023. However, the exemption only applies to transfers on approved exchanges, and taxpayers who transfer on other platforms would still need to assess whether they are subject to 7% VAT or 0% VAT.

NFTs would generally be subject to VAT as the supply of an intangible personal property, but the transfer of NFTs on approved exchanges may be exempt. There is no definition of NFTs in the VAT law, and NFTs representing an underlying service or good would not qualify for VAT exemption. A regulation requiring providers of electronic services to non-VAT registrants to register for and pay VAT in Thailand has come into effect since September 2021, and the service provider or platform may be responsible for paying the VAT depending on their location and registration status.

There are no specific VAT rules for De-Fi or virtual events in Thailand.

▶ **Switzerland**

Switzerland has emerged as a hub for the VDA industry, The Swiss Federal Tax Administration (SFTA) has issued guidelines on how to apply indirect tax laws to VDAs, which are considered a form of intangible property.

Value-added tax (VAT) is applicable to the purchase of VDAs if they are used for commercial purposes. However, if they are used for private purposes, then no VAT is levied. The VAT rate for VDAs is the same as for other goods and services in Switzerland, currently at 7.7%. It is noteworthy that If a person provides VDAs as part of their business activities, then they are considered to be providing a service, and the VAT must be charged accordingly. Moreover, If a person exchanges VDAs for fiat currency or vice versa, then the transaction is subject to VAT. There are also instances where VDAs aren't subject to VAT. If a person mines VDAs, then they are not required to pay VAT on the coins they mine, as the mining process is not considered a commercial activity. VAT will also not be levied if VDAs are held as long-term investments until they are disposed of.

VAT on crypto assets depend upon the classification of the token as a payment token, utility token, or security token. NFTs are not defined in VAT law. It is not defined whether NFTs fall under the definition of ESS/remote services, and marketplaces may have the obligation to account for VAT on NFT sales. There are no specific De-Fi VAT rules or tax authority guidance, and virtual events are likely considered a supply of services taxable at the place of the recipient.

▶ **South Africa**

South Africa has not yet developed specific regulations for the taxation of virtual digital assets, but the South African Revenue Service (SARS) has issued guidance on how to apply existing indirect tax laws to VDAs. VAT is applicable to the supply of goods or services in exchange for VDAs, as well as to the mining of VDAs. If a person provides VDAs as part of their business activities, then they are providing a service, and the VAT must be charged accordingly.

There is exemption for financial services including the issue, acquisition, collection, buying or selling, or transfer of ownership of any crypto asset. However, there is no specific guidance on the taxability of NFTs. Therefore, the Electronic Services Supplies (ESS) rules must be applied, and NFTs are generally considered to fall within their ambit and are subject to VAT. There are no other applicable exemptions for crypto assets, and there is no specific guidance on De-Fi VAT rules or tax authority. There are no specific rules for virtual events, but the ESS rules must be considered for applicability.

▶ **Singapore**

The Goods and Services Tax Act 1993 and e-tax guide GST: Digital Payment Tokens (Second Edition) provide guidance on the taxation of crypto assets in Singapore. Prior to 1 January 2020, supplies of digital tokens, virtual currencies, or crypto assets were subject to GST at either the standard rate of 7% or zero-rated. With effect from 1 January 2020, supplies of digital payment tokens (DPTs) are exempt from GST if used as payment for goods or services, or if exchanged for fiat currency or other DPTs. Non-fungible tokens (NFTs) are subject to GST at the standard rate of 7% unless zero-rating can apply.

There is no definition of NFTs in the GST law, and they do not qualify as DPTs based on the legislative definition of DPT. However, NFTs fall within the definition of ESS/remote services. If a marketplace is involved in the sale of NFTs, the marketplace is usually responsible for accounting for GST on the sale. There are specific definitions of marketplace for ESS/remote services purposes, and the operator of the electronic marketplace will be regarded as the supplier under certain conditions. There are no specific GST rules or tax authority guidance for De-Fi.

There are also no specific rules for virtual events, but overseas vendors supplying digital or remote services to non-GST registered persons in Singapore may be required to register for GST if certain thresholds are exceeded.

▶ **New Zealand**

The Goods and Services Tax Act 1985 (NZ) covers the position and sets out the rules for the taxation of crypto assets. Inland Revenue has issued commentary on the GST changes following the enactment of the GST rules for crypto assets in 2022. Crypto assets are excluded from GST, and it is neither a taxable supply nor an exempt supply. NFTs are subject to GST at the standard rate of 15% for domestic transactions. Options over crypto asset and brokerage in respect of crypto asset transactions are GST-exempt.

NFTs fall within the definition of ESS/remote services. In case a marketplace is involved, the marketplace has the obligation to account for GST on the sale of NFTs. A barter transaction occurs when NFTs are sold in exchange for crypto assets, but the crypto asset payment leg is disregarded for NZ GST.

There are no specific De-Fi GST rules or tax authority guidance, and there are no specific rules for virtual events. However, there is a need to consider the GST remote services rules in a cross-border context.

2. Direct Taxation

India classifies crypto assets similar to other capital assets and applies a 30 percent tax rate. Tax deducted at source (TDS) is applicable at 1 percent, and there is a provision to set off losses. However, short-term gains are not applicable to set off losses.

The taxation regime for other countries is quite different from that of India as summarized below:

▶ **The USA** classifies crypto assets as property and taxes it between 0-20 percent, depending on the tax bracket. Long-term gains are taxed at a rate above 24 percent for gains over USD 170,050, but there is no provision for TDS. Losses can be set off, and short-term gains are applicable for setting off losses.

▶ **The UK** classifies crypto assets as virtual assets and applies a tax rate between 0-20 percent for capital gains above GBP 12,300 tax-free allowance and 0-45 percent for income tax. No TDS is applicable, and there is a provision to set off losses.

▶ Switzerland classifies crypto assets as asset/property and applies a wealth tax on capital gains ranging between 0.3-1 percent. Gifting tax ranges between 2-36 percent, and there is no

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provision for TDS. Losses can be set off, and short-term gains are applicable for setting off losses.

▶ **Canada** classifies crypto assets as commodity or securities and applies a tax rate between 15-33 percent, depending on the classification as income or capital gain. The tax rate is below 30 percent for taxable income up to CAD 155,625. There is no provision for TDS, and losses can be set off.

▶ **Ukraine** classifies crypto assets as a business activity and applies a flat tax rate of 5 percent, with no provision for TDS or short-term gains.

▶ **Brazil** classifies crypto assets as securities and taxes them between 15-22.5 percent as capital gains, with no TDS applicable. Crypto assets received below USD 7300 per month are not taxed but gains above this amount are taxed under capital gains.

▶ **Thailand** classifies crypto assets as like capital assets and applies a flat tax rate of 8 percent, with no provision for TDS. Losses can be set off, and short-term gains are applicable for setting off losses.

▶ **Japan** classifies crypto assets as miscellaneous income and taxes it between 0-55 percent, depending on the income tax bracket. There is no provision for TDS, and there are no short term gains.

▶ **Austria** classifies crypto assets as capital assets and applies a flat tax rate of 27.5 percent, with no provision for TDS. Losses can be set off, and short-term gains are applicable for setting off losses.

▶ **Singapore** classifies crypto assets as property and does not tax it for non-business use. TDS is not applicable, and losses can be set off.

▶ **Malaysia** classifies crypto assets as securities and does not tax it. Active trading is subject to tax similar to stocks, and short-term gains are applicable for setting off losses.

▶ **South Africa** classifies crypto assets as financial products and taxes it at 18 percent for capital gains and 18-45 percent for income tax brackets. The tax rate is below 30 percent for taxable income up to R 488,700. There is no provision for TDS, and losses can be set off.

▶ **The Netherlands** classifies crypto assets as capital assets and applies a net worth tax on asset value ranging between 1.9-5.7 percent, with no provision for TDS. Losses can be set off, and short-term gains are applicable for setting off losses.

The above comparison suggests that most countries have progressive tax structures for VDAs, with capital gain taxes ranging from 5 to 40 percent. Countries like the USA have distinguished tax rates for short-term and long-term gains while the likes of Canada, the UK, and Japan have opted for higher tax rates for higher values of gains. This suggests a robust and progressive taxation regime. Some countries like Switzerland and The Netherlands have chosen to levy small amounts of capital gains tax. However, no country is charging an exorbitantly high tax relative to other countries. India, however, doesn't quite have the same progressive structure as both short-term and long-term capital gains are taxed at 30 percent.

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It is also quite evident that 1% TDS is missing from most countries' regimes while India has chosen to levy it and it hasn't yielded any benefits. The Eysa Centre report on 1% TDS has confirmed that it has affected the VDA market adversely as users have been forced to shift to foreign exchanges. Most countries also allow offsetting of losses against income except Brazil and Japan. India does not allow it either. This disincentives people from investing into VDAs.

J.

Evolving Regulatory Landscape governing VDAs

Key Themes Covered:

Major SSBs: FATF, IMF, FSB, OECD

Over the last 5 years, G20 countries have been stressing on the need for global collaboration on VDA regulation while recognizing the importance of technological innovation.[54]

India recently proposed a joint technical paper by standard setting bodies (SSBs) such as the International Monetary Fund (IMF) and the Financial Stability Board (FSB) for help in the formulation of a coordinated and comprehensive policy approach to crypto assets. IMF, FSB, OECD, among others have been playing a key role in developing guidelines and recommendations on how to regulate VDAs, mitigate risks, comply with laws and standard of organisations such as FATF, determine strategic priorities, utility, and risks of decentralised finance, etc. They continue to consult nations and help them solve this regulatory puzzle.

The following table summarises the positions taken by major SSBs on VDAs and Web3.

Report	Focus/Objectives	Findings	Recommendations/Way Forward
Financial Action Task Force (FATF)			
1. Targeted Update on Implementation of FATF Standards on Virtual Assets/VASPs (June 2022	1. In 2019, the FATF extended anti-money laundering and combating terrorist financing (AML/CFT) obligations to VASPs, requiring member nations to assess and manage the risks posed by VAs.	1. Jurisdictions have made limited progress in implementing FATF's AML/CTF standards for virtual assets, with most only partially compliant. 2. Travel Rule legislation has been passed by 29 out of 98 surveyed	1. The report recommends that both FATF and FSRB members accelerate compliance with FATF's R.15/INR.15 to assess ML/TF risks of VA and VASPs and implement AML/CFT measures.

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[54] As of March 2023.

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	2. FATF issued specific recommendations for VAs, including risk assessment, licensing/registration, identification, supervision/regulation, guidelines, sanctions compliance, preventative measures, targeted financial sanctions compliance, and international cooperation. 3. FATF has since reviewed member nations' implementation of its recommendations twice and issued updated guidance in 2021. 4. This document is the third review of progress made by member nations in implementing recommendations, specifically the Travel Rule	jurisdictions, but only 11 have started enforcement. Technical solutions to ensure Travel Rule compliance are limited and not global. 3. The DeFi sector poses ML/TF concerns, while NFTs used as collectibles are outside the scope of FATF standards. VAs are not widely used for sanctions evasion, but non-compliant VASPs are used for ransomware. 4. Blockchain analytics are being used to identify and recover the proceeds of ransomware attacks.	2. Countries without Travel Rule legislation should introduce it, and FATF jurisdictions should promote implementation and share experiences. 3. The private sector should facilitate interoperability across Travel Rule technological solutions and be flexible to accommodate domestic requirements' nuances. 4. FATF will monitor DeFi's development, focus on AML/CFT challenges and risks, and encourage good practices. It will also watch out for P2P transaction risks and traditional financial institutions' involvement in VA markets
2. Report to the G20 Finance Ministers and Central Bank Governors on So-Called Stablecoins June 2020	1. This report is in response to a G20 request to assess the ML/TF risks of stablecoins, specifically global stablecoins. 2. The report includes a description of stablecoins, identifies associated ML/TF risks, analyzes how the revised FATF Standards apply, outlines potential residual risks, and sets out the FATF's next steps to mitigate these risks.	1. The report identifies the ML/TF risks posed by stablecoins, including their anonymity, global reach, layering, and potential for mass adoption. 2. The report also analyzes how the existing FATF standards apply to stablecoins and determines that obligations apply to entities within the stablecoin ecosystem, depending on their functions. 3.Decentralized stablecoins pose greater risks, but their limited avenues for mass adoption limit the risks. 4. Lastly, the report highlights residual risks from anonymous peer-to-peer transactions and truly decentralized global stablecoins.	1. The FATF is focusing on improving international cooperation in supervising virtual asset service providers (VASPs) and promoting implementation of revised standards by jurisdictions and the private sector. 2. The FATF also plans to enhance the international framework for VASP supervisors to cooperate, share information, and strengthen capabilities.

Organisation for Economic Cooperation and Development (OECD)			
1. Crypto-Asset Reporting Framework and Amendment to the Common Reporting Standard	1. The tax framework for crypto-assets in the report introduces a Crypto-Asset Reporting Framework (CARD) to improve tax oversight by collecting transaction information and amends the 2014 Common Reporting Standard to include certain types of crypto-assets, products, and intermediaries. 2. It also provides model rules for jurisdictions to implement via domestic legislation.	1. Crypto-asset service providers (CASPs) are required to record and report specific transactions, including exchanges between crypto-assets and fiat currencies, exchanges between different crypto-assets, and transfers of crypto-assets. 2. CASPs must also perform due diligence and follow KYC procedures to identify users and determine their tax residence.	1. The OECD presented the Crypto-Asset Reporting Framework (CARF) to the G20 Finance Ministers and will work with member nations to implement it. 2. The implementation package may include framework agreements, IT solutions, and further guidance to support the CARF's consistent application.
International Organisation of Securities Commissions (IOSCO)			
1. Crypto-Asset Roadmap 2022–2023 (July 2022)	The IOSCO Roadmap includes two work streams: Crypto and Digital Assets (CDA) and Decentralised Finance.	1. The CDA stream will address fair markets, safekeeping, and soundness of assets. 2. The Decentralised Finance stream will assess DeFi risks, identify linkages, and consider systemic risk concerns in both themes.	Reports under the identified thematic areas will be published in Q4 2023
2. Issues, Risks and Regulatory Considerations Relating to Crypto-Asset Trading Platforms(February 2020)	1. This report discusses how member nations are addressing issues related to secondary market trading of crypto-assets on crypto trading platforms (CTPs). 2. It aims to ensure that securities regulators apply their regulations to crypto-assets that are securities, in line with the "same risk, same rule" principle.	1. The report found that most jurisdictions apply their existing regulatory frameworks to crypto trading platforms (CTPs) when the crypto-assets traded qualify as securities or other financial instruments. 2. Some jurisdictions have established specific frameworks for CTPs that fall within their regulatory remit, while others have banned crypto-asset trading.	1. The report gives non-binding recommendations to securities regulators on issues including user onboarding, asset safekeeping, conflict of interest, transparency, market integrity, price discovery, and technology for crypto trading platforms. 2. It also identifies applicable IOSCO principles.

		3. Some respondents noted that existing regulatory frameworks do not apply to CTPs because crypto assets are not financial instruments.	
3. Decentralized Finance Report	1. This report presents a holistic overview of the DeFi ecosystem. It explains how DeFI works, who the key players are, and the protocols involved. 2. It also assesses circumstances where DeFi products and services mirror traditional finance and may require regulation.	–	The report does not provide recommendations, but it identifies risks associated with DeFi that may require regulatory intervention. These include asymmetry and fraud risks, operational and technology risks, market integrity risks, illicit activity risks, and governance risks.
4. Prudential Treatment of Crypto-asset Exposures (December 2022)	The Basel Committee on Banking Supervision's standards provide guidelines for banks holding crypto assets as capital, including risk evaluation, monitoring and classification rules.	The Basel Committee on Banking Supervision has issued prudential standards for banks holding crypto assets as capital. Crypto-assets are classified into two groups, with Group 1 including stablecoins and tokenised traditional assets meeting specific conditions and subject to existing Basel framework rules, while Group 2 contains all other crypto-assets and is subject to more conservative capital treatment restrictions.	The BIS will implement the Prudential Treatment Rules in 2025, and the Rules will be incorporated into the Basel framework before then. Central Banks will have to ensure banks comply. The Committee will monitor the development of statistical tests, the inclusion of permissionless blockchains, and thresholds for Group 2a.
5. Basel committee work programme and strategic priorities for 2023/24 (December 2022)	Digitalisation of Finance is a strategic priority for the Basel Committee on Banking Supervision in the coming year. Specifically, the Committee will monitor bank-related developments in the crypto-asset market.	–	The BCBS plans to investigate the role of banks in stablecoin issuance and custody, implement prudential treatment for banks' crypto-asset exposures, and develop additional safeguards for permissionless blockchains.

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6. Application of the Principles for Financial Market Infrastructure to stablecoin arrangements (July 2022)	1. The BIS and IOSCO have released guidance on how the existing Principles for Financial Market Infrastructures apply to stablecoin arrangements (SAs) considered systemically important FMIs. 2. SAs that enable transfer of coins between parties are required to comply with the PFMI and be subject to the same regulatory requirements as FMIs.	1. The report outlines criteria for identifying systemically important stablecoin arrangements (SAs) and provides guidance for complying with the Principles for Financial Market Infrastructures (PFMI). 2. SAs should comply with all PFMI principles, with additional guidance provided for governance, risk management, settlement finality, and money settlement. 3.Key criteria for identifying systemically important SAs include size, nature and risk profile, interconnectedness and interdependencies, and substitutability.	CPMI and IOSCO will address regulatory and oversight issues associated with SAs to fill standard gaps, and will release guidance on applying PFMI to multicurrency stablecoins.
Financial Stability Board			
1. Consultative Document on Regulation, Supervision, and Oversight of Crypto-Asset Activities and Markets (October 2022)	1. The FSB released a consultative document in response to the G20's request to deepen its work on regulatory and supervisory approaches to unbacked crypto-assets, recommending coordinated policy actions to address regulatory gaps and arbitrage 2. The report does not address AML/CFT, data privacy, consumer and investor protection, competition, or market integrity issues.	1. The FSB report focuses on three areas: activities and interconnectedness in the crypto-asset market, regulatory and supervisory approaches and standards for crypto-assets, and challenges in regulating crypto-assets. 2. The report identifies a high level of interconnectedness in the crypto-asset market and notes that while the interconnectedness between crypto-assets and the wider financial system is limited, it is increasing. 3. The report also identifies a number of international standards and policies that apply to crypto-asset markets and captures a range of issues and challenges in regulating crypto-asset	1. The report recommends that financial regulatory and supervisory authorities should establish a technology-neutral oversight framework for regulating crypto-asset activities and markets. 2.The proposed recommendations include authorities having appropriate power, tools, and resources to regulate crypto-assets, effective regulation and supervision, cooperation and coordination among authorities, comprehensive governance and risk management frameworks for crypto-asset issuers and service providers, robust frameworks for data collection, storage and reporting, and transparent information

		activities identified by policymakers.	disclosure to stakeholders.
			3. The authorities should also monitor interconnections within the crypto-asset ecosystem and apply regulation that addresses the risks associated with each individual function and risks arising from the combination of functions. 4. The FSB will finalize proposed crypto-asset recommendations in mid-2023 after public consultations and review them by end-2025, coordinating international regulatory approaches with a focus on DeFi.
2. Final Report and High-Level Recommendations on Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements (October 2020)	FSB issued recommendations to address financial integrity concerns associated with privately issued global stablecoins (GSCs) used for retail purposes. The report is in response to a G20 mandate, and regulatory issues such as AML/CFT, data privacy, consumer and investor protection, competition and market integrity are not covered.	The report identifies three categories of findings regarding global stablecoins (GSCs): 1. Vulnerabilities arising from GSC functions and activities, such as market, liquidity, credit, cyber, and operational risks. 2. Existing regulatory approaches for GSCs, with most countries regulating stablecoins under existing legislation and identifying their functions. 3. Challenges in regulating GSCs, such as incomplete implementation of FATF standards, ineffective supervision of GSCs outside existing regulatory perimeters, and inadequate risk mitigation and competition policies.	1. The report proposes nine recommendations to address financial stability risks associated with global stablecoins. These include ensuring regulatory authorities have the necessary tools and resources, applying comprehensive regulatory and oversight requirements, promoting international cooperation and coordination, implementing effective governance and risk management frameworks, and ensuring transparency and legal clarity for users. 2. Additionally, GSC arrangements should meet all applicable regulatory requirements before commencing operations in a jurisdiction.

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			3. National authorities were required to establish cooperation arrangements and adjust regulatory frameworks for GSCs by Dec 2021 and July 2022 respectively, consistent with international standards and FSB recommendations. The FSB is reviewing implementation and will release a final consultation paper in 2023.
3. Consultative Document on Review of the FSB High-level Recommendations of the Regulation, Supervision and Oversight of "Global Stablecoin" Arrangements (October 2022)	The consultative document seeks to update the FSB's high-level recommendations in light of recent development in the crypto-asset markets and in other standard setting bodies	1. The consultative document analyses development in the global stablecoin market, particularly the collapse of Terra (UST). It finds that stabilisation mechanisms based on algorithms and other assets are inherently unstable. 2. A more general review of the largest GSCs reveals that they would need to make significant improvements to their governance, risk management, redemption rights, stabilisation mechanisms, and disclosures to meet the FSB's high-level recommendations 3. The report also states that stablecoins are not widely used outside crypto-asset markets and do not pose a significant threat to global financial stability.	1. The FSB proposes revisions to its high-level recommendations on global stablecoins. These include subjecting stablecoins with potential to become GSCs to regulatory oversight, regulating GSC arrangements in proportion to their size and complexity, regulating custodial wallet service providers and trading platforms, ensuring ownership and governance of GSCs does not impede regulations, complying with AML/CFT standards, and providing comprehensive disclosures on redemption rights and reserve asset composition. GSC issuers should also provide stabilisation mechanisms and adequate capital buffers. 2. The revised recommendations will be finalised by mid-2023. The FSB will undertake a review of their implementation by 2025

			3. National authorities were required to establish cooperation arrangements and adjust regulatory frameworks for GSCs by Dec 2021 and July 2022 respectively, consistent with international standards and FSB recommendations. The FSB is reviewing implementation and will release a final consultation paper in 2023.
4. The Financial Stability Risks of Decentralised Finance (February 2023)	The report examines the relationship between DeFi and traditional finance, highlights DeFi's financial vulnerabilities, and proposes a potential monitoring framework. It also explores the possible growth scenarios for DeFi, from remaining niche to going mainstream.	1. DeFi, while currently mainly self-referential, poses potential spillover risks to traditional finance through exposure of financial institutions, household and retail exposure, and increased use for payments. 2. Vulnerabilities in the DeFi ecosystem include operational fragilities such as governance vulnerabilities, outages, and coding errors, liquidity and maturity mismatches, leverage risks, interconnectedness with centralised finance, and data-related issues. 3. Other vulnerabilities include market integrity risks, cross-border regulatory arbitrage, and cryptoisation of the economy. Continuous monitoring is required for DeFi, as it has many of the same vulnerabilities as traditional finance but is less mature and rapidly evolving.	1. The FSB outlines effective DeFi monitoring framework with indicators for ecosystem evolution, vulnerabilities, and interlinkages with traditional finance. 2. The FSB will monitor financial vulnerabilities in DeFi and the growth of asset tokenization, measure DeFi's interconnectedness with TradFi, and assess policy recommendations for DeFi. It will work with SSBs to determine regulatory perimeter and tailor recommendations accordingly.
International Monetary Fund (IMF)			

1. Regulating the Crypto Ecosystem: The Case of Unbacked Crypto Assets (September 2022)	The note discusses opportunities and risks of unbacked crypto assets, excluding CBDCs, utility tokens, security tokens, and stablecoins, and suggests regulatory measures.	1. The Note analyzes risks associated with various parties in the unbacked crypto-asset ecosystem. Issuers are decentralized, making it difficult to identify them, and networks can be vulnerable to attacks. 2. Crypto-asset exchanges face similar risks as stock market exchanges, and their custodial services can add to the risk profile. Wallet providers' hot wallets can be hacked, while cold wallets can be lost or damaged. Validators and miners could contribute to financial stability risks. 3. Regulated financial institutions have new risks due to their exposure to crypto assets' high volatility. Entities providing multiple services in the crypto asset ecosystem are subject to increased risk.	1. The Fintech note recommends a global risk-based regulatory framework for crypto-assets and suggests monitoring developments, prioritization, scoping, cross-sectoral collaboration, and continuous risk assessment. 2. Broad bans on crypto-assets are seen as counterproductive, and authorities should determine the scope for regulation and update regulations to ensure effective protection of markets, consumers, and financial stability. Specific recommendations are also given for issuers, crypto-asset exchanges, wallet providers, validators and miners, and regulated financial institutions. 3.The Notes suggest that the FSB is ideally placed to ensure coordination of efforts across the different SSBs.
2. Regulating the Crypto Ecosystem: The Case of Stablecoin Arrangements (September 2022)	This FinTech note provides an overview of the stablecoin ecosystem, makes a case for why stablecoin regulation is needed, and suggests what the key elements of such a framework may look like.	1. The use of stablecoins has grown in popularity and needs regulation due to potential systemic risks. The lack of transparency in reserve allocation, reliance on other parties, and unclear transfer function using smart-contracts, DLT consensus mechanisms, and lack of interoperability can lead to financial instability, risks for consumers, and financial contagion.	1. The Fintech note recommends comprehensive, risk-based, and flexible regulation for stablecoins, with a focus on structural features to provide a level playing field between different entities in the ecosystem. The recommendations address key risks and challenges, including issuance and reserve management and transfer function.

| | | 2. The use of stablecoins by large tech companies could accelerate currency substitution, adding to the urgency of stablecoin regulation. | 2. It suggests requirements for reserve asset allocation, custody, and transparency, independent audits, and management of conflicts of interest. It also recommends a registration or licensing regime for entities involved in the transfer function of stablecoins, governance arrangements, measures to safeguard user funds, and security incident handling procedures. Effective cross-border cooperation between home and host supervisors is also essential for stablecoin regulation.

3. The report suggests the FSB should lead coordination efforts between standard-setting bodies, with continued IMF staff contributions. |
| **3. IMF Policy Paper on Elements of Effective Policies for Crypto Assets (February 2023)** | The IMF staff paper provides guidance to fund member countries on the critical elements of a crypto asset regulatory framework based on the Bali Fintech Agenda, standards proposed by the FSB and other standard setting bodies | 1. The report highlights the benefits and risks of crypto assets. The benefits include cheaper and faster payments, increased financial inclusion, and higher operational resilience. However, there are also risks such as macroeconomic risks, financial stability risks, financial integrity risks, legal risks and uncertainty, consumer protection risks, and market integrity concerns.

2. The report cautions against granting legal tender status to crypto assets as this would lead to increased instability and financial risks. | 1. The IMF has proposed a regulatory framework for crypto assets based on nine elements. The first element emphasizes safeguarding monetary sovereignty and stability by developing effective and transparent monetary policy frameworks, avoiding large deficits and high debt levels, and not granting legal tender status to crypto assets. The second element recommends guarding against excessive capital flow volatility and managing risks of capital outflows. The third element calls for governments to analyze and disclose fiscal risks and ensure unambiguous |

			tax treatment of crypto assets. The fourth element suggests establishing legal certainty and addressing legal risks by modernizing private law and adjusting tax laws. The fifth element suggests developing and enforcing prudential, conduct, and oversight requirements for all actors involved in crypto assets. The sixth element recommends establishing a joint monitoring framework across agencies and authorities. The seventh element emphasizes the need for international collaborative arrangements to enhance supervision and enforcement of crypto asset regulations. The eighth element recommends monitoring the impact of crypto assets on the stability of the international monetary system. The ninth element suggests strengthening global cooperation to develop digital infrastructure and alternative solutions for cross-border payments and finance. 2. On February 8, 2023, the IMF's board discussed and agreed with the findings and recommendations presented in the report on crypto assets. They identified the IMF's role as a thought leader in monitoring risks and impacts, bridging members and global rule setting, and providing macroeconomic advice on crypto assets.

Notes

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