



Digital assets in action: Current use cases for Financial Institutions

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① AGENDA

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Foreword

After a long-lasting period of relative macroeconomic stability in most Western and Asian economies, the environment has changed severely throughout the year 2022. Russia launched a genocidal war on Ukraine and inflation for the first time since decades accelerated above 5% in most G20 economies and to 10% in Euro zone. The ECB for the first time since the financial crisis of 2007/2008 started to significantly increase interest rates. Asset prices began to cool down with no immediate end in sight.

Moreover, the crypto environment has been shaken up by bankruptcies of significant providers such as Celcius, FTX and others. Digital asset prices have already been under pressure due to the macro environment and took further hits due to allegedly severe misconduct at large platforms.

While it would be more than worthwhile to analyze the causes of these developments and their different links with each other, we have another task ahead. We want to understand the institutional adoption of digital assets and its further development. An arguably valuable undertaking considering that technological innovation and entrepreneurial action are usually one of the main ways out of a stagnation phase.

While it might be too early to say this, one thing remains clear: the opportunities of digital assets are greater than ever. Tokenization helps banks to reduce operational costs, speed up time to market and tap new revenue opportunities. Investors benefit from accessing previously illiquid and difficult to access asset classes.

This report provides a comprehensive overview of digital asset use cases and adoption by banks and other institutional market participants. We hope you enjoy reading it and that you will be as excited as we are when discovering that the institutional adoption of digital assets is a reality that is already here today.

We thank the entire Bitbond team for putting in the hard work that it takes to create this report. Special thanks go to our Bitbond crew members **Felix Stremmer** and **Henri Falque-Pierrotin**.

We would equally like to thank all contributors at the numerous financial institutions and technology providers who were so open to sharing their insights with us. Without your input, this report would not have been possible.



Radoslav Albrecht
CEO & Founder



Felix Stremmer
COO



Henri Falque-Pierrotin
Finance Associate

② Market Overview

This chapter examines the development of the crypto market in recent months to understand how it might evolve in the future and how certain use cases are being adopted or explored in the industry.

1**Digital assets: key market developments****2**

Institutional participation in digital assets

3

Regulatory deep dive: EU digital finance package (MiCA & Pilot Regime)

In 2022, cryptocurrency markets experienced their version of a bubble bust

Market overview

The cryptocurrency markets experienced their version of a bubble bust in 2022 as it became clear that excessive leverage is the primary cause of the crypto meltdown.

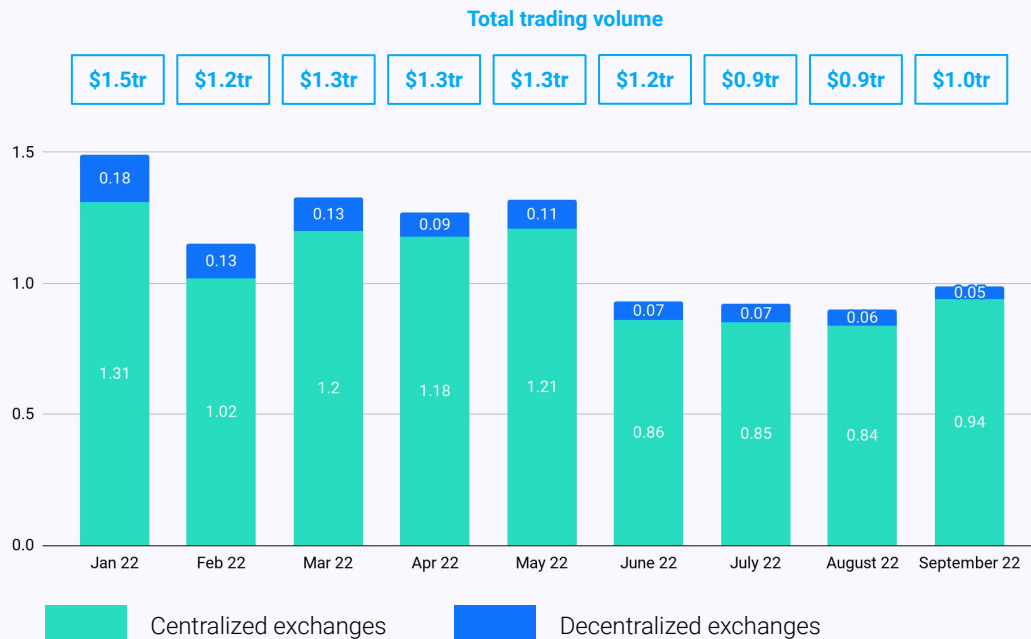
Numerous factors contributed to the decline, including using too much leverage during a period of tightening financial conditions, the collapse of TerraUSD, and concern over other stablecoins, as well as lower trading volumes that increased volatility.

Since its peak in November 2021, the crypto market has lost \$2.1 trillion of its market cap, bringing it to its lowest point since 2020. Before slightly recovering, the prices of BTC and ETH fell below \$18,000 and \$1,000, respectively.

The fear-and-greed sentiment, the 200-day and 200-week moving averages (MA) for Bitcoin, the Mayer Multiple, and the Stablecoin Supply Ratio all indicate that the market is currently under increased levels of pressure.

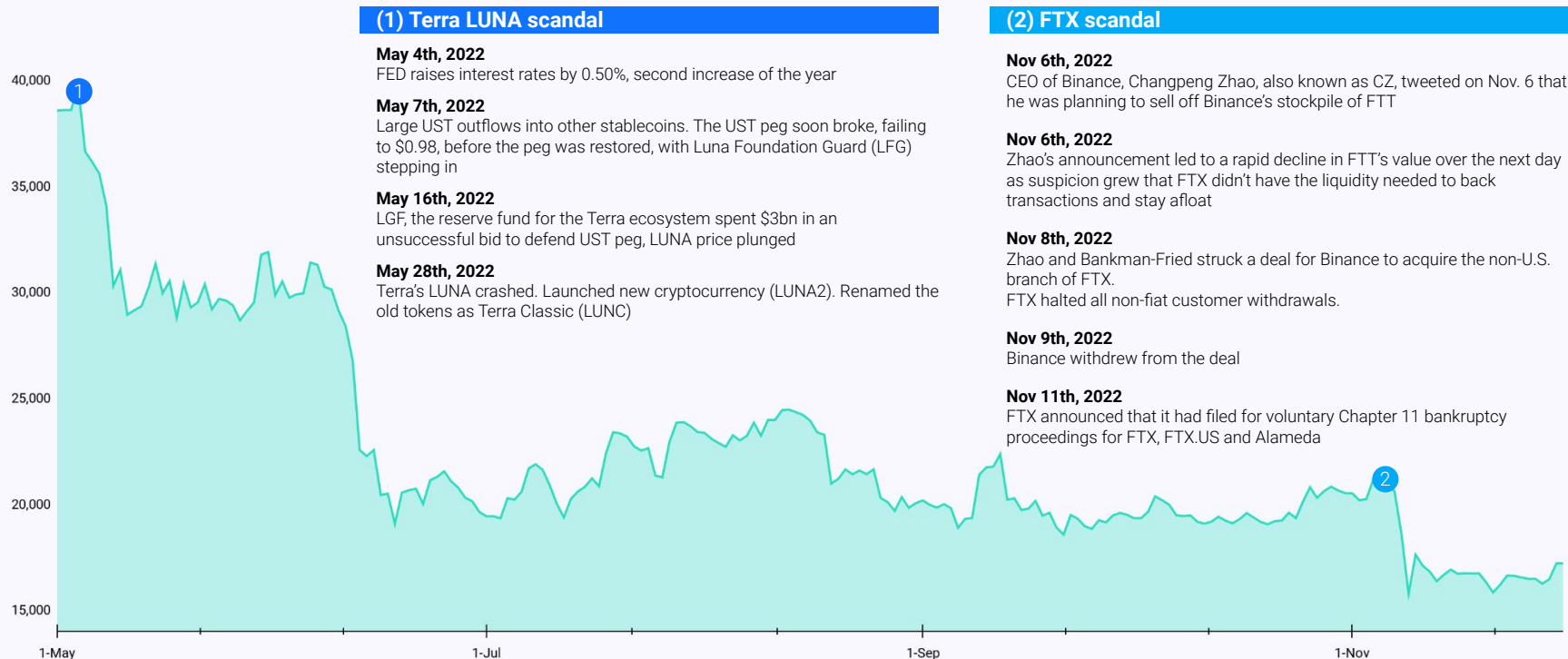
The underlying fundamentals of cryptocurrencies may be strong enough to weather the current storm, however, the current bear market might continue for some time.

Top 10 cryptocurrency exchanges (CEX + DEX) trading volume

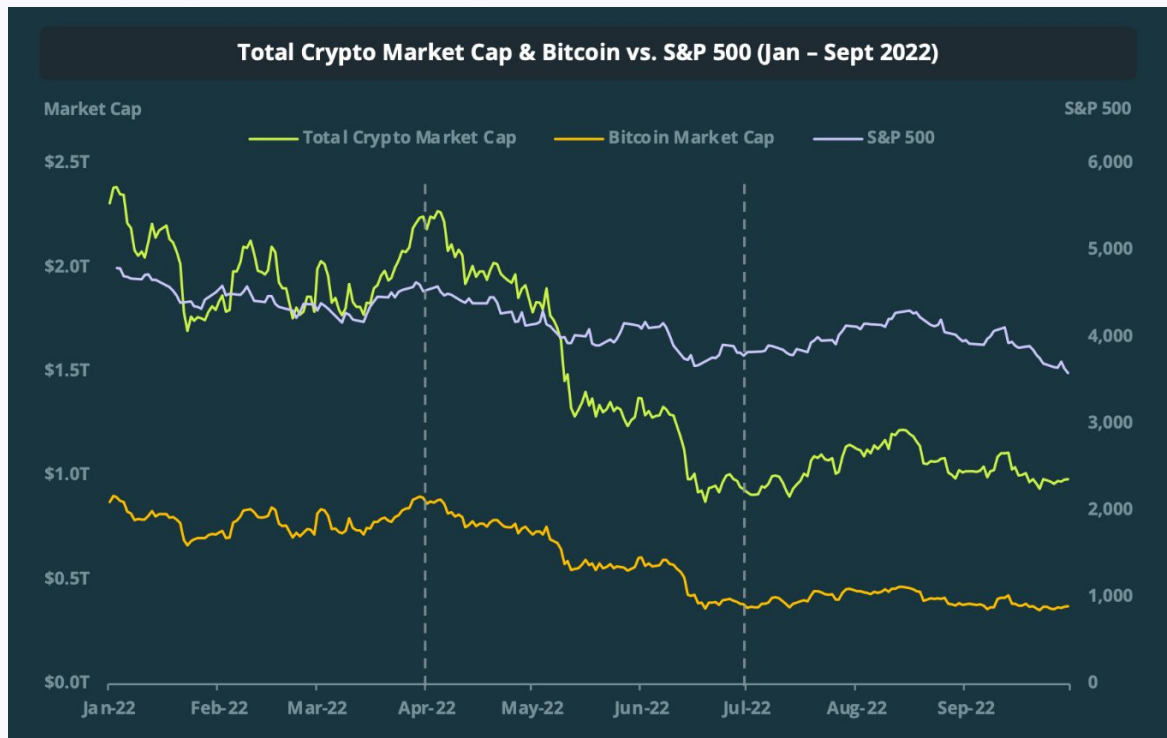


In the span of 3 months, \$2.1tr of crypto market value were wiped out

Bitcoin price throughout 2022 (in \$)



During market turmoil cryptocurrencies move in tandem with equities



Key takeaways

Correlation between total market cap of crypto and S&P 500

- Q3 2022 correlation coefficient: 0.85 (high)
- Q2 2022 correlation coefficient of 0.92 (high)
- The S&P 500 fell by 5.2% which is 5 times greater than Bitcoin's 1.0% decline, in Q3 2022
- Bitcoin is relatively more volatile

With a correlation of 0.90, the total market capitalization of cryptocurrencies likewise kept increasing in lockstep with Bitcoin.

However, this is a decline from a perfect correlation of around 1.0 in Q2 2022.

Total tokenized market cap estimated at 10% of global GDP by 2030

Tokenization of global illiquid assets estimated to be a \$16 trillion business opportunity by 2030

Tokenization of global illiquid assets by year in Trillions of dollars



Notes

Conservative forecast – tokenization potential of \$68m trillion by 2030 in best-case scenario

Asset tokenization potential differs across countries due to variations in maturity of regulations and size of asset classes

Total tokenized market estimated to be 10% of global GDP by 2030

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Interview with Raphael Neuberger, Head of Digital Assets at V-Bank



Raphael Neuberger

Business Development & Head Digital Assets



About: Raphael has been working at V-Bank for a year as the head of digital assets, actively participating in developing the banks digital asset strategy.

He previously held a position at Roland Berger (2+ years) as a project manager and Zeb Consulting as manager (8+ years). Throughout his career, Raphael acquired an extensive knowledge of the capital markets and digital asset universe.

V-BANK announced earlier this year that it is planning to launch a digital asset banking services for its clients. What were the key drivers behind this decision?

We closely listen to our customers, speak to partners and, experts and monitor trends in the market. All these sources of information virtually were shouting at us that the DLT/blockchain technology has a huge potential to shape the future of financial markets. As an infrastructure provider for custody, trading and many more add-on services it is our goal to offer state-of-the-art access to as much assets possible.

As a leading traditional depository bank for independent financial advisors and their clients, your client base is not the typical crypto crowd. How is the demand for access to digital assets developing in this target group?

The demand is growing slowly but steadily and is clearly driven by our business partners who act on behalf of their clients (our end clients) within their mandate. Many of our professional partners (independent asset managers, family offices, foundations, institutional clients, ...) see the opportunities of digital assets and the various use cases that come along. Besides trading of crypto-currencies, we see a lot of interest in the tokenization of (real-) assets and use cases linked to crypto securities.

You are implementing your digital asset custody and trading offering via regulated partners while preparing for an in-house solution in parallel. Can you elaborate on the strategic considerations behind this approach?

We can learn a lot from partners that have already successfully received a BaFin license for crypto custody. I believe that in the long run all major financial service providers active in digital assets will go for their own licence. The question will be how fast they will receive it. Custody is at the foundation of our business and this is true for digital assets as well. When our partners ask who is legally and technically controlling the private keys, we need to be able to answer both of these questions with „yes“

Custody and trading are establishing themselves as primary service offerings provided by financial institutions. What do you expect to be the frontier thereafter?

Custody and trading are also the use cases that are closest to what we offer our customers today. At the same time, we receive a lot of questions regarding the tokenization of gold, art, real estate but also more exotic assets like ships and seldom musical instruments. Since the 2nd quarter of 2022, the requests regarding eWpG and crypto securities are rising. We do see a lot of potential in both of these use cases. Besides the question of minting the token or issuing the crypto security the question at the end of the process is always: „how can get this into my securities account to have an integrated view of all my assets?“. We are going to formulate some answers to these questions soon. But the real potential can only be lifted if the participants in the digital assets space succeed in setting up one or more efficient secondary markets where these assets can be traded at least as easily and cheaply as cryptocurrencies can already be traded today.

Banks mainly focus on infrastructure for custody, trading and tokenization

Recent investments such as the one of Morgan Stanley in staking provider Figment as well as BNY Mellon, Citi, and Wells Fargo in crypto trading infrastructure provider Talos or Goldman Sachs and Citi in crypto infrastructure firm Blockdaemon demonstrate their focus on the continued development of blockchain infrastructure and necessary to support the growing crypto ecosystem.

In general, banks are making investments across a range of sectors, from marketplaces and platforms for blockchain development to services for market data and decentralized apps. The majority of these investments aim to increase consumer reach, user adoption, technological innovation, and customer experience.

[According to Brian Moynihan](#), CEO of Bank of America, some banks are taking a proactive approach by investing in cryptocurrency businesses, while others are adopting a wait-and-see approach because current regulations prevent them from doing so. This was revealed in a recent interview at the World Economic Forum in Davos. Nevertheless, that hasn't stopped them from establishing a cryptocurrency research to serve institutional clients as well as retail customers and create IP. [By 2021, blockchain-related patents accounted for 8% of all BoA-awarded patents](#), representing an 86% increase for the bank in this key patent category.

However, these steps show that banks no longer view cryptocurrency as a risk. As an integrated or add-on option, some banks have already begun adding blockchain and cryptocurrency technologies into their regular banking portfolio.

As an illustration, last June 2022, Citi announced that they are working together with Swiss firm, Metaco, as a custody technology provider for their Digital Asset Custody solution.

Last December 2021, BBVA launched its first commercial solution for the trading and custody of bitcoin in Switzerland

In April 2021, the European Investment Bank (EIB) launched a tokenized bond issuance. They are the first public bank to work with private banks to sell bonds on the blockchain.








In a bear crypto market, tokenization use cases are to gain momentum as they drastically improve bank's issuance efficiency leading to significant costs reduction for the issuer

Summary

- **Banks focus mainly on building digital asset infrastructure, showing growing interest to support the dynamic crypto ecosystem**
- **Through investments in marketplaces, tokenization, crypto data providers and security tools, they aim to increase consumer reach, user adoption, technological innovation, and customer experience in the near future**
- **EU regulators intentions to foster investor protection and financial market stability (MiCA) show that crypto regulations are improving, further accelerating the crypto ecosystem adoption**

As of May 2022, **61 banks** have invested in blockchain companies

Top banks investing in crypto & blockchain companies (Aug 2021 - May 2022)

	HQ	Assets under management	# of investments	Size of funding rounds as a proxy of investment	Companies invested in
Morgan Stanley		\$1,400bn	2	\$1,110m	Figment 
Goldman Sachs		\$2,000bn	5	\$698m	  COINMETRICS  
 BNY MELLON		\$2,300bn	3	\$690m	TALOS  
 Commonwealth Bank		\$785m	4	\$421m	LYGON  
 citi		\$2,291bn	6	\$215m	 TALOS   
 UOB		\$1,450bn	7	\$204m	      
 HSBC		\$3,021bn	1	\$200m	
WELLS FARGO		\$1,948bn	2	\$165m	TALOS 
 KB		\$970bn	8	\$143m	streami     

Before Aug 2021, 55 banks invested in a crypto or blockchain-related firm

Top banks investing in crypto & blockchain companies (until Aug 2021)

	HQ	Asset under management	# of investments	Size of funding rounds as a proxy of investment	Companies invested in
 standard chartered		\$789bn	6	\$380m	 ripple  Cobalt  点融 DIANRONG  METACO  Linklogis International
 UBS		\$1,126bn	5	\$226m	 AXONI  r3  FNALITY  CONSENSYS
 BNP PARIBAS		\$3,081bn	9	\$236m	 TRADEX  HQLA  Digital Asset  METRON  r3  komgo TOKEN
J.P.Morgan		\$3,386bn	8	\$206m	 AXONI  Digital Asset  r3  HQLA  CONSENSYS
 BARCLAYS		\$1,842bn	22	\$196m	 sunexchange  Real Blocks  evernym  avenews  r3  FNALITY  Chainalysis  EVERLEDGER  safello + 4 others
 MUFG		\$3,408bn	6	\$185m	 coinbase  komgo  FNALITY  r3  bitFlyer
ING 		\$1,147bn	6	\$170m	 HQLA  komgo  FNALITY  r3  VAKT
BBVA		\$796bn	5	\$167m	 Cambridge Blockchain  BITCOVAULT  EVERLEDGER  r3  Solarisbank
NOMURA		\$432bn	5	\$146m	 Quantstamp  KOMAINU  r3  SECURITIZE

Growth of VC investments in blockchain startups indicates growing adoption

Web3 accounted for over 57% of blockchain funding in Q2 2022, for the second straight quarter

Notable investments in Q2 2022:



\$400m
Equity round - Apr 2022



\$350m
PE - Apr 2022

LITHOSPHERE

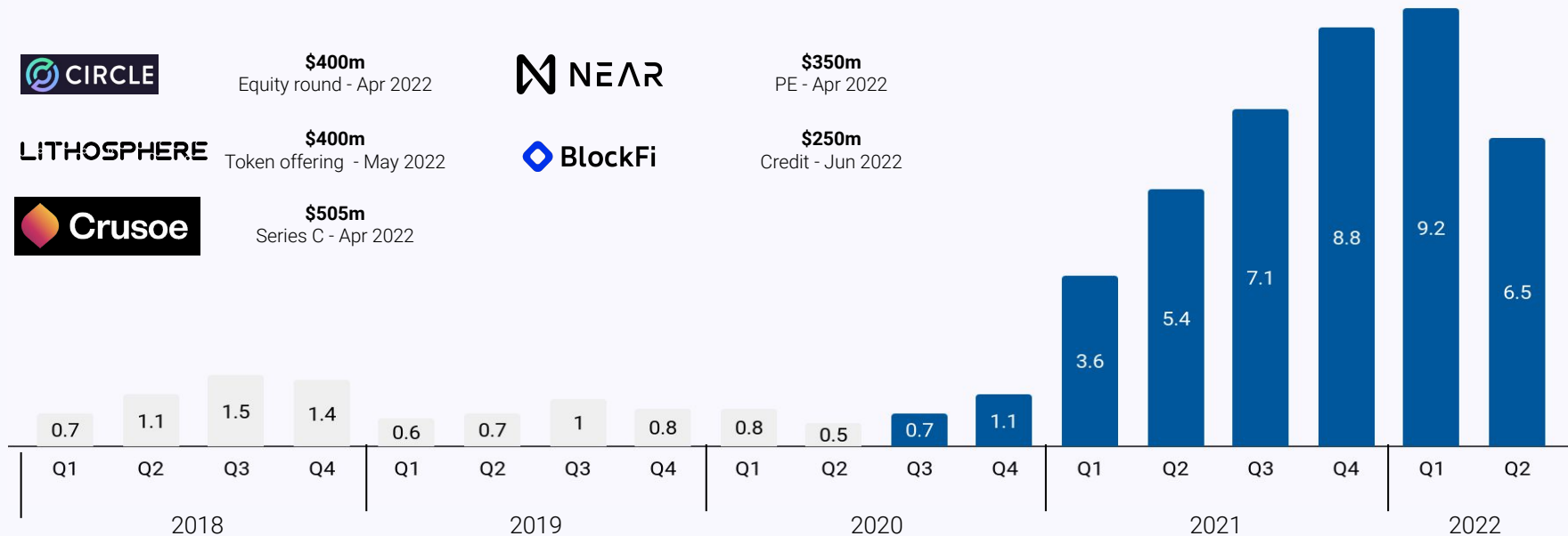
\$400m
Token offering - May 2022



\$250m
Credit - Jun 2022



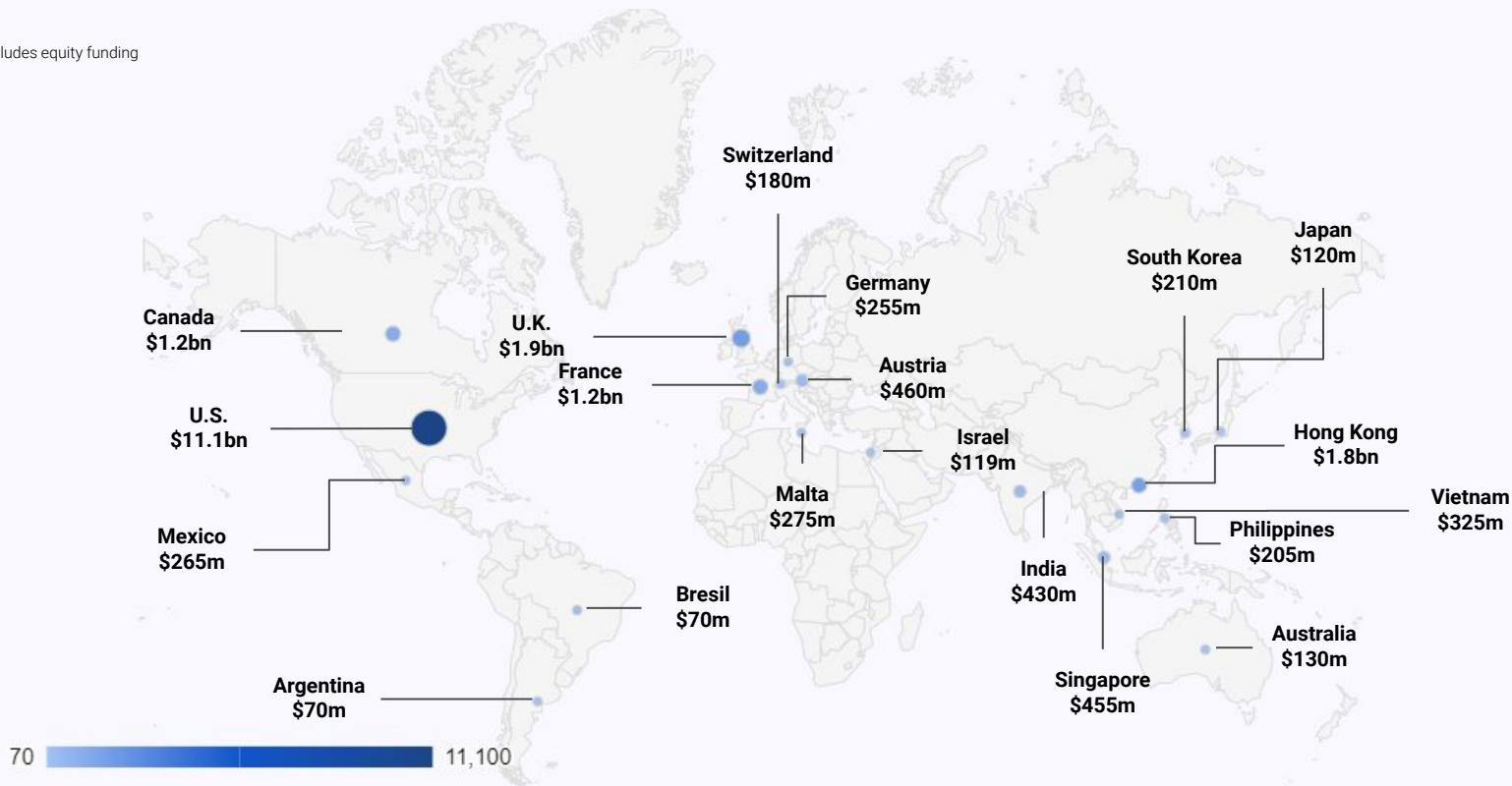
\$505m
Series C - Apr 2022



The US took the lead in investments made in blockchain companies in 2021

Venture capital funding per country for blockchain companies increased in 2021

Note: Data only includes equity funding



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1

Digital assets: key market developments

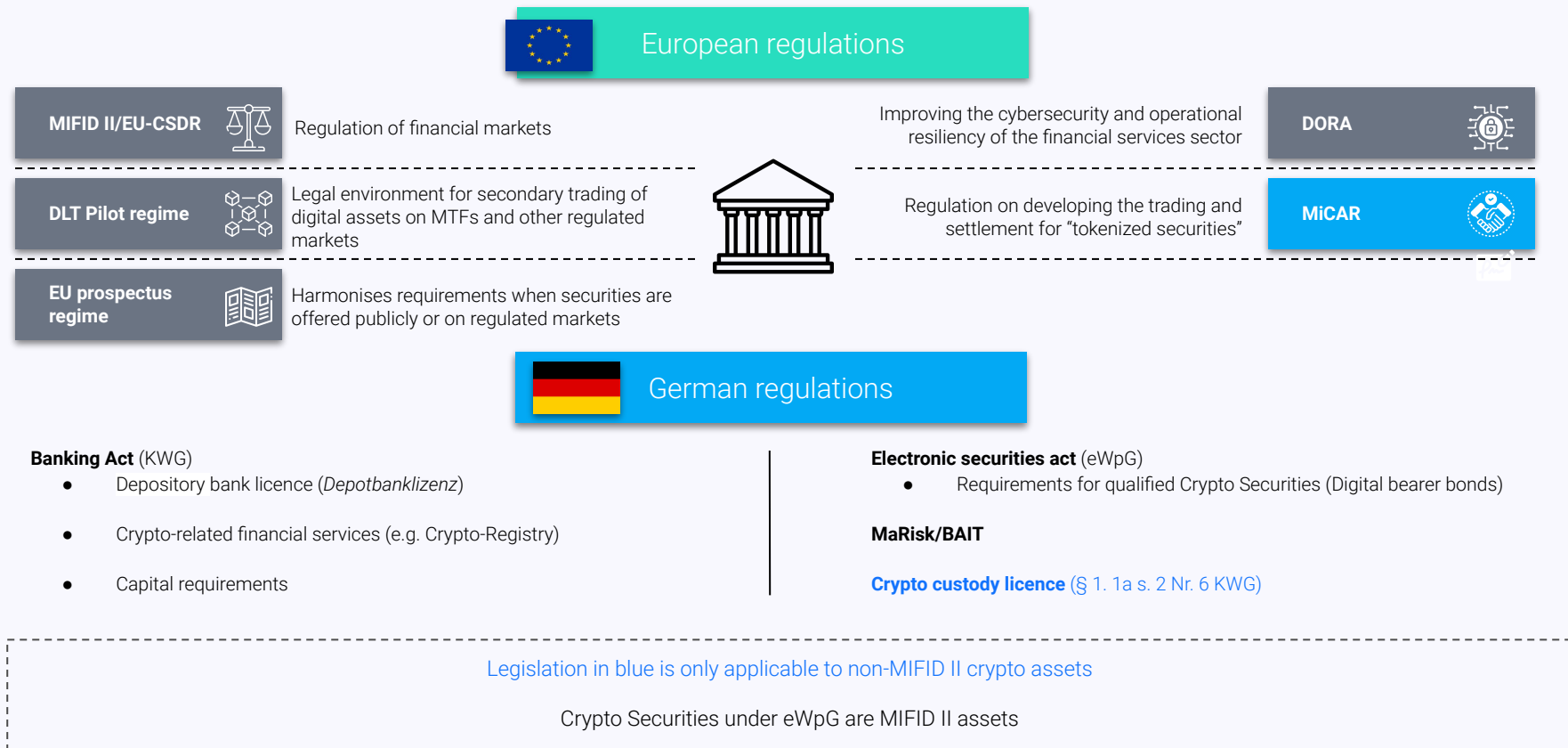
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Regulatory deep dive: EU digital finance package (MiCA & Pilot Regime)

The EU is introducing comprehensive regulations for digital assets



MiCAR regulates crypto issuance and services which are not covered by MiFID

MiCAR is expected to enter into force on full scale in 2024

MiCAR regulation overview

History



The EU's Digital Finance Strategy aims to prepare Europe for the digital age

Intention



The aim is to foster investor protection and financial market stability

Scope



MiCAR encompasses crypto assets and crypto asset services that do not already fall under the MiFID II regulation

Further procedure



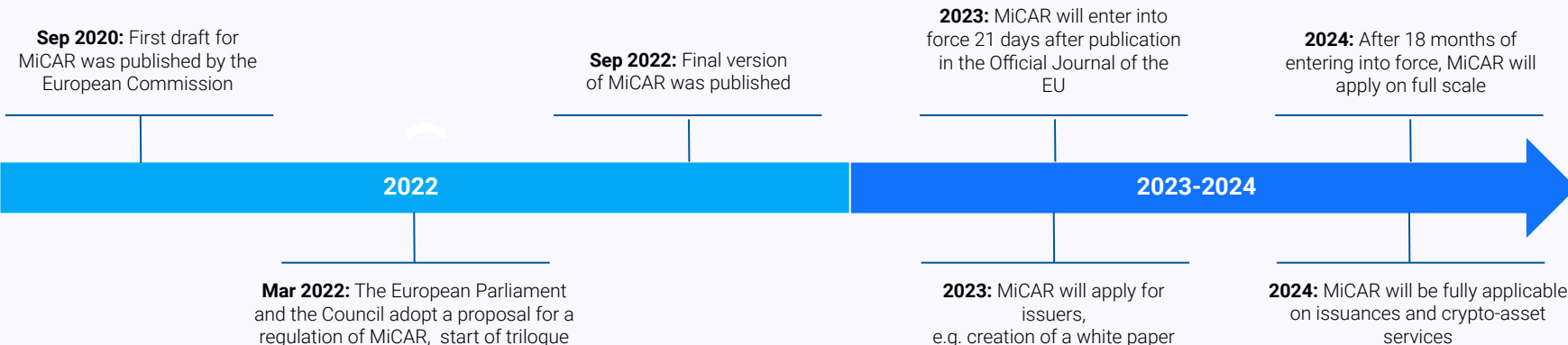
An agreement is to be reached in the trilogue, which will then be published in the EU Journal. MiCAR is expected to enter into force in 2023 with the first application in 2024

Terminology





MiCAR's regulatory work includes the creation of definitions on crypto-assets and crypto-asset services

Timeline of MiCAR



MiCAR creates clarity for crypto-assets and crypto-asset services

Crypto-asset should be treated as a financial instrument based on its substance and regardless of its form

Terminology	Definition					
Electronic money token (EMT)	A crypto-asset whose main purpose is to be used as a means of payment , designed to maintain a stable value by maintaining a portfolio	Criteria for significance (2 (EMT) or 3 (ART) out of 7 criteria)			 ...	Significant asset-referenced tokens
Asset-referenced token (ART)		1 Size of the customer base or shareholders	4 Providing advice on crypto-assets size	5 Provider of core platforms services		
	A type of crypto-asset that is not an electronic money token and that purports to maintain a stable value by referring to any other value or right or combination	2 Value or market capitalization	6 Significance of cross-border activities	7 Interconnectivity with the financial system	 ...	Significant electronic money tokens
Utility token		A type of fungible crypto-asset which is accepted only by the issuer, is used for purposes other than for the payment or exchange of external goods or services				
Crypto-asset	Digital representation of value or use cryptographically for security and in the form of coins or tokens or other digital media that can be transferred and stored electronically, using distributed ledger technology or similar technology					
Crypto-asset services	Any of the services and activities listed below relate to any crypto-asset:					
	The custody and administration of crypto-assets on behalf of third parties			The exchange of crypto-assets for fiat currency or other crypto-assets		
	The operation of a trading platform for crypto-assets			The execution of orders for crypto-assets on behalf of third parties		
	Note: ESMA should specify the conditions under which a crypto-asset should be treated as a financial instrument based on its substance and regardless of its form					

MiCAR defines rules for conduct, reporting and governance

	Issuers			Crypto-Asset Service providers
	Requirements for all issuers	Requirements for issuers of asset-referenced tokens	Requirements for issuers of electronic money tokens	
Requirements for authorization	<ul style="list-style-type: none"> • Application to NCA • Legal entity 	<ul style="list-style-type: none"> • Outstanding amount of tokens > EUR 5m 	<ul style="list-style-type: none"> • Need to authorize as credit institution or electronic money institution • EMTs have to be authorized by the ECB 	<ul style="list-style-type: none"> • Legal entity has to be registered in a EU member state • Provider has to apply to ESMA
Crypto-asset white paper	<ul style="list-style-type: none"> • Overview of key information • Description of the project • Rights and obligations • Issuer and main participants • Technology and standards • Legal entity • Risk 	<ul style="list-style-type: none"> • Complaint handling procedure • Nature and enforceability of rights • Custody and investment policy for reserve assets • Governance • Authorization of WP required 	<ul style="list-style-type: none"> • Indicate whether it is a public offering and/or trading access on a trading platform 	<ul style="list-style-type: none"> • N/A
Form of the white paper	<ul style="list-style-type: none"> • The white paper has to be fair, clear and not misleading; no material omissions, should be concise and comprehensive • Published on issuer's website • Other technical and language requirements 			
Liability for white-paper content	<ul style="list-style-type: none"> • The Issuer or its management body is liable for the white paper • Infringement of the content and form requirements • The burden of proof is on the holders of the token • The civil liability rules will continue to be applicable for the issuer and their management body to protect the holders of the crypto assets 			<ul style="list-style-type: none"> • N/A

MiCAR defines rules for conduct, reporting and governance





2/2

	Issuers			Crypto-Asset Service providers
	Requirements for all issuers	Requirements for issuers of asset-referenced tokens	Requirements for issuers of electronic money tokens	
Conduct requirements	<ul style="list-style-type: none"> All Issuers have to act honestly, fairly, and professionally They have to act in the best interest of the token holders They have to ensure that the token holders are treated equally 	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Credit and electronic money institutions are subject to relevant legislation 	<ul style="list-style-type: none"> Obligation to communicate and act honestly, fairly and professionally
Publication and reporting requirements	<ul style="list-style-type: none"> All Issuers have to publish white papers and marketing Modifications to the white paper also have to be published on their website 	<ul style="list-style-type: none"> Publication of any significant event NCA has to be notified if there are any relevant changes 	<ul style="list-style-type: none"> NCA has to be notified if there are any relevant changes 	<ul style="list-style-type: none"> NCA has to be notified if there are any changes to the management body KYC rules
Governance requirements	<ul style="list-style-type: none"> Conflict of interest (Col) has to be managed 	<ul style="list-style-type: none"> Robust governance arrangements Appropriate and adequate management 	<ul style="list-style-type: none"> Relevant legislation for credit institution or electronic money institution 	<ul style="list-style-type: none"> Appropriate and adequate management Complaint handling procedure
Own funds and reserve assets obligations	<ul style="list-style-type: none"> N/A 	<ul style="list-style-type: none"> Value of reserved assets has to be equal to the face value of the claims 2% of the average amount of reserve assets is required as own funds (at least 350.000 EUR) 	<ul style="list-style-type: none"> Rules of E-Money Directive (2009/110/EC) apply (ZAG) Claim for redemption at any moment at par value for holders of EMT 	<ul style="list-style-type: none"> Class 1: 50.000 EUR Class 2: 125.000 EUR Class 3: 150.000 EUR





The EU DLT Pilot regime creates regulatory certainty for secondary markets

The EU DLT Pilot Regime and MiCAR are part of the EU Digital Finance Package

Purpose

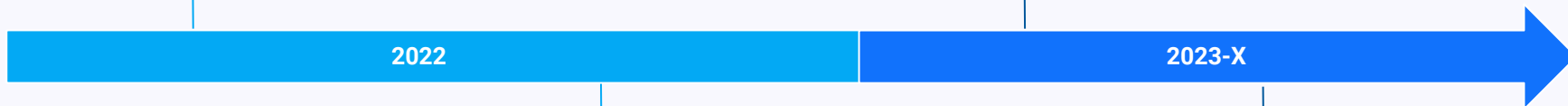
-  Directly applicable across the 30 EEA countries
-  Aims at developing the trading and settlement for tokenized securities
-  Secures uniform approach to the alternative requirements for DLT market infrastructures
-  Pilot Regime provides a mechanism to allow certain restricted use of DLT

Current status of the legislative process

-  CSDR prevents securities exchanges from listing security tokens
-  Security tokens are subject to requirements for the securities to be recorded in a central securities depository (CSD)
-  Settlement of transactions in those security tokens would need to be performed by CSD
-  DLT exchange must acquire a formal CSD license

Nov 2021: Political agreement reached between EU Parliament and Council

Mar 2023: Most regulations will enter into force



Jun 2022: Statement of the regime was published in the Official Journal of European Union

2026: ESMA and the Commission will present a report assessing the pilot regime and how well it worked in practice

③ Asset Tokenization

This chapter examines the development of the asset tokenization and protocol market. It should create an understanding how use cases are being adopted or explored in the industry.

Each section presents a high-level overview of the market participants and available protocols.

- | | |
|---|--|
| 1 | Tokenization: status-quo and market outlook |
| 2 | Key considerations for a tokenization transaction |
| 3 | Regulatory deep-dive: eWpG |
| 4 | Asset tokenization market initiatives |

Blockchain and regulatory innovation paved the way for tokenization

Where does the need for tokenization come from?

Over the last decade, financial institutions have been active in digitally transforming their business operations to counter decreasing margins and improve overall business efficiency.



Securities settlement is **mainly paper based**



Securities **require intermediaries**, with the participation of a central securities depositories (CSD) acting as a bookkeeper



Many securities have **low liquidity** and **accessibility** as they often require a high minimum investment and are therefore inaccessible to smaller investors. Moreover, secondary trading is rendered more difficult as the securities' transferability is rather complex



Securities **lack visibility and security**. T&Cs are often long and obscure. Additionally, the securities ownership mainly relies on who is holding the paper (theft risk etc.)



Tokenization of financial and real assets

Financial institutions are turning to blockchain technology and tokenization to improve the shortcomings of conventional securities. Tokenization combines both the benefit of improved security and digital native-token. Additionally, it applies it to traditional assets creating a new digitized asset that can be stored, traded, and settled on the blockchain.



Improved security



Improved speed



Improved traceability



Improved transparency



Lower costs

Tokenization offers opportunities for financial service providers

Most of the different market participants have already started investing in tokenization

As machine learning and artificial intelligence continue to advance, **more transparency** and **easier access to on-chain and off-chain data** will provide additional inputs into financial modeling, resulting in more robust programs



ISSUERS

Issuers will need to purchase new blockchain technologies in order to transfer the range of traditional assets onto digital asset marketplaces and exchanges



SECONDARY MARKET

Through tokenization, new platforms including participation from both small and large companies would be created. Directly increasing access to capital markets through centralized or decentralized exchanges and applications. Secondary markets are greatly enhanced.



CUSTODIANS

Custodians will need to assess their position in the protection of assets given the immutability of decentralized ledgers and secure wallets, which provide the option of direct custody,



FUND ADMINS

Fund administrators will be able to provide real-time management of tokenized assets to their clients at a lower cost by linking to settlement and transfer systems



CREDIT RATING AGENCIES

In order to lower risk of securitized goods through improved data dependability, credit agencies gain access to real-time performance data on underlying collateral pools, and better surveillance, will be able to encode credit-related information into smart contracts



INVESTOR RIGHTS

By enabling automatic communication and adding voting features to smart contracts, investor rights could be improved

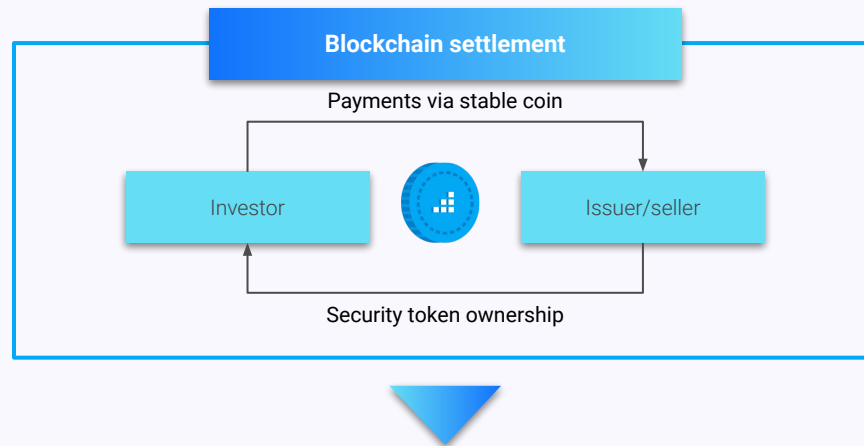
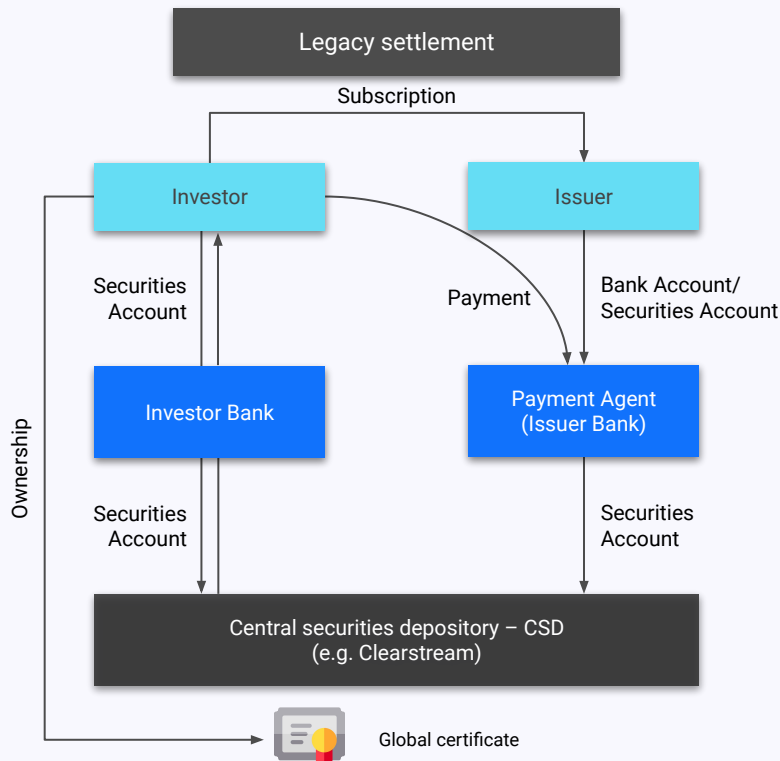


COST REDUCTION

Cost reduction will enhance the potential volume of deals, by making lower deal sizes more affordable, and open the capital markets to smaller businesses

Tokenization enables radically better settlement

And presents clear operational and financial improvements as opposed to legacy systems

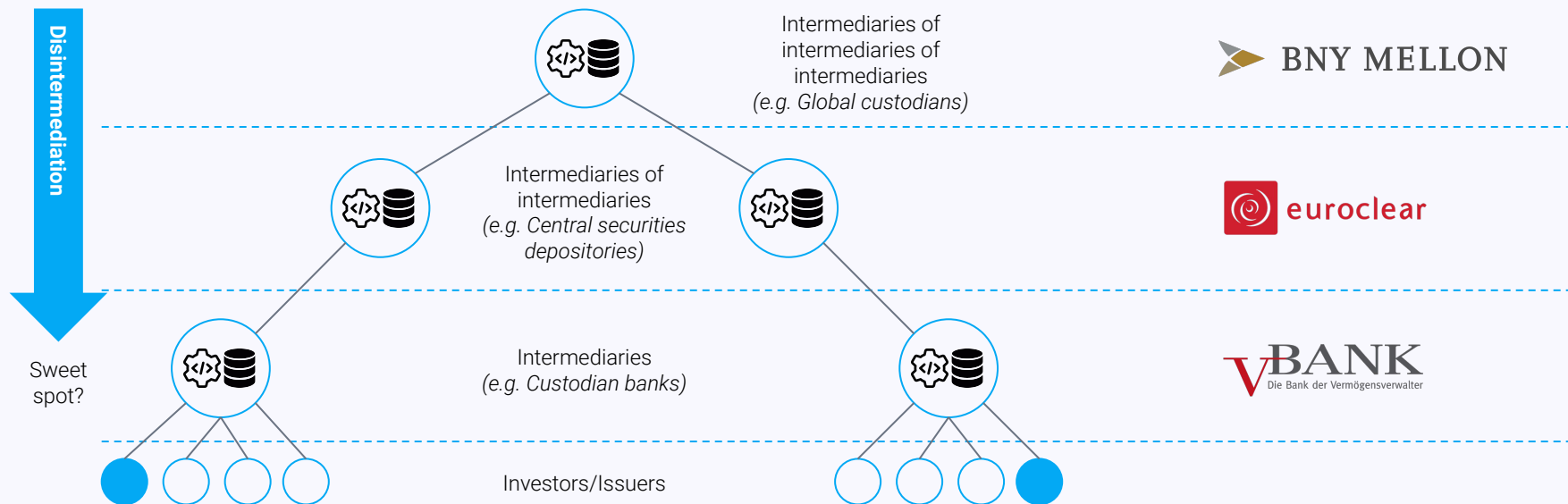


Advantages

- Instant DvP at t+0 with no counterparty risk
- Simpler custody without CSD and easy global transferability
- Higher secondary liquidity at smaller denominations
- Increased transparency and visibility

Tokenization can **disintermediate** the waterfall of custodians

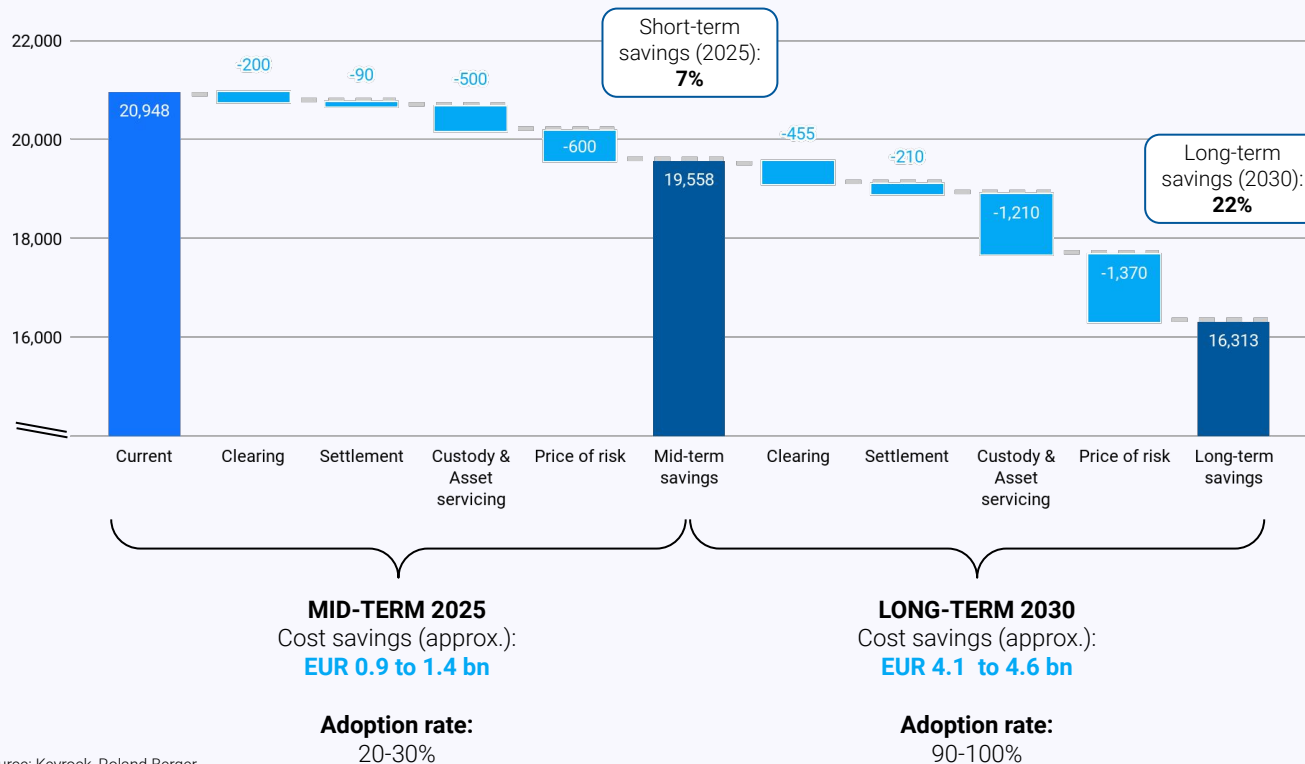
Reducing issuance cost by up to 90% depending on the issuance frequency of the asset



Tokenization of post-trading could lead to efficiency gains of €4.6 bn by 2030

In the long term, all sectors of the post trade value chain are expected to see significant cost savings

Potential cost savings from tokenization in EUR m



Notes

Long-term tokenization could be adopted by 90 to 100% of potential users.

Adoption is driven by:

- Harmonized regulation and systems that facilitate scalability of the technology across borders
- Enterprises with more and more profitable uses cases

Following this growth, regulators will be pushed to define the boundaries of the technological and regulatory framework, further drawing users to tokenization's financial and time-saving appeal

Interview with Martijn Siebrand, Ecosystem Manager Digital Assets at ABN AMRO



Martijn Siebrand

Ecosystem Manager Digital Assets -
Strategy and Innovation



About: Martijn is working with a team to create digital financial products and services for clients. Before this role, Martijn has been working in the financial sector for several years with a specialization in creating new financial products based on data like supply chain finance. Since 2014 Martijn is active around the distributed ledger technology domain with contacts across the globe. Martijn has done various presentations and workshops on the subject of digital assets and is building an ecosystem to implement digital assets in the financial system.

How do you apply or plan to utilize asset tokenization in your organization and what are the key benefits of your use case?

At Group Innovation & Strategy of ABN AMRO, we make use of the DARE innovation framework with stage gates. For tokenization, we cooperate with various departments of the Bank, in particular our global markets and debt capital markets, but also second-line departments. We have done multiple exploration projects to define the current status of the market for digital assets and our potential roles in the last few years. E.g. given our strategic focus on sustainability, we looked at tokenizing energy, supporting real estate, etc. Further in the funnel, we have multiple ventures that are working with real clients to make the first deals happening. Both on the issuing and investor sides. Together we are testing how these markets are being formed, what is possible today and what might come tomorrow.

For new propositions, we interview clients to see what benefits could be realized. For tokenization we have a perspective on the issuer and investor side. Reducing settlement time, access to capital markets for mid corps, a direct connection between investors and the assets, ESG data in the token, and programmed governance are some benefits we get back and see ourselves. Besides the benefits we have also the belief that capital markets will be more digitized than they are today. ABN AMRO is working only on tokenized securities that are fully regulated. The fact that some countries already have specific digital securities legislation in place helps to explore the market.

What were the main challenges you are facing during implementation?

With traditional issuances, we need to align a lot of different parties and departments of the bank. When we digitize the issuance we still are dependent on a lot of different internal and external stakeholders. If we talk about a digital asset it is referred frequently to as crypto and not tokenized securities that we are exploring at the moment.

In addition, we sometimes notice a lack of technology understanding of the stakeholders involved.

Interesting to mention that the tech is not the hardest part but more (missing) the legal framework and reporting requirements.

Also, some of our clients lack the mandate at this moment to hold a financial instrument fully digital, they have to extend their investment mandates.

What are your considerations around selecting a blockchain for tokenization in this dynamic technological environment?

ABN AMRO has its own DLT team exploring different blockchains. We have been programming on private and public ones. Currently, public infrastructure with low energy usage has our preference. -We are continuously testing which blockchain is best suitable for a certain solution. We think in this phase the use of multiple blockchains is the most feasible solution as this field is developing rapidly. We have chosen strategic partners that we work with that are supporting multiple blockchain platforms, offering maximal flexibility in this phase.

What piece of advice would you give to others looking to introduce asset tokenization in their organization?

Asset tokenization is still a very new concept for most financial institutions and colleagues. So explaining what it is, what the benefits are, and why the market is moving in this direction is very important. We have collaborated closely with external and internal parties since the start to jointly develop propositions that are helping our customers but also to make sure we stay aligned internally. Especially in complicated finance processes that tight integration is what determines if a solution adds value or if it doesn't. Furthermore, it helped us that we started with a clear use case. Cause the possibilities are endless, that is a change but also a risk. By keeping that use case central you ensure focus. Which helps to retain focus on what needs to be done now and what can be done tomorrow. That use case also helps you to test early on if you're making the right choices for your initiative.

Tokenization does not end with banks and security tokens



③ Asset Tokenization

This chapter examines the development of the asset tokenization and protocol market. It should create an understanding how use cases are being adopted or explored in the industry.

Each section presents a high-level overview of the market participants and available protocols.

- 1 Tokenization: status-quo and market outlook
- 2 **Key considerations for a tokenization transactions**
- 3 Regulatory deep-dive: eWpG
- 4 Asset tokenization market initiatives

Example infrastructure components for a tokenization transaction

8 components are needed for a tokenized transaction

Key considerations are to be kept in mind during a transaction

Within the EU Framework, crypto regulation varies. As an illustrative example of working as a role model for similar regulations across Europe, we will be covering the German regulatory framework.

Blockchain, Issuer Key Management, Custodian, Tokenization provider, and Registrar should be selected after acquiring a deep understanding of what the issuer or organization is looking to achieve and after conducting a thorough market analysis to assess which fits best their needs.

So far institutional transactions are mainly settled in fiat as institutional investors do not want to carry the counterparty risk that current stablecoins pose. However, this is subject to change in the near future with transactions being settled using commercial or central bank CBDCs.

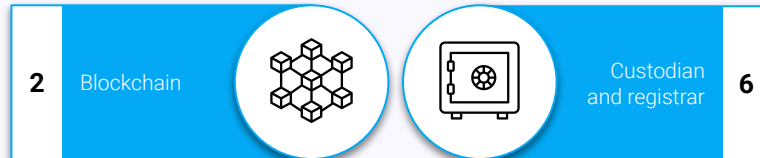
The listing of security tokens in Europe is not yet supported by regulations. However, from next year on, under the EU Pilot Regime, it will be possible to list security tokens on certain exchanges.

Established regulatory framework with precedent transactions



Digital book building with integration into existing distribution channels

High versatility at low transaction fees with broad compatibility



Provided by the issuer or by an experienced crypto custodian bank and registrar with strong track record

Bank-grade security with approval policies and minimal onboarding effort



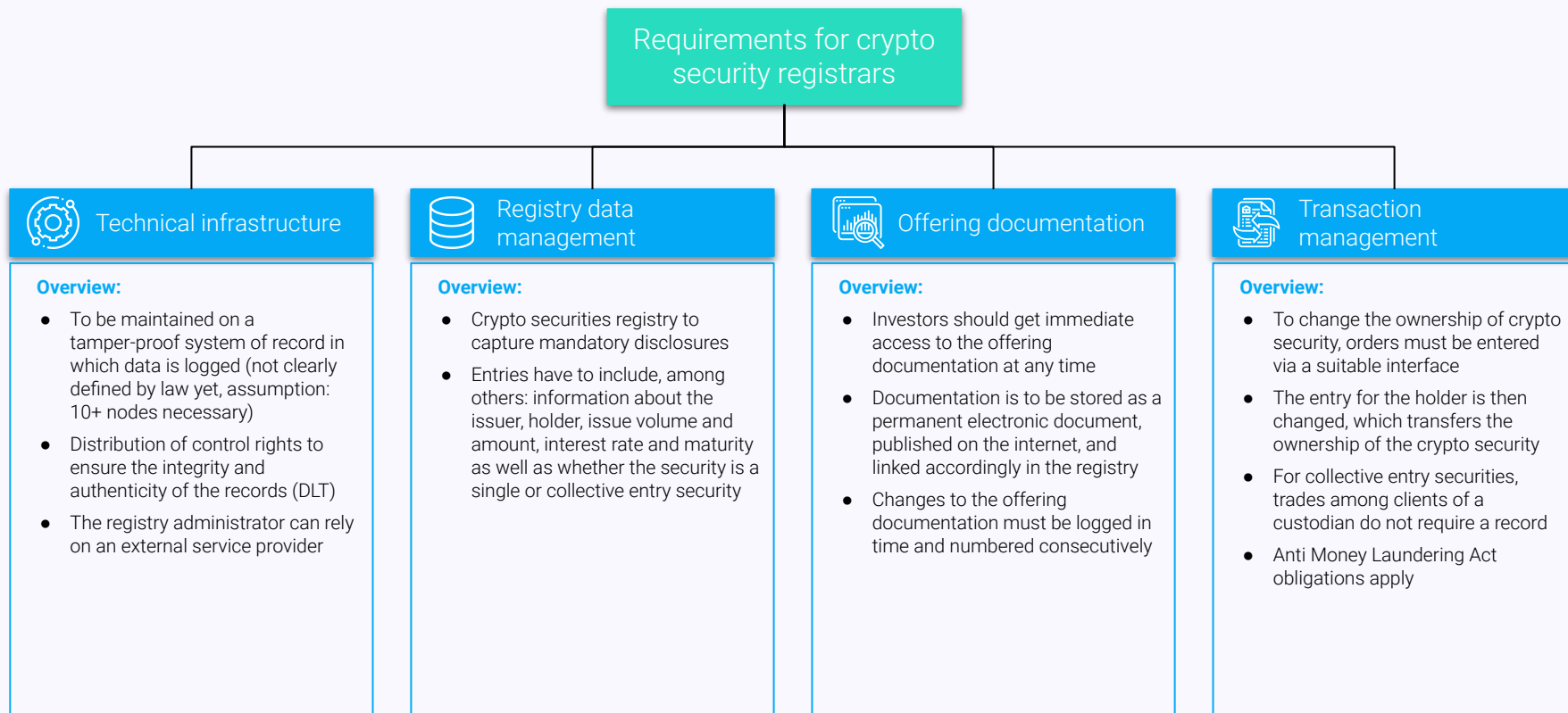
Investments and payouts via fiat transfers, issuer as its own paying agent

Established product with strong client references and low integration effort












OTC trading only, secondary transfers via custodian

eWpG defines requirements in four areas for crypto security registrars










Choice of blockchain for tokenization depends on use case requirements

The table below show the 4 protocols most commonly used in the context of a securities offering







Parameter	 Ethereum (EVM chain)	 Polygon (EVM chain)	 Avalanche (EVM chain)	 Stellar (non EVM chain)
 Scalability	Has scaling problems, which are supposed to be solved by merging with new consensus layer TPS: 15	Structure of multiple sidechains enables high scaling Ability TPS: 7,000	The Avalanche network consists of many sub-chains that ensure very high scalability TPS: 4,500	High scalability TPS: 1,000
 Security token track record	Proven track record, especially in institutional context	Same standards as Ethereum, growing track record	No known security tokens so far; but support for ERC-20 and ERC-721 Ethereum standards	Successfully used for issuing several regulated security tokens
 Acceptance of custody solutions	Very high acceptance among wallet providers and custody solutions	High acceptance also due to EVM compatibility	High acceptance also due to EVM compatibility	High acceptance for Stellar Lumens; support on wallets for "custom assets" not always available
 Transaction fees	EUR 10-30	EUR 0.002	EUR 0.10 - 1.00	EUR 0.000002
 Compatibility	High but complexity of Solidity bears attack potential, but tradable on almost all centralized and decentralized exchanges	High but complexity due to solidity and as EVM chain similar to ETH; acceptance by largest exchanges given	High but complexity due to solidity and as EVM chain similar to ETH; acceptance by largest exchanges given	Limited functionality compared to EVM, creation of smart contracts not possible; wide acceptance by centralized, as well as decentralized exchanges

ERC-20/ERC-1400 token standards offer versatile configuration options

2

Token feature	Description
1 Token name 	Meaningful name with identifying function
2 Symbol 	Token ticker serves as an abbreviation to the name
3 Number of tokens 	Token supply, driven by token denomination
4 Number of decimals 	Determines the divisibility of the asset
5 Burning of tokens 	Capability to decrease token supply
6 Minting of tokens 	Capability to increase token supply
7 Pausing of tokens 	Capability to pause token transfers globally

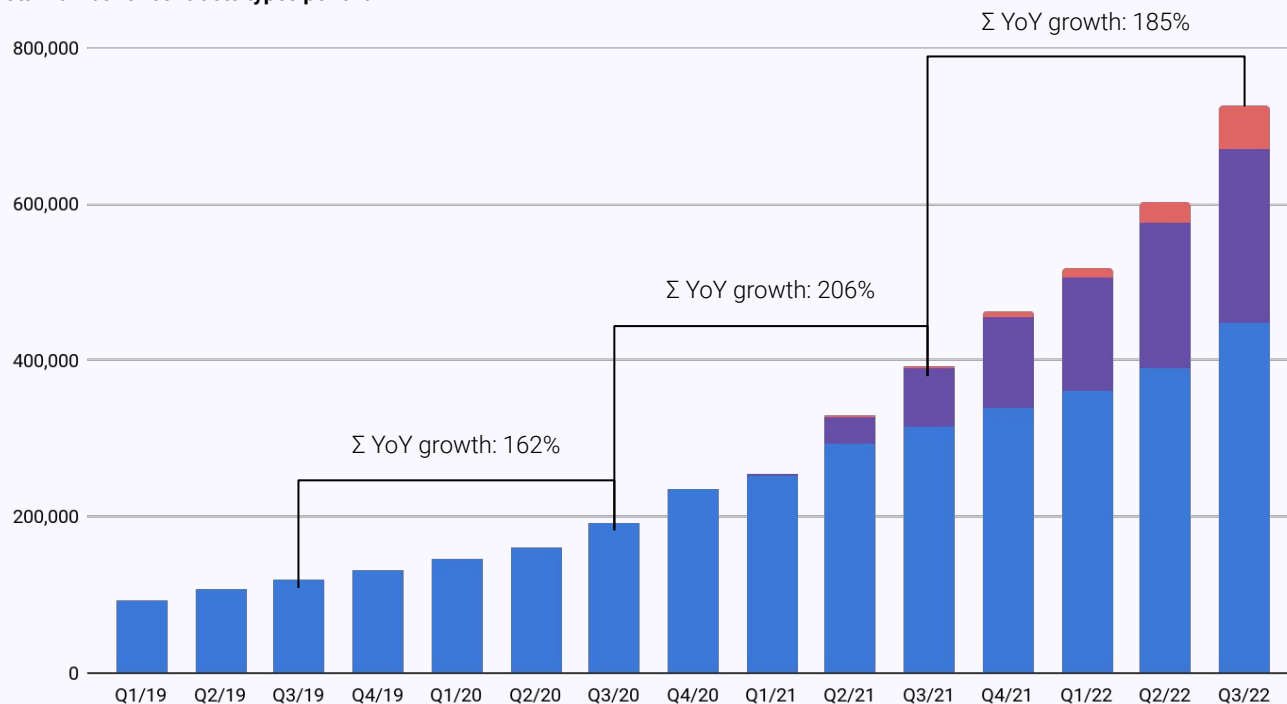
ERC-20 features

Token feature	Description
8 Blacklisting of addresses 	Capability to halt token transfers to and from individual addresses
9 Ownership of smart contract 	Change owner of smart contract who can manage life cycle events of token
10 Attachment of a document 	The capability to attach documents to tokens
11 Whitelisting of addresses 	Capability to allow token transfers only to certain addresses
12 Max token per address 	Limit the maximum amount of tokens that can be held by an address
13 Force transfer 	Owner of smart contract can transfer tokens between external wallets

Security token features

ERC-20 and ERC-1400 tokens are leading the way to market adoption

Total number of contracts types per chain



ETH ERC-20/1400 (1)

Share vs MATIC: 54%
Q3 2022: number of contracts - 391K

MATIC ERC-20/1400

Share vs ETH: 46%
Q3 2022: number of contracts - 335K

AVAX ERC-20/1400

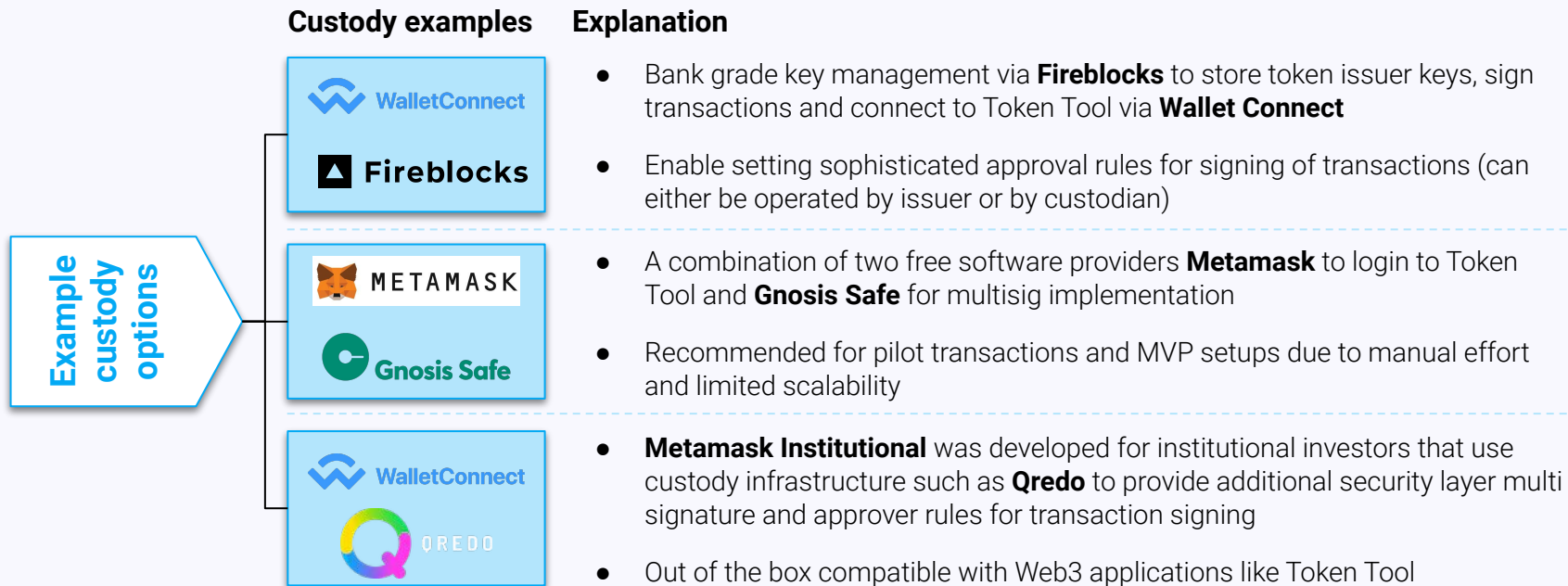
Share vs ETH: 11%
Q3 2022: number of contracts - 54K

From Q3 2019 to Q3 2022, the number of contracts grew at a **CAGR of 83%** driven by the strong growth in ERC-20

Notes: 1) includes only [blue checkmark](#) tokens, actual number significantly higher

Source: <https://dune.com/bitbonder>

Issuer key for pilot transaction is stored via [secure self-custody solution](#)

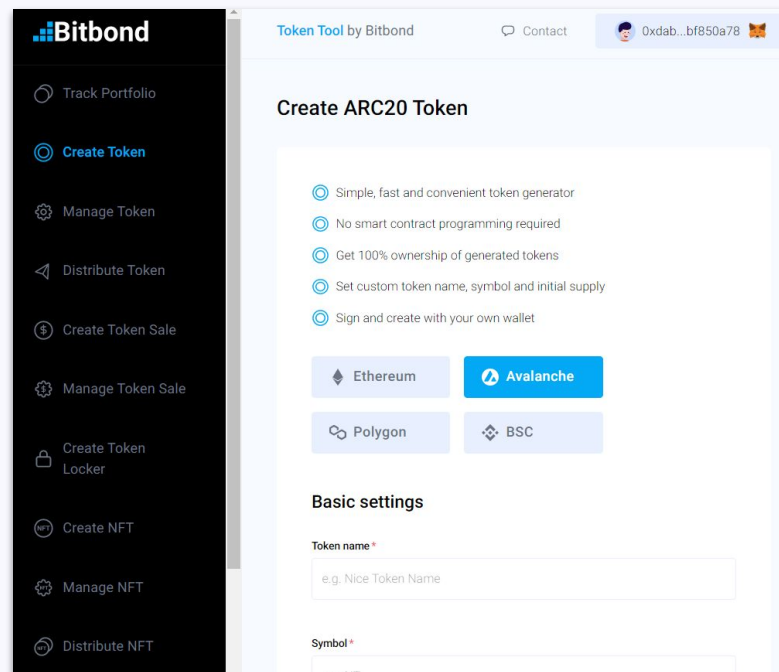
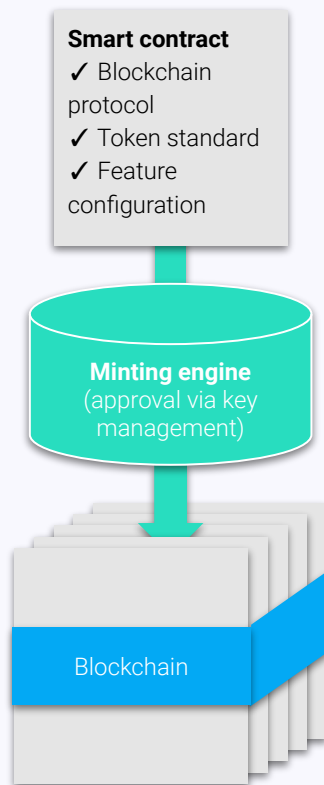


The minting engine is used to **deploy smart contracts and create tokens**

Technically, the process takes place via software tailored to the protocol on which new tokens are issued

Summary:

- Customized tokens can be issued to represent proof of ownership of financial instruments or other rights
- The process of issuance is also called minting (analogous to coinage)
- Different protocols define different standards for minting
 - Simple scripts (Stellar)
 - protocol-specific programming languages (Solidity on Ethereum)
 - common programming languages (JavaScript on Lisk or C on Polkadot)
- In any case, the issuer must use an issuer wallet (i.e. an address from which the new tokens are released on the blockchain) from which it can sign transactions



Secondary trading via OTC – exchange listing not possible, yet

Current Situation

- CSDR prevents securities exchanges from listing security tokens (changes partially with DLT Pilot Regime)
- Security tokens are subject to requirements for the securities to be recorded in a central securities depository (CSD)
- Settlement of transactions in which security tokens would need to be performed by CSD
- DLT exchange must acquire formal CSD license

EU DLT Pilot Regime

- Represents a controlled environment ("sandbox"), providing exemptions from certain regulatory requirements (MIFID II, CSDR) starting **March 2023**
- Authorised investment firms and DLT MTFs are eligible
- Trading DLT transferable securities that are not booked in a CSD but recorded on MTF's distributed ledger
- **Shares** with a market capitalization <EUR 200 million or **bonds** with an issuance size < EUR 500 million
- Market value of securities traded and recorded with one operator is limited to EUR 2.5 billion

Trading venue options



Decentralized exchanges



③ Asset Tokenization

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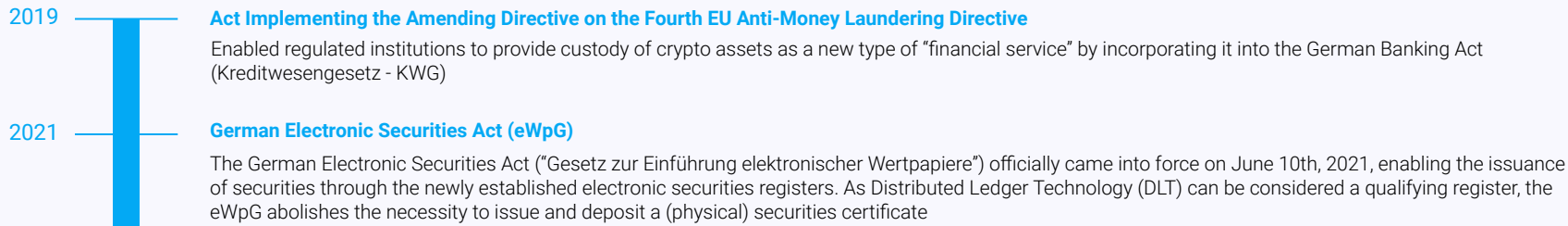
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eWpG advances the adoption of blockchain technology in Germany

DLT is considered a qualifying register under the new electronic securities act

Background and previous regulation



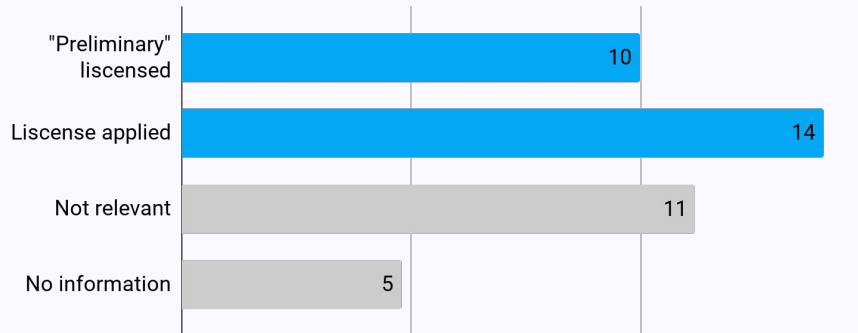
Purpose of eWpG regulation

The main objective of the German government's blockchain strategy is to capitalize on the opportunities that blockchain technology offers and to advance digital transformation. The purpose of the eWpG is that electronic securities carry the same rights and obligations as physical, certificate-based securities under the principle of technological neutrality.

Adoption of eWpG regulation

Crypto securities are considered securities under the German Custody Act (Depotgesetz) and can only be held for third parties by a bank with a custody license or a CSD. The WEPEX-adesso market survey indicates that since the enforcement of the eWpG, 25% of the 40 leading financial institutions in Germany have acquired their Crypto Security Register license. Another 35% of German financial institutions are in the process of applying to acquire their Crypto Securities Register license.

Number of leading German financial institutions owning a (preliminary) crypto securities registrar licence



Crypto Securities are recorded via a Crypto Securities Register

Bearer bonds and certain fund shares can be registered as securities without the issuance of a certificate

Bonds and certain fund shares are affected



As per section 1 of the German Electronic Securities Act, the eWpG applies to bearer bonds (Inhaberschuldverschreibung) while crypto-fund shares are regulated under the crypto-fund share ordinance (KryptoFAV). The eWpG does not (yet) cover the issuance of company shares, stock, or real estate. The eWpG defines electronic securities as securities without a certificate. Therefore, the issuance of electronic securities is completed through an entry into an electronic securities register instead of issuing a (physical) securities certificate.

Central Register vs Crypto Securities Register




The eWpG distinguishes between Centrally Registered Securities (Zentralregisterwertpapiere) and Crypto Securities (Kryptowertpapiere). Depending on the classification, the security is either entered into the Central Register or the Crypto Securities Register. Whereas the Central Register consists of securities clearing and a deposit bank, the Crypto Securities register is composed of a "Register Management Body" and a third party named by the issuer.

To guarantee security, the crypto securities register must be maintained on a counterfeit-proof recording system. Thus, the data is logged chronologically and stored in a manner protected against unauthorized deletion and subsequent modification.

Centrally registered securities

- 1 Entry into a centrally managed securities register 
- 2 Includes Bonds + Fund Share Certificates 
- 3 Dematerialisation of the physical General Certificate (Globalurkunde) 

Crypto Securities

- 1 Entry into an electronic Crypto Securities Register (DLT) 
- 2 Includes bonds (Inhaberschuldverschreibungen) 
- 3 No intermediaries required anymore 

Market participants see the eWpG vastly improve securities operations

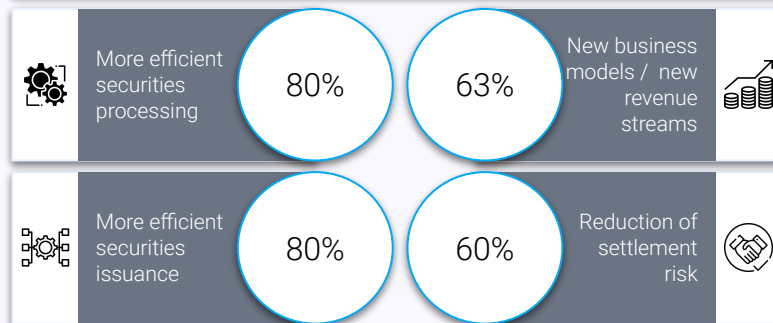
Wepex and adesso surveyed the current sentiment of German financial market participants regarding the eWpG

Market survey overview






Wepex and adesso surveyed 40 players in the German financial markets

- 33% of respondents said they were already using an eWpG-based solution. Only 3% stated that the eWpG does not interest them
- 23% of respondents said that they already have a Digital Asset Custody licence. 10% of respondents are in the application process and 15% of respondents are still in the early stages of applying for a licence
- 58% of the survey participants stated that they would miss opportunities if they did not deal with strategies in the context of the eWpG
- 43% of survey participants fear that they will lose revenue stream to competitors if they do not position themselves quickly enough in the market with an eWpG offering

Greatest benefits of eWpG for survey participants in %



Quantified cost savings compared to conventional securities operations

Parameter	 Settlement	 Custody	 Emission	 Trading
 Cost savings in %	30%	25%	24%	10%

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Tokenization can be used to bridge CeFi and DeFi

As seen in Société Générale use case where tokenized assets are used as collateral within the DeFi world

Tokenization allows illiquid assets to be used in unique ways as collaterals within the decentralized finance (DeFi) and direct lending market

The latest example of such a solution is the Société Générale - Maker Dao use case

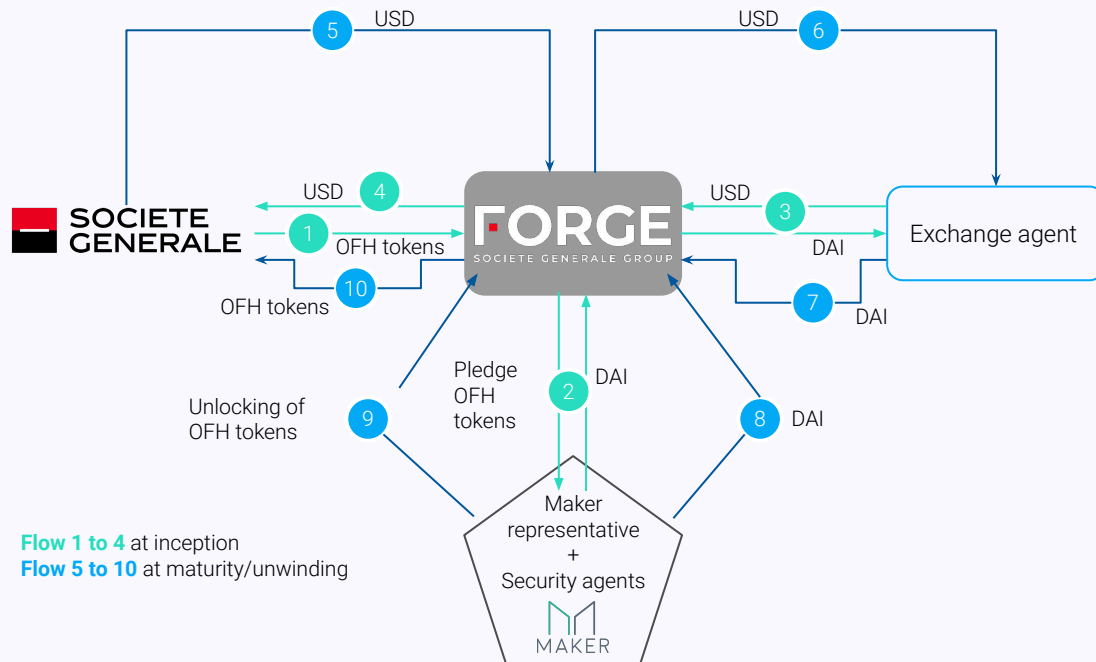
Société Générale - Maker Dao use case overview

The French bank will use a tokenized 2020 Euro 40 million bond issuance (OFH tokens) to be transferred on-chain to the DeFi protocol as collateral against their borrowings of 30 million DAI tokens, the stablecoin native to the MakerDAO ecosystem.

As of the 14th of July 2022:






- MakerDAO voted to approve the creation of a real-world asset vault dedicated to Société Générale's digital asset subsidiary
- By depositing OFH tokens as collateral, Société Générale-Forge will be able to borrow up to 30 million DAI

Structure of the potential Société Générale - MakerDAO collaboration



Offering of institutional protocols is growing but lending rates are volatile



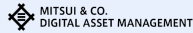


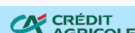








AAVE, Compound, Alkemi and ClearPool offer DeFi services for institutional services

	 MAKER	 AAVE	 Compound	 clearpool	 A L K E M I
Year of creation	2015	2017	2017	2021	2018
Total Value Locked	\$6.4bn	\$3.8bn	\$1.7bn	\$5m	\$0.5m
Institutional service	Maker	Aave Arc	Compound Treasury	Clearpool Earn	Alkemi Earn Verified
Description	Decentralized protocol allowing users to generate Dai by leveraging collateral assets approved by Maker Governance	Institutional-grade non-Custodial liquidity protocol to earn interest on deposits and borrow assets	Institutional-grade non-Custodial lending protocol to earn interest on deposits and borrow assets	Institutional-grade decentralized dynamic marketplace for institutional unsecured capital	Institution-grade liquidity network for to access compliant DeFi and earn yields through borrowing and lending
Supported coins	5	35	17	17	6
Security	<ul style="list-style-type: none"> Audited by Trail of Bits, PeckShield, and Runtime Verification Formal verification is ongoing with the MCD system's core contract having been fully formally verified 	<ul style="list-style-type: none"> Audited by Consensys, Certik, Mixbytes, Peckshield, Sigma Formal verification is done by Certora Market Risk assessment is done by Gauntlet Certik Security score: 90 	<ul style="list-style-type: none"> Audited by OpenZeppelin and Trail of Bits Formal verification done by Certora Market Risk assessment done by Gauntlet Security score: 95 	<ul style="list-style-type: none"> Audited by Pessimistic The documentation for the project is incomplete 	<ul style="list-style-type: none"> Integrated the platform security assessment framework initiated by ConsenSys/Codefi Strict risk mitigation approach

Tokenized securities can work as collateral in the DeFi space both for lending and borrowing protocols

Banks are driving tokenization market adoption

Asset managers, corporates etc. are becoming more and more active in the digital asset sector

Institution	Type	Date	Asset	Project description	Source
 Citi	Bank	Jun 8, 2022	Investment	Citi invests in blockchain trade finance startup LiquidX	Link
 HOUSEBIT	Corporate	Jun 8, 2022	Real estate	HouseBit Completes First Fully Tokenized Property at The Loft in Downtown Miami	Link
J.P.Morgan	Bank	Jun 6, 2022	T-Bonds	J.P. Morgan's Onyx Has Tokenized \$300B of US T-Bonds So Far	Link
J.P.Morgan	Bank	May 31, 2022	DeFi	J.P. Morgan in Singapore MAS tokenization pilot for DeFi on public blockchain	Link
 MITSUI & CO. DIGITAL ASSET MANAGEMENT	Asset manager	May 13, 2022	Real Estate	Mitsui partners MUFG SBI for more real estate tokenization	Link
 Yield Crowd	Investment manager	Apr 25, 2022	Real Estate	Yield Crowd Tokenizes US \$50M Real Estate Portfolio on Stellar Blockchain	Link
 Singtel	Corporate	Apr 20, 2022	Bond	Singtel partners UOB to issue \$100m tokenized bond on ADDX	Link
 CRÉDIT AGRICOLE	Bank	Dec 21, 2021	Investment	Crédit Agricole Group finalizes the first investment in an Italian startup with BlockInvest	Link
 WIEN ENERGIE	Corporate	Dec 15, 2021	Joint venture	RIDDLE&CODE in blockchain joint venture with Wien Energie for renewable energy	Link
 7TOKEN	Start up	Dec 9, 2021	Fund	Tokenized fund for footballers' image rights launches	Link
 HSBC	Bank	Dec 14, 2021	Settlement	HSBC and Wells Fargo launch blockchain-based FX settlement	Link
 iMining TECHNOLOGIES	Corporate	Nov 11, 2021	Carbon Credit	iMining Partners with GuildOne to Fulfill Net Zero Commitment with Tokenized Carbon Credits on Cardano	Link
 Goldman Sachs	Bank	Nov 5, 2021	News	Goldman adopts DAML for digital asset tokenization efforts	Link
 HSBC	Bank	Sep 27, 2021	News	HSBC partners with SGX and Temasek digital asset venture, Marketnode	Link
 Deutsche Bank	Bank	May 19, 2021	ESG Bond	Deutsche Bank partners for ESG bonds, digital assets POC	Link
 LB BW	Bank	May 19, 2021	Note	Daimler issues the first fully digital note with LBBW	Link

Banks are driving tokenization market adoption

Asset managers, corporates etc. are becoming more and more active in the digital asset sector

Institution	Type	Date	Asset	Project description	Source
 COMMERZBANK	Bank	Apr 29, 2021	JV	Deutsche Börse, Commerzbank create digital asset joint venture 360x	Link
 European Investment Bank	Bank	Apr 27, 2021	Bond	European Investment Bank (EIB) Issues its first ever digital bond on a public blockchain	Link
 SOCIÉTÉ GÉNÉRALE	Bank	Apr 15, 2021	Structured product	Société Générale issues the first structured product on public blockchain	Link
 COMMERZBANK	Bank	Mar 6, 2021	Settlement	Commerzbank and Deutsche Börse execute legally binding securities settlement using DLT	Link
 SGX	Exchange	Jan 22, 2021	JV	Singapore Exchange, Temasek create digital assets joint venture	Link
 VONOVIA	Real Estate Group	Jan 15, 2021	Bond	German real estate firm Vonovia issues a fully digital bond via Stellar	Link
 SoftBank	Corporate	Jan 4, 2021	News	SoftBank joins Japan Security Token Association	Link
 Swift	Organization	Dec 23, 2021	News	Banks' SWIFT Messaging System to Experiment With Tokenized Assets in Early 2022	Link
 SYGNUM	Digital asset bank	Dec 14, 2021	Equity	Digital asset bank Sygnum tokenizes own shares ahead of future IPO	Link
 standard chartered	Bank	Dec 7, 2020	Bond	Union Bank, Standard Chartered pioneer blockchain-enabled bond issuance in the Philippines	Link
 universal protocol	Crypto coalition	Dec 2, 2020	Carbon certificates	Blockchain tradable carbon token launched	Link
 BNP PARIBAS	Bank	Oct 7, 2020	POC	BNP Paribas Securities Services and Curv complete proof of concept for the secure transfer of digital assets	Link
 BBVA	Bank	Feb 19, 2020	Green bond	BBVA issues the first blockchain-supported structured green bond for MAPFRE	Link
 Santander	Bank	Sep 12, 2019	Bond	Santander launches the first end-to-end blockchain bond	Link

④ Digital Asset Custody

This chapter examines development in the digital asset custody market from the starting point of key management approach to understand how use cases are being adopted or explored in the industry.

The section presents a high-level overview of the market participants and technology providers.

1 **Digital asset custody: status-quo and market outlook**

2 Regulatory deep dive: Travel rule

3 Digital asset custody market initiatives

Interview with Martin Kreitman, Co-Founder & CEO of Tangany

1/2



Martin Kreitman

CEO & Co-founder



About: Martin Kreitman is co-founder and managing director at Tangany GmbH, a regulated crypto custodian based in Germany. Tangany provides a whitelabel solution for the technical and regulatory custody of digital assets like cryptocurrencies, security tokens, crypto securities, and NFTs. Tangany has more than 50 B2B clients including institutions, corporates, and FinTechs. The institute has grown fast in recent years and was cash positive in 2021. A 7 million Euro investment round in early 2022 increased the capabilities of Tangany further. Martin Kreitman is also a member of the board at Bundesblock e.V., the German blockchain association with more than 100 members.

Many banks assess whether to build their own custody solution or to partner with an established custodian. What do you think are the most relevant criteria for this decision?

That's a huge decision to make. Let me try to be as objective as possible given that I am working for a Whitelabel custody solution. In order to be able to make a decision, different criteria should be addressed. For one, it's about the dynamic of blockchain. There are hundreds of blockchains and the dynamic of which ones are hyped and which ones vanish away can be challenging. Just two years ago, Ripple, Litecoin, and Stellar were must-have blockchains. Today, they are replaced by Polkadot, Cardano, and BNB Smart Chain, of course, aside from the leader Bitcoin and Ethereum itself. This requires a lot of knowledge in terms of how the general tech is evolving and what blockchains will be important in two years' time.

Another topic is the general complexity of a crypto custody solution. You need the safest possible place to store the private key. Today, there are two main solutions: MPC and HSM. Either way, on the runtime to sign a transaction the private keys need to be revealed in some way. Around the storage, you have to create the infrastructure to communicate with all those blockchain nodes, which tend to be quite unstable. So you are constantly focused to integrate the latest blockchains, supporting soft- and hard forks, and keeping the nodes alive. This requires a large team of blockchain experts who are capable to create the software. To no surprise, those experts are rare, very rare.

On the opposite, using an existing solution seems to be the easier path. There are great solutions on the market. Yet, as there is this high complexity, only a few service providers exist. This has led to the trend that banks do not decide between build or buy but between acquire or buy. Many providers have been acquired in recent years, which makes it very important to partner with a partner which will also be around for many years.

Operationalization of digital asset services is a key challenge for financial institutions -- which challenges does a custodian like Tangany solve in this regard?

Digital assets are not your daily asset. First, there are countless variations from currencies to NFTs. They are highly available and exist only digitally. Everything is online, in the cloud. At Tangany, we often see the challenge of how to connect the existing financial world with the 'new' world. What's the connector? That is what Tangany provides. A solution that is highly flexible (omnibus vs segregated wallets), supports all existing digital assets, and can be integrated via API into any existing IT system.

This is often combined with our financial license in a way that we also take care of the onboarding of the end customers legally. Institutions need already proven processes like reconciliation and settlement, both are adapted to our service and reflected if suitable.

Tangany's role is the enablement of institutions to enter the world of blockchain and digital assets safely, in both ways: technical and regulatory.

Custody is only the first step for financial institutions tapping into digital assets. What does it take to build a future-proof service offering in the space?

Knowledge. You need expert knowledge about the market, tech innovations, upcoming regulations, and business cases. One year on the internet is like ten years in traditional industries. One year in the blockchain is like 100 years. At Tangany, we have many experts, which do not only work in our industry but also dream about blockchain. For many, it's a hobby. That is what it takes to be able to build a future-proof solution in this ecosystem.

Interview with Martin Kreitmair, Co-Founder & CEO of Tangany



Martin Kreitman

CEO & Co-founder



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Over the past 18 months, the custody market has seen dynamic developments in terms of acquisitions and funding rounds. What is your take on the next 18 months?

Given the global economic cooldown, I expect to see fewer of that news in the next months. I know of some players which are looking for a take-over, but most of the players are focused on growth and creating something lasting. We might see more activity in that field with the next bull run of cryptocurrencies.

Blockchain is highly innovative and has seen many hypes starting with Bitcoin itself, over ICOs, STOs, and recently NFTs. Are NFTs sustainable compared to ICOs?

It's great that we see many innovations in the market, which are needed to validate what potential blockchain has. NFTs are here to stay, that is for sure. We at Tangany have also decided two years ago to fully support custody and management of NFTs with our solution and also have many clients in the NFT field, mostly FinTechs. NFT is a standardization, it's tech. And this tech has quite some power to be used for business cases. What we see today are experiments and tests. Some are incredibly successful, and some fail in the worst possible way. That is market validation and the progress required to see the best usage of this tech. There is much potential waiting and there will be other innovations after NFT as well. Blockchain is just about to get started, like the Internet in the early 2000s years.

Custodians are critical to maintaining the growth and adoption of digital assets

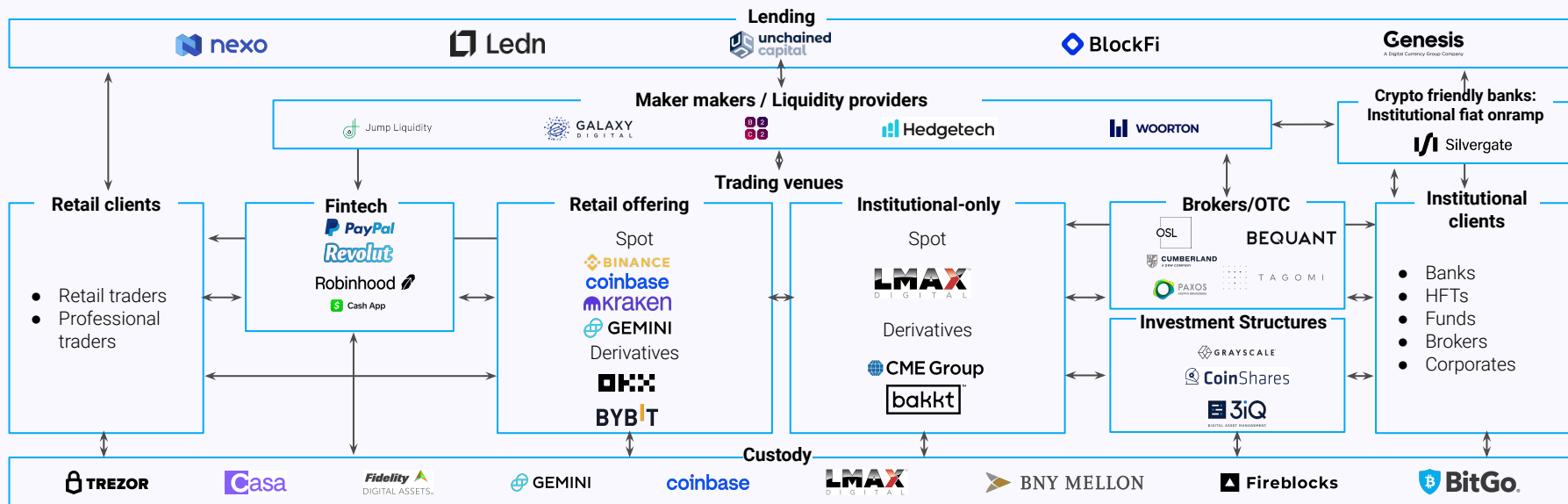
For each buyer/client different custody solutions are available on the market

Market Overview

The increasing interest in digital assets from both retail and institutional investors has given rise to the growth of custody options. As the market evolves, various types of custody options have emerged and new providers are seeking to establish the structures and controls that work best in their markets and for their propositions.

The emergence of the custodians is to be applauded as it is one of the key components in maintaining the growth and adoption of digital assets.


As the digital asset market continues to grow, the role of custodians to maintain the safekeeping of these assets is becoming ever more important.





Financial institutions participate in the digital asset custody growth

Corporations and financial institution actively enter the crypto market space

Corporate investment in digital assets (Bitcoin Holdings)

					
91,579 BTC	43,200 BTC	27,000 BTC	16,402 BTC	10,889 BTC	8,027 BTC

Digital asset custody initiatives (by institutions)

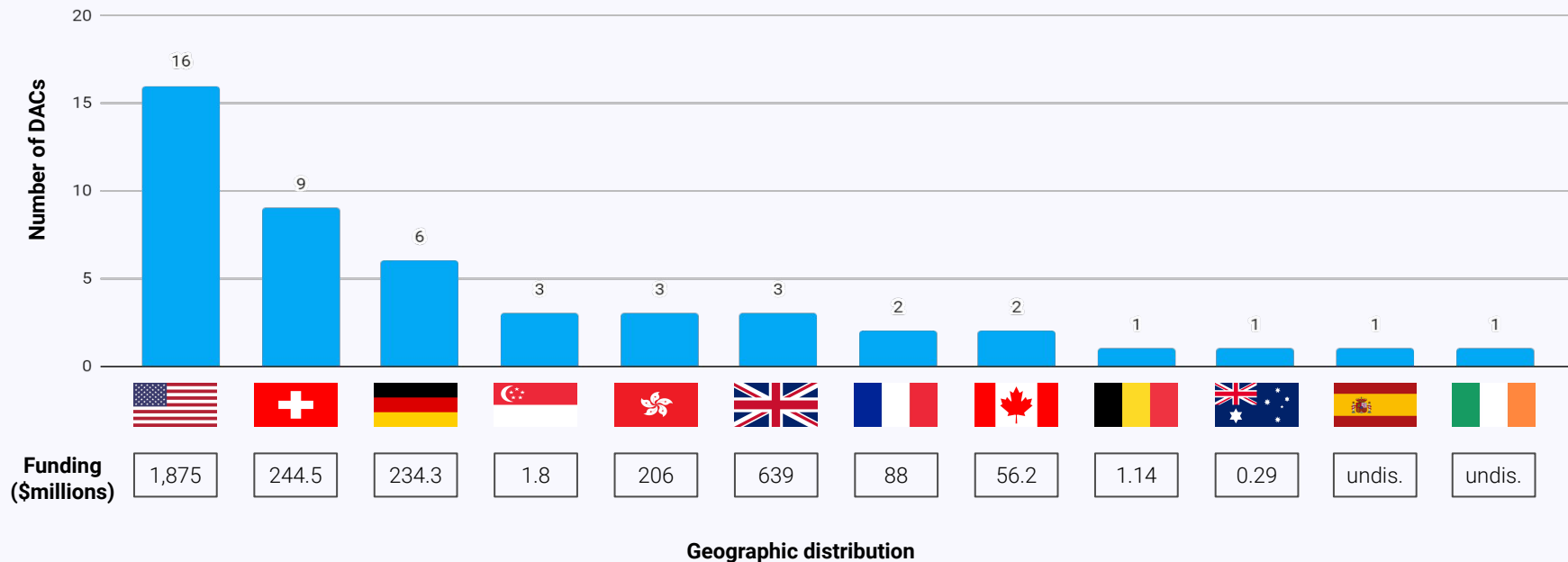
										
Announced its crypto custody solution for independent financial advisors and their clients Aug. 2022	Developing its crypto custody solution for businesses with institutional customers and for its own institutional customers Aug. 2022	French Banking Giant BNP Paribas Enters Crypto Custody Space and started working with Fireblocks and Metaco Jul. 2022	Société Générale - Forge has selected METACO to orchestrate its digital asset custody operations Jun. 2022	Citi partners with METACO to develop Institutional Digital Asset Custody Capabilities Jun. 2022	Their custody solution Pyctor moved into production, in collaboration with ABN AMRO, BNP Paribas, Citibank, Invesco, Société Générale, State Street, UBS Feb. 2021	Selected digital custody infrastructure provider Fireblocks for its digital asset custody unit Feb. 2021	Launched their full -service digital asset exchange providing a custody ecosystem for digital assets Jan. 2021	Launched their trials trading and custody services for digital assets with BBVA Switzerland Dec. 2020	Launched in partnership with Northern Trust their digital asset custodian "Zodia" for institutions Dec. 2020	Announced their Digital Asset Custody prototype for institutional clients Dec. 2020

Overview of digital asset custody providers active in Germany

								
Name	Coinbase Custody	BitGo	Tangany	Finoa	Bankhaus von der Heydt	Solarisbank	Crypto Finance	Bitcoin Suisse
HQ	US / DE	United States, Palo Alto	Germany	Germany	Germany	Germany	Switzerland, Zug	Switzerland, Zug
Founding Year	2012	2013	2019	2018	1784	2016	2017	2013
Employees	3568	210	30	116	30	400	81	239
Funding	\$539M	\$86M	\$8M	\$21M	N/A	\$350M	\$38M	\$49M
AUC	\$223B	\$65B	\$450M	N/A	N/A	N/A	N/A	\$5.5bn
Type	Custodian	Custodian and tech provider	Custodian	Custodian	Custodian	Custodian	Custodian	Custodian
Regulated Custodian	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Audited	SOC 1 type 2, SOC 2 type 2	SOC 1 type 1, SOC 2 type 2	N/A	N/A	N/A	N/A	SOC 2 / ISAE 3000 Report	ISAE 3402 Type 2
Insured	\$320M	\$100M + \$600M (optional)	N/A	N/A	N/A	N/A	InsuredN/A	No
Supported Assets	159	400+	120	185	50+	50+	100+	159
Staking / Yield Services	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Separation of Funds	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Notable Clients	Polychain Capital, a16z Crypto	Bitstamp, Nexo	Bankhaus Scheich, Quirin Privatbank	Black Manta Capital	Sutor Bank, Justtrade	Nuri	Bank Frick	N/A

Digital asset custody providers are rapidly growing with the US leading the way
It is only logical that with the increase of demand for digital asset custody, the supply increases

Distribution of digital asset custody service and technology providers (DACs) by geography (Dec. 2021)



Interview with Andrew Han, Director of Business Research at Fireblocks

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Andrew Han

Director of Business Research



About: Andrew is the Director of Business Research at Fireblocks. Andrew provides industry-leading insights for digital strategists and business leaders across traditional and digital asset native institutions, while actively engaging clients in strategic projects. He writes the monthly Digital Asset Insider for Fireblocks and periodical thought leadership reports focused on the emerging digital asset ecosystem.

Many banks assess whether to build their own custody solution or to partner with an established custodian. What do you think are the most relevant criteria for this decision?

Custody solution considerations go beyond traditional custody systems and workflow, as the assets being custodied are in the form of digital asset tokens accessed by a private key. The technology to develop security surrounding the private key is highly complex, requiring a sophisticated set of skills involving cryptography, which is what Fireblocks' multi-party computation (MPC) custody technology is based on. Banks are able to build their own custody solution around this critical component as the secure backbone to the suite of digital asset services they provide to their customers including trading, lending, margining, and collateral management.

The next consideration is the digital asset transfer network infrastructure needed to support their business and interoperability with counterparty digital asset systems. The digital asset ecosystem supported by Fireblocks includes 35 blockchains and 1,100+ tokens. Banks who want to build their own custody solution will also need to determine what blockchains and tokens they wish to support and interact with. This will determine with whom they will be able to conduct business or not.

Whether a bank develops its own technology solution or partners with an established custodian, in the end, will depend on how much control and flexibility they want to have over the range of services offered to customers. Regardless, either will need ongoing technical expertise to meet the dynamic nature of the digital asset ecosystem.

Operationalization of digital asset services is a key challenge for financial institutions -- which challenges does a custodian like Tangany solve in this regard?

Within a single workspace, Fireblocks customers are able to access and optimize their operational workflows over their digital assets. Where there is a need, several workspaces can be provisioned to meet the operational requirements of customers. This workspace is a hub from which the solutions to customers' operational requirements merge:

1. **The Nature of Custody: Private Key Driven.** Accessing and moving customer digital assets from Fireblocks Vaults is secured through the MPC-CMP signing algorithm. MPC-CMP allows financial institutions to configure and manage a key management scheme that fits their requirements.
2. **Treasury Management and Portfolio Rebalancing.** Fireblocks allows customers to customize their Vaults to secure the specific tokens needed. Connectivity to major digital exchanges to seamlessly manage treasury operations and balances, with an option to connect to fiat on/off ramps. Through whitelisted addresses, tokens can only move between approved venues.
3. **No Recourse & Privacy.** With the Fireblocks Transfer Network, customers are able to securely transfer assets to counterparties within the Network privately. The Network supports several blockchains and tokens that expand based on demand. The challenge of continued blockchain and token support is taken care of by Fireblocks.
4. **Internal Misconduct.** The Transaction Authorization Policy (TAP) manages rules authorizing the movement of tokens between exchanges, decentralized finance applications, and vaults. Rules can be set to require additional authorization for the movement of tokens over set amounts.
5. **Connectivity and Integrations.** Connectivity to decentralized finance applications with the security of Fireblocks Vaults to store tokens is easily provisioned. Integration with partners for on-chain compliance for anti-money laundering (AML), know your transaction (KYT) and Travel Rules is an option available to customers.

Interview with Andrew Han, Director of Business Research at Fireblocks



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Custody is only the first step for financial institutions tapping into digital assets. What does it take to build a future-proof service offering in the space?

Delivering a secure and reliable custody technology solution is a given for Fireblocks. Continued engagement with customers ensuring their business is being supported and operating smoothly is what Fireblocks makes a priority through its Accounts Management and Client Success teams. In doing so, we stay up to date with the needs of customers, and identify new emerging needs.

Improvements from innovative developments in our custody technology are rolled out to customers as product updates, addressing new cyber threats which are identified or anticipated.

As digital asset markets grow in both size and value, so does the need for new business solutions and technology products. Future-proofing means that firms need to be thinking ahead to develop the technology that extends into the secure custody technology already in place to make it equally secure. The Fireblocks DeFi solution does that by holding tokens in a secure Fireblocks Vault and connecting to DeFi applications through WalletConnect.

Providing business-relevant solutions ensures the technology fits with business needs, like when it comes to regulation. Fireblocks Permissioned DeFi was developed to meet this need from regulated financial institutions. Going forward, we believe that our infrastructure is not only suitable for crypto-native tokens, but also for future central bank digital currency (CBDC) initiatives.

The digital asset ecosystem is expected to broaden and deepen, as traditional financial systems either are replaced by new digital asset infrastructure or become interoperable with them. Supporting tokenization is key, as we believe in the future, all financial assets will exist on-chain.

Specialized digital asset services are emerging, such as cross-margining, and there is a growing need to have the ability to plug into secure digital asset infrastructure. Custody technology firms that partner or integrate

these services in their platforms are able to offer their clients greater operational efficiencies through an optimized and integrated workspace and workflow.

Over the past 18 months, the custody market has seen dynamic developments in terms of acquisitions and funding rounds. What is your take on the next 18 months?

Interest in custody technology remains high from financial institutions (banks, central banks, asset managers) and fintech companies (payments, super-apps) in every jurisdiction given it is a critical part of digital asset infrastructure required to participate in this space.

Existing custody technology firms and digital custodians will continue to grow, and some could be attractive acquisition targets for large financial institutions seeking to accelerate their go-to-market strategies, as we had seen with Galaxy Digital acquiring Bitgo and Paypal's acquisition of Curv in 2021.

Funding for new entrants and existing firms developing custody technology could see continued interest given it is of critical importance. However, how quickly new entrants, as and when they emerge, are able to launch into the market and provide a comprehensive secure solution required by financial institutions remains to be seen.

Integral to the expansion of the digital asset ecosystem, will be the integration of digital asset payment networks within domestic borders and cross-borders, with scalable custody technology. This will enable greater and safer connectivity and transfer efficiencies business-to-business and ultimately benefit the consumer with lower transaction costs.

Stablecoins are emerging as a token use case where issuers facilitate the movement of value across multiple blockchains for both broad and specific purposes. The dominant U.S. Dollar stablecoin issuers have proven both the need and use for stablecoins in the ecosystem. Stablecoin markets will grow, as digital asset payment networks expand to meet domestic needs, or at the very least, the needs within a large financial institution or corporate for internal treasury operations.

④ Digital Asset Custody

This chapter examines development in the digital asset custody market from the starting point of key management approach to understand how use cases are being adopted or explored in the industry. The section presents a high-level overview of the market participants and technology providers.

1 Digital asset custody: status-quo and market outlook

2 **Regulatory deep dive: Travel rule**

3 Digital asset custody market initiatives

Interview with Thomas Gregg, Regional Sales Director EMEA, at Chainalysis

1/2



Thomas Gregg

Regional Sales Director Central EMEA at:



About: Thomas Gregg leads the Central EMEA operations at Chainalysis, the blockchain data platform that provides data, software, services, and research to government agencies, exchanges, financial institutions, and insurance and cybersecurity companies. Much of his previous work involved scaling high-growth US-headquartered companies successfully into mainland Europe. In his free time, Thomas enjoys anything that involves learning about crypto

With digital assets gaining popularity among investors globally, how do you believe the travel rule will impact the digital asset industry?

It's early to evaluate the adoption rate of the Travel Rule (TR) by industry players. If we look back, for traditional financial institutions, the TR was launched in the early 90s and it took almost a decade for banks to fully comply with it globally, even given the fact that banks were regulated and licensed at that time

Various jurisdictions have implemented the TR for cryptocurrency differently, leading to different minimum thresholds, varying PII requirements, further obligations for the originator and beneficiary VASPs, and divergent treatment of transactions with non-custodial wallets. These variations in implementation and thresholds are critical to note as companies ramp up their TR compliance plans and test cross-jurisdictional TR transactions. Indeed, while the industry agreed upon one data messaging format – IVMS 101 – there are currently nine TR Messaging Protocols on the market, which can leave VASPs unsure of which solution to choose

The travel rule is one part of a growing regulatory framework for the digital asset industry. While over the medium-long term, a proportionate and effective regulatory framework will drive the growth of the sector, providing the clarity and protections necessary for the industry to grow, in the short-term, the transition period will inevitably involve some growing pains

What do you recommend to banks that are launching digital asset services and face uncertainty around AML regulation?

FATF recommendations are the global standard for AML in the digital asset sector. Therefore, even though there is currently uncertainty around the specific details of AML regulation in many jurisdictions, we have a fairly good idea of the sense of direction of those regulations

That means that financial institutions can start preparations now, even while the sector awaits the final details of the AML rules. There are a few key elements that should form part of their preparations:

- Training - invest in uplifting the knowledge of the relevant staff in your organization to understand digital assets, including their specific technology features that differentiate them from existing financial asset classes when it comes to AML/CFT compliance. This will lay a foundation for conducting effective risk assessments and risk management controls and procedures.
- Risk assessment - Identifying and assessing the different types of risks that providing digital asset services may pose, as well as how their features can facilitate new compliance approaches, is key to developing risk mitigation strategies and applying preventive measures.
- Controls and technology - Design and build an effective control framework and utilize existing technologies such as blockchain analytics to mitigate the different types of risks that digital assets may pose. Blockchain analytics is a powerful tool and provides unparalleled visibility on the flow of transactions, but to maximize the value of the technology and have truly a risk-based approach to risk management, effective controls around the technology are necessary to focus on the risk that matters.

Interview with Thomas Gregg, Regional Sales Director EMEA, at Chainalysis

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Some institutions still have reservations towards crypto based on its connection with illicit financial transactions. What is Chainalysis' view on this topic given your insights into millions of transactions every day?

It's a common misconception that crypto is used primarily for illicit activity. Like with many new technologies, criminals were early adopters of cryptocurrencies, and their initial embrace has helped shape its overall reputation.

Although today it is more well known that cryptocurrency is traceable, criminals still use it for the same reason people use crypto for legitimate purposes: it's instantaneous, cross-border, and liquid. One of the benefits of the transparency of cryptocurrency blockchains is that with the right tools, it's possible to detect and investigate the illicit activity.

What do you see as the next big frontier in crypto analytics?

Blockchain analytics tools are and will be absolutely essential for numerous government agencies in countries that lean towards making cryptocurrencies a legal tender, so they have the investigative, regulatory, and market intel tools that they need to ensure their economy's reliance on crypto increase GDP without increasing illicit finance in their economy.

The growth of DeFi transactions creates new technical challenges for cryptocurrency investigators and compliance teams, as DeFi protocols and the applications, they power create more complex, difficult-to-trace transactions than traditional centralized services.

DeFi and NFTs are two of the fastest-growing areas of cryptocurrency, with nearly half of crypto transactions involving a DeFi entity or an NFT or related types of smart contracts. Likewise, DeFi's role in the cryptocurrency-based crime is also growing, as the total value moving to DeFi protocols from illicit addresses is increasing every year. Over the course of 2021, DeFi protocols became the go-to target for hackers looking to steal cryptocurrency.

DeFi protocols have accounted for an ever-growing share of all funds stolen from cryptocurrency platforms since the beginning of 2020, and lost the vast majority of stolen funds in 2021. As of May 1, DeFi protocols account for 97% of the \$1.68 billion worth of cryptocurrency stolen in 2022. Even worse, much of the cryptocurrency stolen from DeFi protocols have gone to hacking groups associated with the North Korean government, especially in 2022.

For investigators, DeFi makes cryptocurrency transactions even more complicated, since e.g. chain hopping is easy with new DeFi protocols, and users can switch between several different kinds of cryptocurrency in a single transaction. Cross-chain graphing e.g. Chainalysis Reactor can mitigate much of that complexity, but tracking funds across blockchains to separate destinations can still be time-consuming. With our Chainalysis Storyline capabilities, these complexities can be solved with a new, web3-native blockchain analysis tool that provides a holistic view of the movements of all funds an address has transacted with across blockchains, but still allows investigators to concentrate on the transactions and funds that matter most to them.

What is the FATF travel rule and does it help to prevent illegal transaction

As it lower dependency on a single exchange and allows for better execution

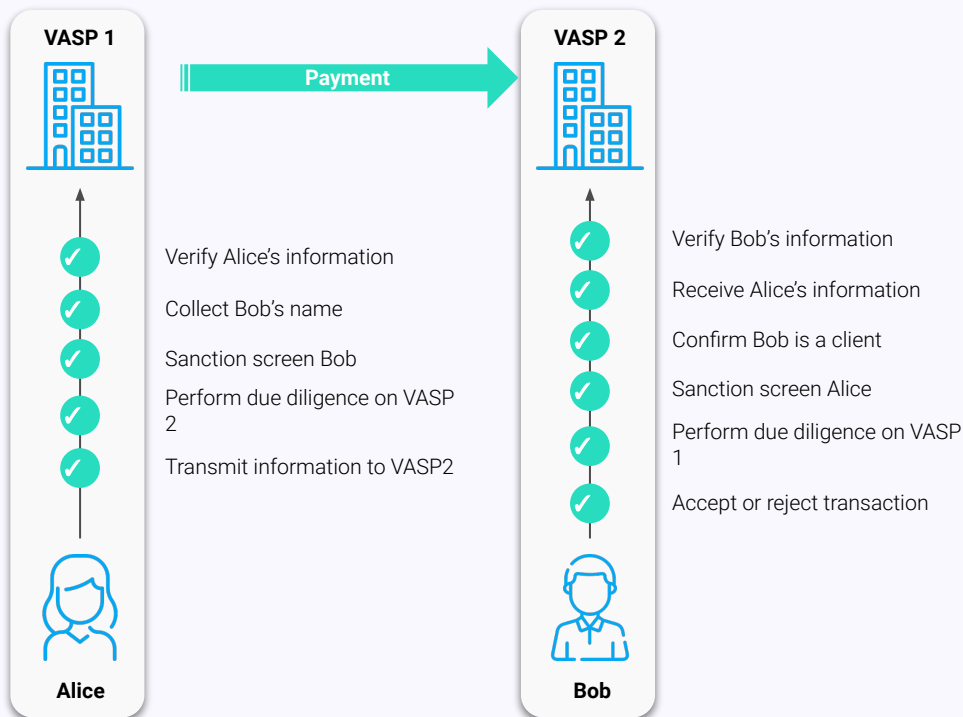
Coinfirm presents really accurately in its “Crypto Compliance” report the following points:

Over 20 years later, in 2019, the Financial Action Task Force (FATF) urged businesses that store, transmit, or exchange cryptocurrencies to also abide by the Travel Rule for transactions exceeding \$1,000. The Crypto Travel Rule was created as a result.

Today, a lot of exchanges have AML/CFT procedures that enable them to identify their customers and screen them for sanctions as part of onboarding and ongoing customer due diligence. These procedures assist them in preventing sanctioned individuals from directly initiating transactions using their products. The crypto industry, in contrast to financial institutions, does not have a mechanism akin to a SWIFT network to connect to reliable counterparties and send and receive required information to easily comply with the Travel Rule.

The Crypto Travel Rule was previously required by regulators who recently imposed fiat sanctions on Russian individuals, realizing that the Travel Rule enables exchanges to recognize and potentially prevent transactions with sanctioned counterparties. As a result of the conflict, some recently ordered the AML rule.

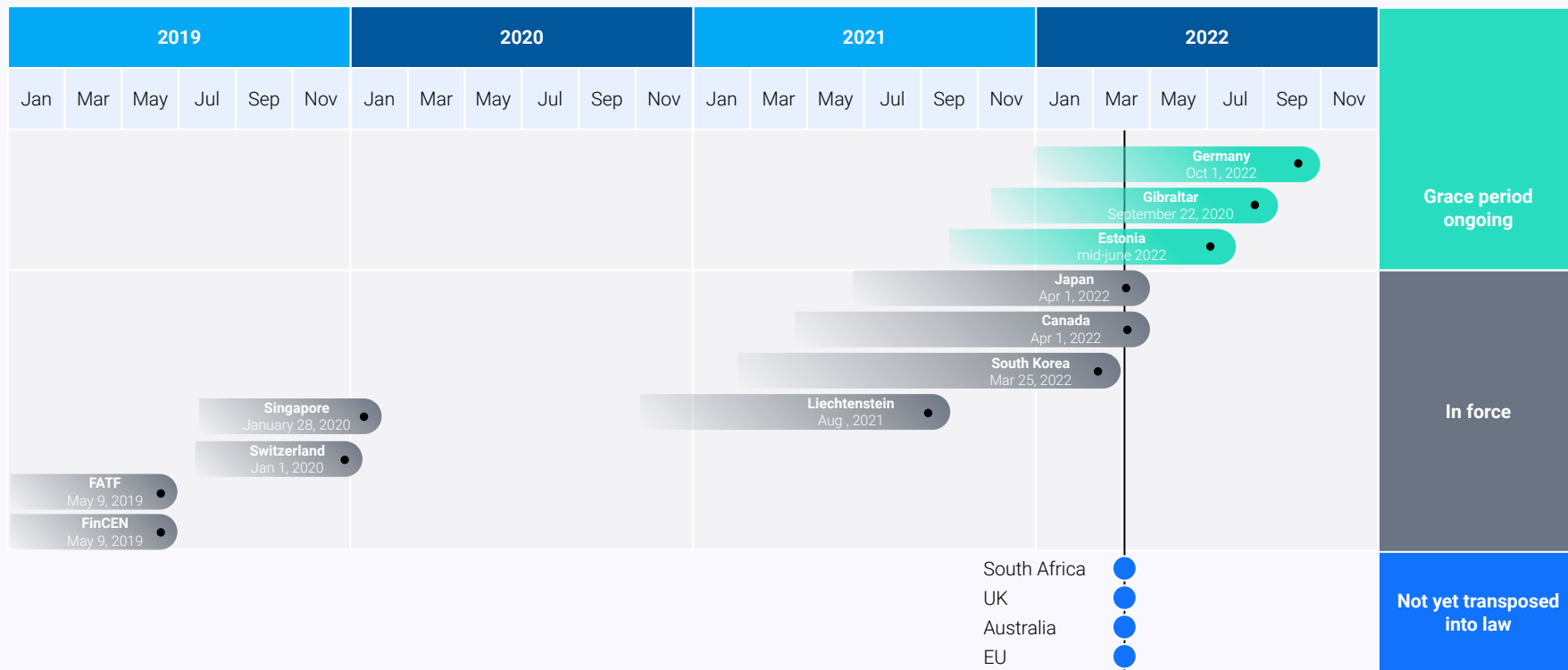
What does the crypto travel rule require companies to do?



The industry-wide Travel Rule compliance is staggered in stages

Leaving many companies vulnerable to routing transactions to sanctioned individuals

Travel rule enforcement timeline

























Overview of partnerships and collaborations between market participants

Chainalysis and Elliptic are the two providers that are the most active with financial institutions at today's date

Overview:

The market for crypto compliance has seen a lot of partnerships and collaborations. Companies are collaborating to broaden their reach and establish their dominance in the market. As a result, the following benefits accrue to the businesses from these partnerships:

- Growing the cryptocurrency selection
- Automating and streamlining compliance solutions
- enhancing security in the financial systems

Involved parties	Date announced	Comment
 CAPITAL UNION BANK	 April 2022	Capital Union Bank selected Chainalysis as its compliance partner to offer crypto solutions such as trading and custody to its customers
 Fluid Finance Based in Switzerland	 April 2022	Swiss DeFi-first bank alternative, Guild Finance, integrated Merkle Science's transaction monitoring platform
 LexTego	 March 2022	\$LexTego, a regtech partnered with Coinfirm to bridge crypto and TradFi with AML offering
 BNY MELLON	 February 2022	BNY Mellon partnered with Chainalysis to track users' crypto transactions
 CoinDCX	 February 2022	Crypto exchange, CoinDCX partnered with Solidus Labs to enhance its antimoney laundering protection
 BingX	 January 2022	Social trading platform, BingX, integrated SumsuB's KYC system to enhance its compliance and simplify the KYC process for its users
 Comply Advantage	 November 2021	ComplyAdvantage developed a new blockchain analysis and transaction monitoring tool that integrates Elliptics' AML monitoring platform
 CoolBitX	 September 2021	CoolBitX integrated Chainalysis' KYT solution into its Sygna product, which provides AML for VASPs to meet regulatory requirements
 wazirx	 July 2021	Crypto exchange WazirX partnered with TRM Labs to enhance and solidify AML and antifraud measures for transactions made on the WazirX platform
 NOTA BENE	 June 2021	Notabene and Elliptic partnered to launch a ready-to-use solution that is FATF-compliant for crypto businesses and banks
 Revolut	 May 2021	UK-based Revolut integrated Elliptics' crypto compliance software to broaden its cryptocurrency offering

④ Digital Asset Custody

This chapter examines development in the digital asset custody market from the starting point of key management approach to understand how use cases are being adopted or explored in the industry. The section presents a high-level overview of the market participants and technology providers.

1 Digital asset custody: status-quo and market outlook

2 Regulatory deep dive: Travel rule

3 **Digital asset custody market initiatives**

Selection of digital asset custody initiatives

More and more actors are entering the digital asset custody universe

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Institution	Type	Custody provider	Date	Project description	Source
 CIRCLE	Financial technology	NY Community Bank	Jun 28, 2022	Stablecoin issuer Circle partners New York Community Bank	Link
 citi	Bank	Metaco	Jun 22, 2022	Citibank Chooses Swiss Firm Metaco for Digital Asset Custody	Link
 ANCHORAGE DIGITAL	Custody Provider		Jun 10, 2022	Anchorage forms custody network with five crypto exchanges	Link
 nubank	Neobank	Paxos	May 11, 2022	Nubank, Brazil's Largest Digital Bank, Launches Bitcoin and Ether Trading	Link
 Shinhan Bank	Bank	Korea Digital Asset Custody	Apr 8, 2022	First South Korean bank issues crypto accounts for corporations	Link
 CIRCLE	Financial technology	BNY Mellon	Mar 31, 2022	BNY Mellon to Custody Assets Backing Circle's USDC Stablecoin	Link
 tullett prebon	Inter-Dealer-Broker	BitGo, Komainu	Mar 29, 2022	World's largest interdealer broker expands custody with BitGo and Komainu partnership	Link
 Standard Chartered	Bank	Zodia	Mar 14, 2022	Standard Chartered's crypto custodian to help clients earn yield on token holdings	Link
 STATE STREET	Bank	Copper	Mar 9, 2022	State Street inks institutional crypto custody deal with Copper	Link
 bitpanda	Trading Platform	Trustology	Feb 22, 2022	Bitpanda to provide crypto custody with the acquisition of FCA-approved Trustology	Link
 Fireblocks	Custody Provider		Jan 27, 2022	Fireblocks raises \$550 million in Series E funding, now valued at \$8 billion	Link
METACO	Custody Provider		Jan 26, 2022	Digital assets custody firm Metaco partners with IHS Markit for post trade	Link
 UnionBank	Bank	IBM, Meta	Jan 20, 2022	UnionBank of the Philippines Picks IBM and Metaco for Crypto Custody	Link
 eqonex GROUP	Corporate	DIGIVAULT	Jan 15, 2022	Crypto Custody Leader DIGIVAULT achieves double-digit growth as it adds to its list of capabilities	Link
 BBVA	Bank	BBVA	Dec 9, 2021	BBVA launches its first commercial solution for the trading and custody of bitcoin in Switzerland	Link
 ANCHORAGE DIGITAL	Custody Provider		Dec 15, 2021	Anchorage Raises \$350M, CEO Says Big Banks Will Offer Crypto in 2022	Link

Selection of digital asset custody initiatives

More and more actors are entering the digital asset custody universe

Institution	Type	Custody provider	Date	Project description	Source
 coinbase	Corporate		Nov 30, 2021	Coinbase to acquire crypto custody technology firm Unbound Security	Link
 Celsius	Crypto Lending	GK8	Nov 3, 2022	Lending network Celsius acquires crypto custody firm GK8 for \$115m	Link
 aws	Corporate		Oct 30, 2021	Amazon Web Services Looks to Drive Crypto Settlement and Custody to the Cloud	Link
 NOMURA	Financial Services	Cardo	Oct 20, 2021	Nomura invests in Crypto Garage, partners for custody	Link
 SOCIÉTÉ GÉNÉRALE	Bank	Pycor	Oct 18, 2021	Société Générale Shopping for Crypto Custodian	Link
 VON DER HEYDT	Bank	Fireblocks	Okt 8, 2021	One of Germany's Oldest Banks Bankhaus von der Heydt Aims to Become a One Stop Shop for Digital Assets with Fireblocks	Link
 usbancorp	Bank	NYDIG	Oct 5, 2021	U.S. Bank Launches Crypto Custody With NYDIG Backing	Link
 ARAB BANK	Bank	Tezos	Oct 5, 2021	Arab Bank has chosen Tezos to facilitate institutional custody service	Link
 SEBA BANK	Bank		Oct 4, 2021	SEBA Bank secures the first institutional licence to custody Collective Investment Schemes for Digital Assets in Switzerland	Link
 incore	Bank	Tezos	Aug 24, 2021	Swiss B2B bank InCore launches new tokenization tool using Tezos	Link
 UnionBank	Bank	Hex Trust	Aug 18, 2021	Union Bank of Philippines partners with Hex Trust to enter digital asset ecosystem	Link
 T..	Corporate	Coinbase Custody	Aug 9, 2021	Deutsche Telekom to store Celo tokens on Coinbase Custody	Link
 Securrency	Financial Services	GK8	Aug 4, 2021	State Street-backed Securrency partners with GK8 for custody and institutional blockchain infrastructure	Link
 VOYAGER	Broker	Coinify	Aug 2, 2021	Voyager acquires crypto custody and payments platform Coinify	Link
	Civil authority	Anchorage	Jul 29, 2021	U.S. Marshals to use Anchorage for custody of seized digital assets	Link

⑤ Crypto Trading

This chapter examines development in the crypto trading market from the starting point of crypto trading approach to understand how use cases are being adopted or explored in the industry.

We will identify providers and best practices as a first layer to assist institutions in their choices of trading and execution venues for digital assets.




1 Accessing crypto via banks: overview of provider landscape

2 Alternatives for sourcing crypto liquidity

3 Crypto trading market initiatives




































Buying crypto enables independence, alternatives offer easier handling

Comparison of crypto funds and crypto derivatives vs direct cryptocurrency exposure

	Direct exposure	Crypto Derivatives	Crypto Funds
Description	<ul style="list-style-type: none"> Direct purchase and delivery of cryptocurrencies via a crypto exchange or a liquidity provider Bank provides trading as a financial commission business and earns a markup on the price 	<ul style="list-style-type: none"> Derivatives (futures / forwards, options, swaps) on underlying crypto assets Bank gives investors access to derivatives issued by third parties to participate in crypto 	<ul style="list-style-type: none"> Portfolio of a variety of different digital assets managed by a portfolio manager Bank gives investors access to regular funds issued by third parties to participate in crypto
Provider selection			
Pros	<ul style="list-style-type: none"> Maximum control over offered crypto assets Instant and direct settlement of orders Transparent pricing, lower fees / higher margins Direct to investors (no third party) Incremental purchase amounts and direct withdrawal/deposits of cryptos can be enabled for clients (if needed/asked for) 	<ul style="list-style-type: none"> Reduce operational complexity by avoiding direct handling of cryptos Apply existing internal workflows for derivatives products Enable levered exposure and hedging for advanced investment experience 	<ul style="list-style-type: none"> Reduce operational complexity by avoiding direct handling of cryptos Apply existing internal workflows for fund products Provide clients access to the portfolio management expertise of the fund Reduce volatility risks of individual crypto assets
Cons	<ul style="list-style-type: none"> Increased operational complexity related to the direct handling of cryptos and exchange integration Client is responsible for portfolio management (but saving plans functionality can be offered) 	<ul style="list-style-type: none"> No control over underlying assets ("not your keys, not your crypto") Additional risk exposure to derivatives issuers Increased product complexity for investors Substantial overhead fee compared to direct crypto exposure / lower spread Min. investment size defined by product 	<ul style="list-style-type: none"> No control over underlying assets ("not your keys, not your crypto") Additional risk exposure to fund issuer (crypto custody, fund management) Substantial overhead fee compared to direct crypto exposure / lower spread Min. investment and liquidity defined by fund












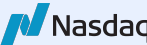

European banks offer direct crypto exposure, US banks take indirect approach

Comparison of international private banks and their crypto offerings to wealth management clients

Bank	HQ	Exposure type		Coverage	Service offering	Deposits & withdrawals
 SUTORBANK <small>TRANSITION PARTNERSHIP OF 100</small>			Direct	BTC, ETH, BCH, LTC, XRP	Buy and hold crypto assets	
 Solarisbank			Direct	BTC, ETH and many others	Buy, sell, and hold crypto assets	
 N26			Direct	BTC, ETH, DOGE and 200 more	Buy, sell, and hold crypto assets	
 BBVA			Direct	BTC, ETH	Buy, sell, and crypto-custody	
 MAERKI BAUMANN & CO. AG <small>PRIVATBANK</small>			Direct	BTC, ETH, XRP, BCH, LTC	Buy, sell, and crypto-custody	
 SEBA BANK		Derivs	Direct	BTC, ETH, DOT, SOL, AVAX, LTC, XTZ, ADA, XLM, USDC, BCH, SNX, UNI, YFI, LINK, AAVE, CHF, USD, GBP, EUR, HKD, SGD, PLN, JPY	Buy, sell, and hold crypto assets	
 SYGNUM		Funds	Direct	7 Cryptos, 7 DeFi coins, Sygnum Digital Assets Multi-Manager Fund, Sygnum Platform Winners Index ETP	Buy, hold, and trade crypto assets	
 DUKASCOPY <small>Swiss Forex Bank & Marketplace</small>		Derivs	Direct	Multiple crypto currencies supported by integrated exchanges	Buy, hold, and trade crypto assets	
 BANK FRICK			Direct	BTC, ETH, BCH, LTC, NEM, Qtum, XLM, USDC	Buy, hold, and trade crypto assets	
 J.P.Morgan <small>Private Bank</small>		Funds		Grayscale's Bitcoin Trust, Bitcoin Cash Trust, Ethereum Trust, Ethereum Classic vehicles, Osprey Funds' Bitcoin Trust	Buy, sell, and hold shares in crypto funds	N/A
Morgan Stanley		Funds		Galaxy Bitcoin Fund LP, Galaxy Institutional Bitcoin Fund LP, FS NYDIG Select Fund	Buy, sell, and hold shares in crypto funds	N/A
 Goldman Sachs		Derivs		Bitcoin Non-Deliverable Forwards (NDFs)	Buy, sell, and hold bitcoin derivatives	N/A
 flatEX DEGIRO BANK			Direct	BTC, ETH, LTC, XRP, BCH, LINK, UNI	Buy, sell, and crypto-custody	

Leading crypto indices can be used as references for asset selection

Crypto indices generally identify the most important crypto assets to be monitored in the long run

Provider	Location	Active since	Coverage	Methodology	Index names
 bitpanda		2014	Top 5 - Top 10 - Top 25 cryptocurrencies	Partnering with MV Index Solutions, the Index division of the leading asset manager VanEck to calculate and review their indices	BCI5 BCI10 BCI25
 S&P Global		n.d.	Top 5 - Top 10 - Other	Strict methodology, eligibility factors, portfolio rebalancing	S&P Bitcoin Index S&P Cryptocurrency BDN S&P Cryptocurrency Broad Digital Market Index, ETC.
 F5 CRYPTO		n.d.	BTC, ETH, ADA, BNB, ATOM, DOT, DOGE, SOL, LUNA, AVAX, SHIB, MATIC	Regular rebalancing to capture trends	F5 Crypto Index
 SIX		2016	BTC, ETH, XRP, BTC Cash, LINK, DOT, ADA, UNI, DOGE, SOL	Measure the performance of the largest and most liquid crypto assets and tokens and provide an investable benchmark for this asset class	SIX Crypto Market Index 10
 CRIX		2021	BTC, ETH, BNBC, LUNA, SOL, XRP, ADA, DOT, AVAX	Constituent reevaluated each quarter Constituent are rebalanced each month	Royalton Crix Index
 Index	Decentralized	2020	ETH, DeFi assets, Data, BED,	Expert methodologists - long term partner either from external or from the Index Coop itself	Interest Compounding ETH Index DeFi Pulse Index Metaverse Index etc.
 Nasdaq		2022	BTC, ETH, LTC, LINK, UNI, BCH, XLM, FIL, AXS, SAND	The Index is calculated by CF Benchmarks Ltd., a regulated London-based calculation agent with a focus on calculating and administering Digital Asset Indexes	Nasdaq Crypto Index (NCI)

⑤ Crypto Trading

This chapter examines development in the crypto trading market from the starting point of crypto trading approach to understand how use cases are being adopted or explored in the industry.

We will identify providers and best practices as a first layer to assist institutions in their choices of trading and execution venues for digital assets.

1 Accessing crypto via banks: overview of provider landscape

2 **Alternatives for sourcing crypto liquidity**

3 Crypto trading market initiatives

Interview with Dolf Diederichsen, CEO & Co-Founder at Hyphe

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Dolf Diederichsen

CEO & Co-Founder



About: Dolf began his career at Boston Consulting Group, working on international corporate clients in Germany and Japan. After discovering Bitcoin in 2012, he built a business selling cryptocurrency in the form of physical gift cards across thousands of stores in the Benelux, before pivoting towards institutional clients. Hyphe is a regulated digital asset liquidity provider, enabling European banks, brokers, and asset managers to trade quickly and easily. The company's mission is strongly aligned with the growth in market participation.

What role do liquidity providers play in the institutional adoption of crypto?

Liquidity providers play a central role in institutional adoption. Banks may or may not wish to provide their own custody solution, depending on their profile, but they will need external liquidity. Whatever product or platform they are building or sustaining, it will require at least some trading, either regularly and at scale - for example in the case of a retail brokerage product - or less frequently - for example when creating an investment fund that invests in digital assets.

Gaining access to liquidity via a trustworthy, easy, and efficient partner with deep liquidity and banking-grade protocols is the best way for institutions to enter the digital asset space.

What should financial institutions consider when comparing liquidity providers and crypto exchanges for liquidity sourcing?

Institutions may be tempted to integrate directly with crypto exchanges, but in reality, this is quite problematic. Exchanges present various hurdles, create unwanted counterparty risk, insist on processes and protocols which are often not bank-friendly, and structure their pricing and fees purely around volume, which may not suit a bank starting in the space, or an institutional platform with fluctuating traffic. The requirement to refund a trading account, potentially with millions of Euros, is enough to deter most institutions.

Instead, there is a range of LPs in the marketplace, each with a different profile. Institutions should discount any LP that also offers custody, since this is a separate competence and a potential conflict of interest - client assets held in custody may be used to bolster the firm's liquidity position, which is risky. Financial institutions will want an LP with the right regulatory status, plus a front-foot-forward approach to regulation, considering that more is coming in this space. The LP's inventory needs to be aligned with the institution's own needs, and highly liquid in all relevant assets. Scrutinise the platform's performance: overall uptime, fill rates, execution speed, cancellations, and failed trades.

Finally, institutions need to feel comfortable that they are accessing valid price discovery; that their pricing is not limited to one trading venue, a so-called 'pricing island'.

Which crypto assets are most popular among your clients and where do you expect demand to move throughout the next year?

When we started serving institutions we assumed they would be fairly conservative, seeking liquidity in the top four or five assets by market cap. And of course, there are some clients solely focussed on Bitcoin. But we continue to be surprised by the appetite for variety among the majority of institutional clients, especially those serving retail customers directly via trading platforms. Last year saw a great deal of interest in 'smart contract' protocols, and this had a long tail as asset managers such as VanEck - a client of ours - have created ETPs in this space. Bitcoin and Ethereum remain by far the most heavily traded assets across our platform, and in general in the market, but there's also considerable trading volume in Cardano, Solana, and Ripple. Where do I expect demand to move this year? Predictions are very tricky! Our platform is agnostic in that sense; we'll continue to serve our clients and their customers in whatever direction they want to take as investors.

Interview with Dolf Diederichsen, CEO & Co-Founder at Hyphe

2/2



Dolf Diederichsen

CEO & Co-Founder



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You have been advocating for more fairness in crypto trading - can you elaborate on current issues and solutions?

Yes. Having been in the space for some time, and seen this category grow up, professionalize, and go mainstream, it's shocking how some bad practice remains, and institutions are still exposed. The pricing structures within digital asset trading are all too often opaque. Transaction costs are way too high, and the breakdown is often hidden in the spread. If we look at traditional securities trading, these practices wouldn't fly, but in crypto, there is still room for unfairness.

We've been talking about this topic - as you mention - because we're also doing something about it. We recently launched our proprietary price discovery tech, Clear-Calculus, which monitors weighted price signals from the market, allowing clients to understand and trade against the fair market price for assets. This gives them a fair foundation from which to build their own custom pricing model.

Let's talk regulation. How is the landscape evolving?

Globally there's a growing consensus that digital asset markets need greater regulation, and that a degree of coordination between territories is wise. Of course, whenever industry is operating ahead of regulation, there's pressure to move fast to catch up, but of course, we need to avoid poor regulation as a result. In Europe, businesses such as ours are regulated at a national level, via local interpretation of the EU's AML 5 Directive. We're headquartered in the Netherlands and therefore licensed as a 'crypto service provider' via the Dutch central bank, DNB. The current regime means there are differences between EU member states, some are ahead, others behind. This does create some challenges. But everyone is waiting for MiCAR, the pan-EU legislation (rather than a directive) which should harmonize regulation for member states. When will it arrive? We believe by 2024/25.

At Hyphe we very deliberately hold ourselves to a higher standard than is currently demanded by AML 5. We use our knowledge of traditional securities markets, and insight from continued dialogue with the regulator, to ensure we're not only MiCAR-ready a few years in advance, but also can share those higher standards of service with our clients right now.

Trading via an exchange saves fees, liquidity providers have easier integration

Comparison of direct exchange integration and market access via liquidity providers

Trading via single exchange	Trading partner	Trading via liquidity provider
<ul style="list-style-type: none"> Integrate with selected exchange via API for off-exchange settlement without pre-funding Focus on regulated exchange with substantial trading volume and relevant asset coverage 	Description	<ul style="list-style-type: none"> Onboard liquidity provider to route orders to various trading venues Best execution over multiple venues Trade settlement without pre-funding
	Provider selection	
<ul style="list-style-type: none"> No additional fees, transparent orderbook, and pricing Incremental purchase amounts possible Less compliance resources required for due diligence of single exchange vs multiple exchanges connected to liquidity provider Large exchanges imply lower counterparty risk for settlement than smaller liquidity providers (volume/liquidity) 	Pros	<ul style="list-style-type: none"> Best execution via multiple exchanges Access to deeper volume compare to single exchange Reduced dependency on the availability of single exchange Simplified technical integration
<ul style="list-style-type: none"> Dependence on a single exchange's volume, prices, asset coverage, and availability Volume limitations (depending on the exchange) Potentially higher technical integration complexity 	Cons	<ul style="list-style-type: none"> Risk exposure against a single liquidity provider (availability, cash liquidity of provider for their pre-funding) Limited asset coverage compared to large exchange Compliance due diligence of all connected exchanges required

Crypto trading still remains a key market opportunity in crypto applications

With a global market opportunity of ~\$250 bn in 2022 for centralized exchanges

Market overview

Global trading on centralized crypto spot exchanges in 2022 currently averages around \$35 bn/24h (\$3.7 tr total volume YTD)

Centralized exchanges charge an average of 200 bps in effective fees for retail trading, resulting in a calculative global market opportunity of ~\$250 bn in 2022

Decentralized exchanges reached \$456 bn total volume YTD (\$4.3 bn/24h, ~1:8 vs centralized exchanges) before the crash

Around 600 centralized and decentralized exchanges currently operate globally

Selection criteria for exchanges

Scope of digital assets and instruments used: Exchanges can choose which digital assets to support. In addition, the exchange makes the decision of whether to support financial instruments (spot, futures, options, etc.)

Reputation and regulation: Where is it incorporated? What regulation applies? Depending on the regulation, clients may enjoy a higher degree of consumer protection or security in their transactions

Fee Models: The fee is made up of a taker fee and a maker fee. This model aims to stimulate trading by rewarding the so-called market makers that lend liquidity to the system

Execution Quality: Another important feature is the distinction between the types of execution mechanism: firm or indicative quote

Notes: CoinMarketCap ranks and scores exchanges based on the following: Web Traffic Factor; Average Liquidity; Volume, as well as the Confidence that the volume reported by an exchange is legitimate


























Source: <https://coinmarketcap.com/rankings/exchanges/>

DeFi exchanges

Name	HQ	Vol. 24h	# coins	# pairs	Score	Fund Raised (\$m)
 BINANCE		\$18.0bn	357	1463	9.9	200
 OKX		\$2.1bn	345	618	6.2	n.a.
 coinbase		\$1.5bn	217	532	8.0	552
 KUCOIN		\$1.4bn	712	1264	7.6	180
 Gate.io		\$1.1bn	1471	2726	7.2	74
 UNISWAP		\$1.0bn	504	1110	n.d.	11
 BYBIT		\$0.8bn	237	318	6.5	n.a.
 Huobi Global		\$0.8bn	629	1003	6.7	2
 kraken		\$0.6bn	202	631	7.5	136
 BITFINEX		\$0.4bn	181	439	7.0	n.d.
 crypto.com		\$0.3bn	225	391	6.1	20

Liquidity providers drive institutional trading and exchange market making

Comparison of leading crypto liquidity providers

Provider	Location	Active since	Coverage	Interaction	Fee structure	References
		2015	Derivs Direct	API, web interface, voice	Price, no per-transaction, deposit, withdrawal fees	Liquidity provider of Parent company  
		2013	Direct	API	Low to no fees	Liquidity provider of Parent company  
		2004	Derivs Direct	API, web interface, voice	N/A	Liquidity provider of  HIKE 香港交易所
		2014	Derivs Direct	API, web interface, voice	Price, no additional trading fees	Parent company 
		2018 (Digital asset division)	Derivs Direct	API, web interface	No fees, but a spread is included in pricing	Liquidity provider for Bitcoin futures 
		1999	Direct	API, web interface	N/A	Liquidity provider of Parent Company  
		1985	Direct	API	N/A	Liquidity provider of Parent Company  

⑤ Crypto Trading

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Selection of crypto trading initiatives

More and more actors are entering the crypto custody universe

Institution	Type	Date	Project description	Source
 Volksbanken Raiffeisenbanken	Bank	Mar 23, 2022	Volksbanken unveil plans for retail crypto trading	Link
 GALAXY DIGITAL	Fund	Mar 21, 2022	Galaxy Digital Facilitates Goldman Sachs's First OTC Crypto Options Trade	Link
 [B]³ BRASIL BOLSA BALCAO	Stock Exchange	Mar 16, 2022	The Brazilian Stock Exchange B3 will launch Bitcoin and Ethereum futures	Link
 charles SCHWAB	Broker	Mar 3, 2022	Schwab files to launch a crypto ETF	Link
 SBERBANK	Bank	Dec 30, 2021	Russia's Largest Bank Introduces First Blockchain-Focused ETF in the Country	Link
 DEUTSCHE BÖRSE GROUP	Investment manager	Nov 29, 2021	Invesco launches spot Bitcoin ETP on Deutsche Boerse	Link
 JPX JAPAN EXCHANGE GROUP	Stock Exchange	Nov 25, 2021	Japanese stock exchange JPX creates digital subsidiary, including for blockchain	Link
 DEUTSCHE BÖRSE GROUP	Crypto Exchange	Dec 21, 2021	Crypto Exchange Bitpanda Lists Bitcoin Exchange-Traded Note on Deutsche Boerse	Link
 XETRA	Broker	Dec 15, 2021	Scalable Capital moves into crypto trading	Link
 SUTORBANK DEUTSCHE PROVINZIALBANK 1872	Crypto banking	Dec 15, 2021	British crypto specialist buys Sutor Bank	Link
 Sparkasse	Bank	Dec 13, 2021	Sparkasse prepares for Bitcoin trading	Link
 Nasdaq	Stock Exchange	Dec 7, 2021	Nasdaq Stockholm lists Bitcoin and Ether exchange-traded notes	Link
 EURONEXT	Investment manager	Dec 1, 2021	21Shares to List Europe's First Polygon ETP in Paris, Amsterdam description	Link

⑥ NFTs

This chapter examines development in the NFT market from the starting point of NFT tech features to understand how use cases are being adopted or explored in the industry.

The section presents a high-level overview of the market participants and how the underlying technology works.

- | | |
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| 1 | NFTs: status-quo and market outlook |
| 2 | NFTs explained and its impact on capital markets |
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Over the last years the NFT market grew substantially

With trading volume on OpenSea increasing from 13m to 33m between 2020 and 2021

Market Overview

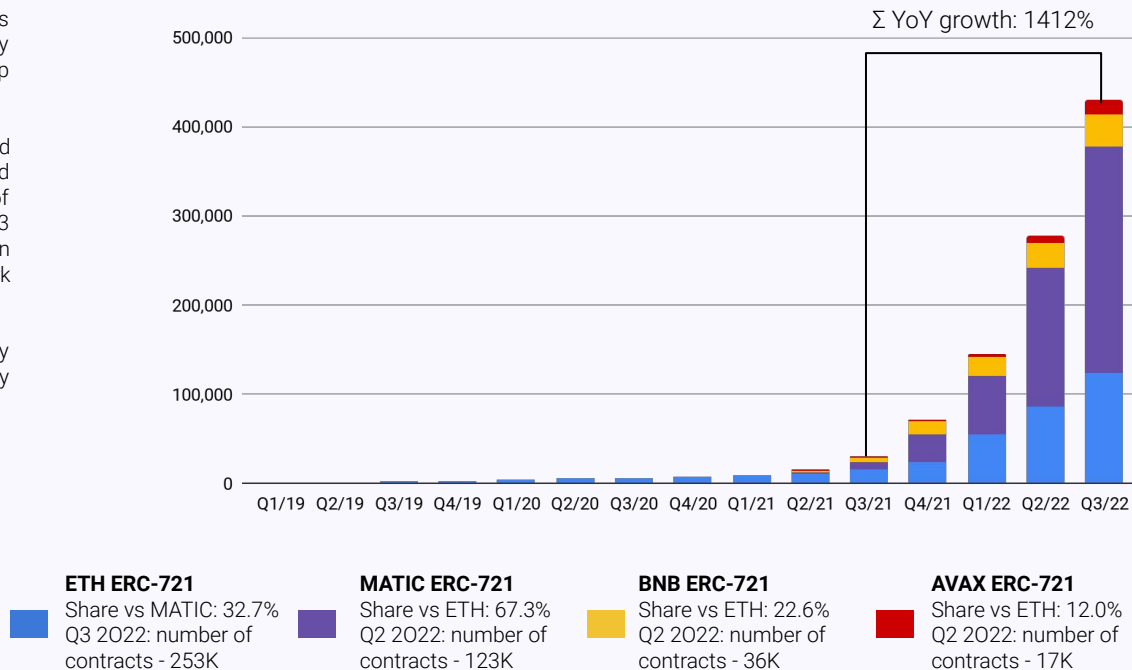
NFTs are non-fungible tokens with unique identification codes and metadata. Unlike fungible tokens, NFTs are not mutually interchangeable and can therefore be used to prove ownership and to certify authenticity.

The first NFT was created in 2014 but the industry only started to gain momentum in 2017 when the ERC-721 token standard was proposed. The year 2021 is often referred to as the "year of the NFT" as the trading volume increased from 33 billion to 13 billion between 2020 and 2021. Mainstream attention then reached its first all-time high when Beeple sold his digital artwork "Everydays: The first 5000 days" for \$69 million in March 2021.

The momentum that NFTs gained in 2021 can be illustrated by the number of users and transactions that were tracked by DappRadar on the largest peer-to-peer marketplace OpenSea.

From Q1 2019 to Q2 2022, the number of contracts grew at a **CAGR of 509%** driven by the strong growth in ETH and MATIC contracts

Total number of NFT contracts per chain



However, the NFT market was greatly impacted by the crypto collapse

With globally traded volume dropping 84% between Q1 and Q3 2022

Market Overview

NonFungible mentioned in their NFT Market Report for Q3 2022 the above figures:

- The NFT market shrinks and enters a stabilizing phase, along with promising indications of an impending boom
- Between Q2 and Q3 2022, there was a dramatic 77% decline in the amount of USD exchanged, with a global volume of roughly US\$1.7 billion in Q3 2022
- For the first time ever, a net quarterly loss of US\$450M is reported
- During the period, there was a 44% decrease in total loss and an 84% decline in profit at resale (\$326 million profit for a loss of US\$783 million)
- From a trading perspective, the market has significantly shrunk in on itself, but with more than 120,000 daily transactions, its one million active wallets per quarter still keep the NFT industry's heart beating

NFTs Q2 2022 performance overview

	Q1 2022	Q1 2022	Q3 2022	Q1-Q3 Delta
Traded volume (total in \$bn)	10.73	7.36	1.67	-84%
Sales volume (in m)	12.63	11.46	10.90	-14%
# buyers (in bn)	1.57	1.16	0.90	-43%
# sellers (in bn)	0.90	0.71	0.63	-30%
# active wallets (in m)	1.86	1.41	1.12	-40%
Total profit (at resell in \$bn)	3.50	2.07	0.32	-91%
Total loss (at resell in \$bn)	-1.15	-1.40	-0.78	-32%
Average ownership duration (days)	30.9	27.5	31.1	+1%
Active smart contracts	11,848	16,109	17,619	+49%
Average price (in \$)	849	643	154	-82%

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Interview with Dr. Dominique Lammer, Chief Digital Officer, at DZ PRIVATBANK



Dr. Dominique Marcel Lammer

Chief Digital Officer, Head of Marketing,
Corporate Strategy & Digital
Transformation

DZ PRIVATBANK

About: Before joining DZ PRIVATBANK, Dr. Dominique Lammer worked in the field of "Retail Banking" and "Asset and Wealth Management" for the strategy consulting firms Roland Berger and Oliver Wyman. He studied Management at the London School of Economics and the University of St. Gallen and received his doctoral degree in "household finance" from the Goethe University Frankfurt. At DZ PRIVATBANK, his digital transformation team is assessing different technologies and startups and developing use cases, especially in the crypto space, for the different business lines of the bank

With NFTs changing the way people think about ownership rights to their new creation, how do you think it will impact the financial sector?

Distributed ledger technology (DLT) in general and NFTs in specific offer a widely underestimated opportunity to secure and prove property rights. But not only property rights are revolutionarily digitized, the possibility of making non-fungible assets divisible is also a major advantage of DLT. For financial services companies, it is essential to understand where to adequately use the advantages of DLT in the complex value chains of financial products and services. Even though, in theory, intermediaries are no longer needed in a blockchain world, the current discussions around NFTs show clearly that banks will still be needed – at least in the medium term – to sound the market, advise customers and provide them with technical assistance. For the wealthy private banking clients of DZ PRIVATBANK, NFTs are particularly interesting as they offer ways to tap into new asset classes and to put physical art collections or vintage cars on the market using tokenization. To cater to this customer demand, banks need to become more tech-savvy and be open to strategic alliances with tech companies.

How can financial institutions help to mitigate risk associated with NFT markets?

While banks must be open-minded towards new technologies they must constantly and carefully gauge related risks and rewards. This is imperative. The more established financial companies participate in the NFT market, the safer it will be for customers, as the number of players will help the market to mature. Then, customers can trust the reliability of strong financial institutions also in the crypto space.

Institutional adoption of NFTs – what is your take for the next 3 years?

From my point of view, NFT is wafting through the hype circle: Having passed the peak of exaggerated expectations, the valley of disappointment will follow. But I am convinced of the technology and its long-term possibilities. I assume in the next three years, more and more established financial companies will enter the market and offer attractive products which will be more and more accepted by customers. The tokenization of art, real estate, and other non-divisible valuables will be the first step. Most likely, institutional customers will be the first to tap into it, but the democratization for retail customers will follow quickly.

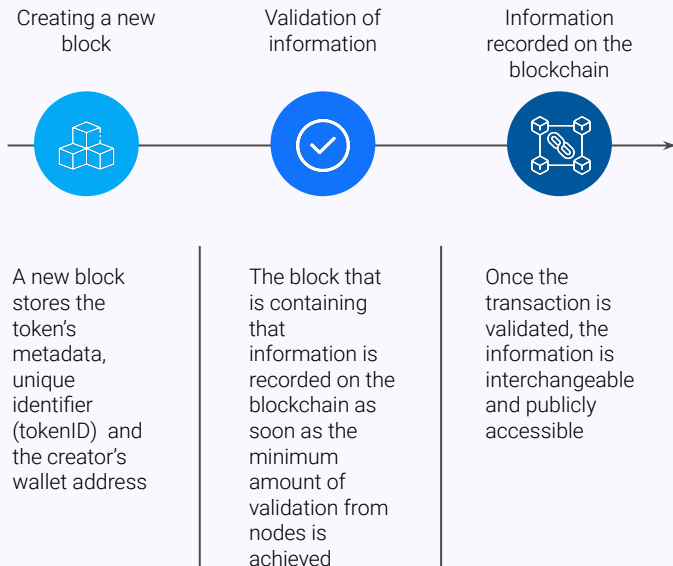
From your perspective, what are the key factors to develop and launch a successful NFT product or service as a financial institution?

First and foremost, the product must offer a clear value-add to the customer which has not been there before. For example, an artist secures the commissions on the resale of her painting via an NFT-embedded smart contract. Secondly, access to the product must be easy for the customer and there must be a handy way to keep and store the token. The more technological knowledge is needed, the lower the adoption rate will be. When those two parameters are given, the focus should be on advice. While the technological background is less important, the advice on risks and rewards in line with regulatory diligence is very important. Unfortunately, the regulator is still lagging behind these exciting technological developments.

NFTs are used to create **unique** digital assets and collections

NFT minting process

NFTs are minted by writing smart contracts that conform with NFT token standards such as ERC-721, ERC-1155, or Flow.



Most common NFT token standards

ERC-721

The ERC-721 token standard is the most popular and widely used NFT token standard. Compared to ERC20 tokens, each ERC-721 token minted is unique and can be priced individually. As each ERC-721 token requires its own unique identifier, separate smart contracts must be minted for every NFT token or collection.



ERC-1155

The ERC-1155 is a multi-asset token standard that allows users to create non-fungible and fungible tokens in the same contract. Thus, one TokenID can represent several configurable token types with their attributes and metadata.



Flow

Flow is specifically designed for crypto games and digital collectibles, and therefore built to scale more efficiently. Unlike ERC-721 and ERC-1155 tokens, Flow tokens do not run on the Ethereum protocol but on the Flow blockchain.



Protocol

NFT use cases are diverse and still expanding

Its impacts on the capital markets could be great with the tokenization of certificates, confidential documents and other asset classes



DIGITAL CONTENT

Encoding digital content in smart contracts enables content creators to capture the ownership rights of a piece of artwork or song



GAMING

NFTs have the potential to disrupt the current gaming industry as "Play-to-Earn" gaming models gain in popularity. The implementation of NFT in-game items gives gaming items real-world value as users can sell their items after losing interest in the game



FASHION

In the fashion industry, NFTs can be used as a tool of verification to solve the issue of counterfeit projects. Additionally, NFTs can provide the customer with complete supply chain traceability, revealing details about manufacturers and previous owners



EVENTS AND TICKETING

As smart contract execution is automated, revenues from NFT tickets can be directly distributed to artists. Thus, the use of NFTs in the events and ticketing industry gives artists more control over the resale market



DOMAINS

Blockchain domains primarily serve to simplify complex wallet addresses by setting up a web3.0 domain. Instead of having a wallet address with over 30 characters, users can own their personalized address as an NFT








OTHERS

The tokenization of PDF or any confidential documents as well as certificates could drastically improve the market reducing associated cost and counterparty risks

Many other use cases will appear in the future, with certain directly impacting the financial world

NFTs use cases start impacting the capital markets: tokenization of gold

NFTs can simplify the processes of investing in gold, working as digital ownership certificates

	Physical ownership	Digital ownership (NFT)
 Storage	Physical gold ownership involves a variety of issues related to the weight and size of gold as well as the transaction processes	With tokenized gold, investors do not have to physically store the metal leading to lower costs associated with purchasing gold
 Trading	The processes to buy, sell or transfer gold are outdated and time consuming. The gold bars must be transferred to a different location if ownership changes	The trading of gold is simplified as the metal does not have to be physically transferred from one investor to another. Thus, gold can be traded at any time which increases inclusiveness and flexibility for investors
 Market liquidity	As gold bars are not easily divisible, the market liquidation is limited	Gold bars can be fractionalized to increase the number of potential investors
 Identification	Each gold bar is serially numbered and sold with a certificate	As each NFT has its own TokenID and unique character, gold bars can be best represented by using the ERC-721 token standard
 Security	If the gold bar and its certificate is stolen, the metal can be sold on secondary markets	As the owners of the serially-numbered gold bars is publicly available in the block explorer, ownership can always be traced back. Thus, gold bars that do not come with the associated NFT will be worthless








⑥ NFTs

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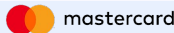


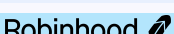





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Selection of NFT marketplaces

Name							
HQ	US	UK	US	Acquired by Yuga Labs	US	Decentralized	Vietnam
Founding Year	2017	2021	2021	2017	2020	2022	2018
Funding in \$M	427	n.a.	159	n.a.	n.a.	n.a.	9
Avg. price in \$ (7d)	129.8	761.3	54.3	110,860,000	10.9	275.6	9.4
# Traders (7d)	138,335	2,298	110,690	54	18,314	21,967	21,161
Volume in \$M (7d)	62.1	2.8	14.6	5.0	0.7	15.0	1.2
Supported protocol	Avalanche, Ethereum, Polygon, Solana	Ethereum	Solana	Ethereum	Flow	Ethereum	Ethereum, Ronin












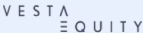


Selection of NFT initiatives

More and more actors are entering the NFT universe

Institution	Type	Date	Project description	Source
 GUCCI	Corporate	Jun 23, 2022	Gucci Invests \$25K in DAO of NFT Marketplace SuperRare to Star Digital Art Vault	Link
 ebay	Corporate	Jun 23, 2022	eBay acquires NFT marketplace KnownOrigin	Link
 shopify	Corporate	Jun 22, 2022	Shopify Adds NFT-Gated Option for Online Retailers	Link
 UNISWAP	Web 3 infrastructure	Jun 21, 2022	Uniswap Labs acquires NFT marketplace aggregator Genie	Link
 MAGIC EDEN	NFT Marketplace	Jun 21, 2022	Solana NFT Marketplace Magic Eden Raises \$130M, Plans Multi-Chain Expansion	Link
 TAG Heuer <small>SWISS AVANT-GARDE SINCE 1860</small>	Corporate	Jun 16, 2022	Swiss luxury watchmaker TAG Heuer introduces NFT-enabled smartwatch	Link
 mastercard	Corporate	Jun 10, 2022	Mastercard partners with 7 NFT platforms	Link
 Alibaba Cloud	Corporate	Jun 9, 2022	Alibaba Cloud launches service to build NFT marketplaces	Link
 Linktree*	Linking platform	May 17, 2022	Linktree launches new NFT features in partnership with OpenSea	Link
 Robinhood	Financial Services	May 17, 2022	Robinhood Plans "Web 3" Crypto Wallet for DeFi Traders, NFT Buyers	Link
 Spotify	Corporate	May 17, 2022	Spotify reportedly tests NFT galleries on musician profiles	Link
 QuickNode	Web 3 Infrastructure	May 13, 2022	QuickNode Acquires NFT Analytics Platform Icy Tools	Link
 .arianee	Web 3 infrastructure	May 9, 2022	Arianee Raises \$21M to Bring Luxury NFTs to the Metaverse	Link
 ZORA	NFT marketplace	May 5, 2022	NFT marketplace Zora raises \$50 million in round led by Haun Ventures	Link
 VanEck	Investment manager	May 2, 2022	Investment management firm VanEck launches NFT collection	Link










Selection of NFT initiatives

More and more actors are entering the NFT universe

Institution	Type	Date	Project description	Source
 CXIP	Protocol	Apr 26, 2022	CXIP Labs Taps Celebrity Investments in \$6.5M Round for NFT Development Suite	Link
 OpenSea	NFT marketplace	Apr 25, 2022	OpenSea acquires NFT aggregator Gem	Link
 RARIO	NFT marketplace	Apr 21, 2022	NFT Cricket Platform Rario Raises \$120M Round Led by Dream Capital	Link
 LimeWire	NFT marketplace	Apr 21, 2022	LimeWire raises \$10 million in private token sale to grow music-linked NFT platform	Link
 Genies	Start up	Apr 13, 2022	NFT avatar startup Genies valued at \$1B following Series C funding round	Link
 SAMSUNG	Corporate	Mar 30, 2022	Samsung Taps Nifty Gateway to Create Smart TV NFT Platform	Link
 IMMUTABLE	Start up	Mar 7, 2022	NFT Layer 2 startup Immutable raises \$200 million, now valued at \$2.5 billion	Link
 KPMG	Auditor	Feb 28, 2022	KPMG Canada Buys World of Women Ethereum NFT, ENS Domain Name	Link
 BitsCrunch	Start up	Feb 25, 2022	BitsCrunch raises \$2.6M in funding for NFT analytics tools	Link
 WARNER MUSIC GROUP	Corporate	Feb 23, 2022	Warner Music Group and Splinterlands Collaborating on Play-to-Earn Games	Link
 mastercard	Payment Services	Feb 15, 2022	Mastercard to Offer Crypto and NFT Consulting Services, May Help Develop CBDCs	Link
J.P.Morgan	Bank	Feb 15, 2022	J.P. Morgan buys NFT land in Decentraland metaverse	Link
 VESTA EQUITY	Investment manager	Feb 15, 2022	Vesta Equity launches real estate-backed NFT platform on Algorand	Link
 SAMSUNG	Corporate	Feb 14, 2022	Pre-orders of Samsung's New Galaxy S22 Smartphone to Come With NFTs	Link
 salesforce	Corporate	Feb 10, 2022	Salesforce planning an NFT Cloud	Link

Selection of NFT initiatives

More and more actors are entering the NFT universe

Institution	Type	Date	Project description	Source
	Corporate	Feb 9, 2022	New Alfa Romeo SUV Will Come With NFT Service Record	Link
 reddit	Social news forum	Jan 27, 2022	Reddit Trial Will Allow Users to Set Any NFT as Their Profile Picture	Link
 Meta	Corporate	Jan 20, 2022	Meta Experimenting With NFT Marketplace on Instagram	Link
 Autograph	NFT marketplace	Jan 19, 2022	NFT platform Autograph raises \$170 million in Series B funding	Link
 Lamborghini	Corporate	Jan 19, 2022	Lamborghini to launch NFTs linked to space exploration	Link
 coinbase	Exchange	Jan 18, 2022	Coinbase partners with Mastercard for NFT marketplace purchase	Link
 GAP	Corporate	Jan 12, 2022	Fashion Giant Gap Launches Gamified NFTs on Tezos	Link
 OpenSea	NFT platform	Jan 5, 2022	NFT marketplace OpenSea confirms \$300m funding at \$13bn valuation	Link
 Bitwise®	Asset Manager	Dec 17, 2021	Bitwise launches NFT index fund for accredited investors	Link

Your contact



Radoslav Albrecht

Founder & CEO
+49 163 3643808
radko@bitbond.com



Felix Stremmer

COO
+49 151 61166662
felix@bitbond.com

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www.bitbond.com

Bitbond GmbH Lottumstr. 26, 10119 Berlin, Germany