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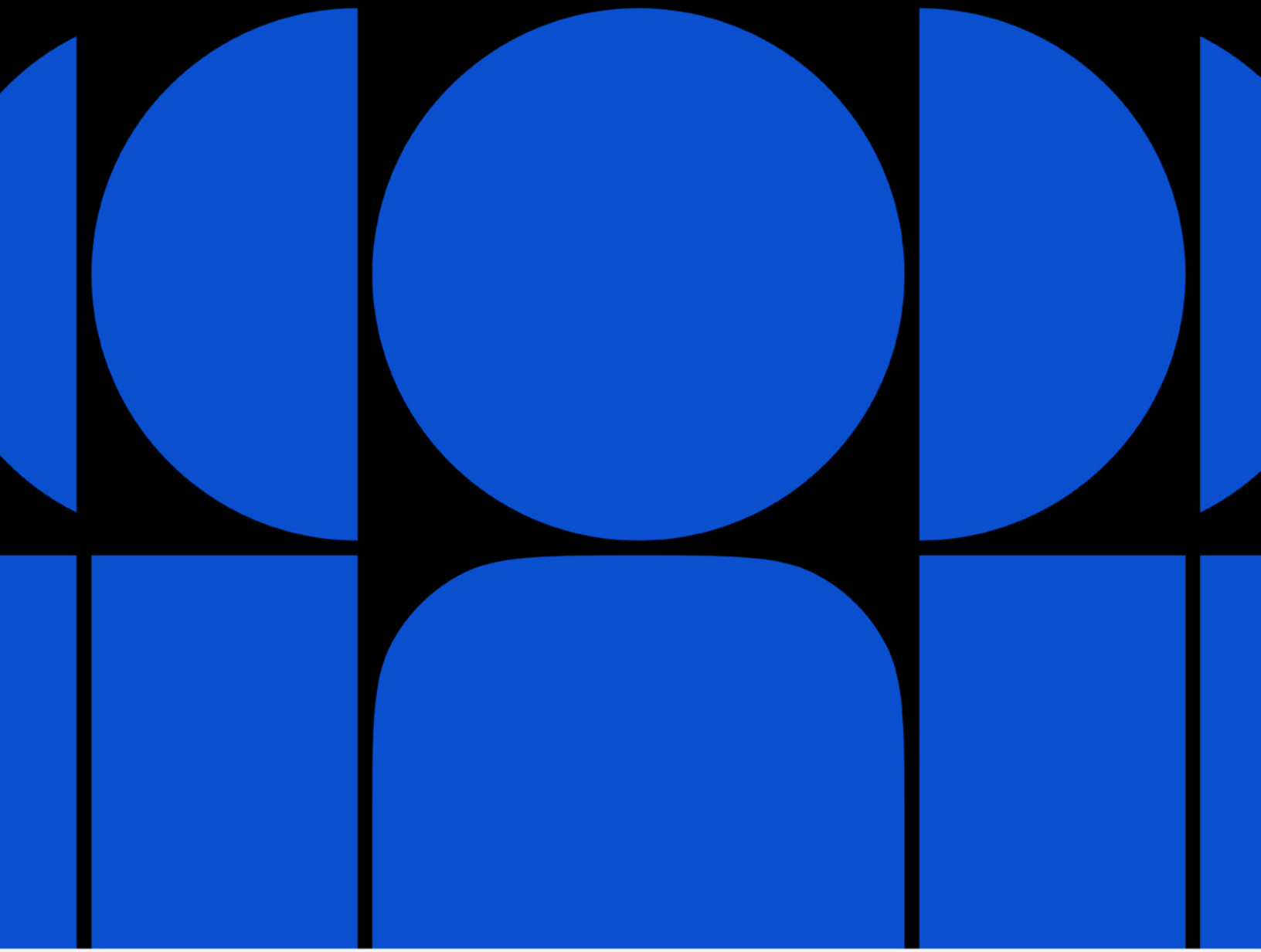
THE CONSUMER CRYPTO CATALYST

Decentralized Applications For Everyday Users



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OVERVIEW

The consumer crypto landscape is poised to reshape how individuals interact with products and services in their everyday lives. This report focuses on defining, mapping, and analyzing the emerging sector of consumer crypto, which refers to blockchain-enabled platforms and services designed for the general public's use. Despite the growing interest in this space, there is a lack of clarity around what constitutes consumer crypto and how it differs from other sectors in the broader crypto ecosystem. To shed light on this nascent sector, we provide a clear definition and a comprehensive taxonomy of the various subsectors within consumer crypto which is set out in Section 1. This report aims to equip stakeholders with a solid foundation for understanding and navigating the consumer crypto space. By providing clarity around the definition, taxonomy, and key trends shaping this sector, it seeks to facilitate informed decision-making and contribute to the ongoing development of blockchain-powered consumer applications.

The report is structured as follows:

Section 1 defines consumer crypto and provides a structured taxonomy breaking down the key application and infrastructure layer subsectors. The application layer subsectors identified include community/brand engagement, decentralized social, gaming, media, and messaging. The infrastructure layer subsectors include wallets, payments, networks, identity management, metaverse, analytics, and decentralized physical infrastructure networks.

Section 2 explores the current market landscape across both the crypto-native ecosystem and traditional consumer brand activity. It covers each application and infrastructure subsector, highlighting notable projects, user activity, and venture funding trends. The analysis also reviews data on Fortune 100 companies to gauge the penetration and maturity of consumer crypto initiatives among traditional consumer brands. We've found that both venture funding and user growth has increased across all five application layer subsectors over the five years from 2019 to 2023. Additionally, nearly one-third of Fortune 100 companies have consumer crypto initiatives in development.

Section 3 envisions the road ahead for consumer crypto, identifying the key barriers to mainstream adoption such as high transaction fees, complex user experiences, negative public perception, and regulatory uncertainty. This section also projects how the subsectors we've outlined may evolve, such as decentralized social media platforms offering customizable content curation algorithms. In addition, we explore the potential emergence of new subsectors such as on-chain AI agents and tokenized personal data markets.

Finally, Section 4 explores the on-chain consumer regulatory direction by analyzing past enforcement actions and their potential implications for the future of consumer crypto products. This section also provides a high-level overview of the regulatory approach to consumer crypto across key markets in North America, Europe, and Asia, offering insights into the potential impact of different regulatory frameworks on the development and growth of on-chain consumer products.

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Morph is an Ethereum Layer 2 scaling solution that utilizes rollup technology to improve blockchain accessibility, efficiency, and usability for developers and consumers. Morph's approach incorporates a decentralized sequencer network, which aims to optimize efficiency, reduce costs, and maintain decentralization. By integrating an optimistic zkEVM, Morph seeks to provide a secure, performant, and developer-friendly environment by combining aspects of optimistic and ZK rollups. Morph's design architecture is modular, consisting of Sequencer Network, Rollup, and Optimistic zkEVM modules, which offers flexibility and composability. Morph focuses on the consumer blockchain landscape, providing developers with tools to create decentralized applications that cater to everyday consumers.

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The authors of this report may hold tokens mentioned in this report. Please refer to The Block's financial disclosures page for author token holdings.

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PART 1
INTRODUCTION

When Bitcoin was introduced over a decade ago, it popularized the use of public blockchains as infrastructure for peer-to-peer payments. Since then, the use cases for blockchains have expanded significantly, largely driven by the introduction of smart contracts by platforms like Ethereum. New sectors such as DeFi and NFTs (non-fungible tokens) that are built using smart contracts experienced rapid growth in usage and relevance throughout 2020 and 2021, respectively. In addition, the proliferation of applications across sectors including media, sports and entertainment, gaming, and others has led to the emergence of a distinct sector, which we will define in the report as consumer crypto.

While early successes have provided a glimpse of blockchain's potential in supporting consumer use cases, they have been mostly transient. Despite some signs of success, the growth potential of the nascent consumer crypto sector remains untapped largely due to lacking infrastructure. As blockchain infrastructure improves, these early successes will likely give way to applications with stronger product-market fit, positioning consumer crypto as a key entry point for mainstream adoption of blockchain technology.

Although many have an intuitive understanding of what consumer crypto entails, the term still lacks a precise definition. Identifying a clear and specific definition helps establish a common language for stakeholders—investors, developers, regulators, and consumers alike. Along with a clear definition, we aim to provide a structured taxonomy of consumer crypto, delineating its various subsectors, and provide an outlook into its future. This clarity is crucial for establishing a shared understanding which can facilitate many positive downstream effects such as promoting adoption, guiding regulatory frameworks, and attracting increased investment and developer activity. To effectively contextualize the significance of consumer crypto, it's important to understand the scale and impact of traditional consumer industries. According to the U.S. Bureau of Economic Analysis, consumer spending accounted for 67.8% of the United States' gross domestic product in the first quarter of 2024, highlighting the economic influence of this sector. By exploring the potential of blockchain technology to enhance consumer-facing industries, this report aims to provide the nascent consumer crypto ecosystem with the attention it deserves, given its capacity to impact a sector that forms the backbone of the global economy.

To effectively define consumer crypto, it's helpful to set the context with a clear understanding of traditional consumer industries. A consumer company refers to a business that sells products or services directly to

the end-user for personal use rather than for resale or further processing. The consumer industry encompasses a wide range of products and services including footwear and apparel, food and beverage, sports and entertainment, travel and hospitality, electronics, digital and social media, leisure and recreation, toys and games, and much more. These industries are characterized by direct interaction with end-users, whose purchasing decisions reveal the value and utility of the products or services offered.

Consumer crypto represents a transformative extension of traditional consumer industries, weaving blockchain technology into the fabric of the consumer space. More precisely, consumer crypto refers to blockchain-enabled platforms, use cases and services designed for the general public's use that facilitate everyday activities. This includes anything from tokenized loyalty programs and crypto collectibles to blockchain-based gaming and decentralized social media platforms. On-chain consumer products seek to fundamentally reshape the way we interact with and experience products and services, creating more efficient, transparent, and user-centric solutions that challenge standard practices in consumer industries. While some existing consumer use cases may remain largely untouched by blockchain rails, the potential of on-chain consumer products spans a wide range of use cases across essentially every consumer internet service category and within many physical goods contexts as well.

This report will primarily explore on-chain consumer products focused on everyday utility and engagement rather than sectors characterized by a strong financial emphasis, such as DeFi, GameFi, or NFTFi. While these sectors have applications that directly serve end-users, the financial component shifts the primary focus from everyday utility and engagement to profit and speculation. Furthermore, although there are certain contexts in which those financially oriented sectors intersect with consumer use cases, those applications tend to be well-covered by existing research. To make this more concrete, we define below the subsectors comprising the application layer of consumer crypto:

Community and Brand Engagement: The community and brand engagement subsector defines the set of applications that serve to strengthen connections within communities, including the relationship between brands and their audiences. This subsector includes applications spanning loyalty reward programs, social and fan tokens, NFTs and digital collectibles, as well as subscription and membership products. These applications aim to enhance user engagement and encourage ongoing interaction and loyalty.

Media: The media subsector encompasses applications that leverage blockchain technology to authenticate, establish ownership, and distribute a wide range of media content. This subsector includes applications that focus on various types of media including art, podcasts, music, video, and blogs and articles. These applications enable greater transparency in content distribution, empowering creators to maintain control over their work and directly engage with their audience.

Decentralized Social: The decentralized social subsector includes blockchain-enabled social networking applications that allow users to create, share, and exchange information and content with others. These platforms differentiate themselves from traditional social media by leveraging blockchain technology to ensure data integrity, security, and user sovereignty. By decentralizing the control over network data, these applications prevent any single entity from monopolizing information or user activity, thereby promoting a more open and transparent environment.

Gaming: The gaming subsector includes blockchain-based games and gaming platforms that often represent in-game assets as NFTs. This integration of blockchain technology allows for unique in-game economies where players can own, sell, or trade their digital assets. These games span a variety of categories including strategy and resource management games, autonomous worlds, esports, adventure, role-playing games, and more.

Messaging: The messaging subsector refers to applications and protocols that facilitate communication directly between wallet addresses without relying on a centralized application to store and manage messages. The applications in this subsector are developing crypto-native chat and notification services that can be leveraged across applications.

While much of the focus of this report is aimed at the application layer, it's also important to consider the infrastructure that consumer crypto applications rely on. This foundational layer is crucial because it not only supports but also enhances the functionality and scalability of applications. The breakthroughs in user experience that lead to lasting growth in the consumer crypto sector will likely be driven by advances in this infrastructure. Innovations here can lead to improved security, faster transactions, and more robust integration capabilities, all of which are essential for mainstream adoption. Below, we outline the main components of the infrastructure layer underlying consumer crypto.

Wallets: The wallet subsector is a fundamental infrastructure component for consumer crypto, providing the interface for engaging with blockchain applications. This subsector includes applications ranging from user-friendly software wallets with basic functionality to hardware wallets with higher security. In particular, new wallet features such as account abstraction, embedded wallets, and wallet-as-a-service will work to redefine the user experience across consumer crypto applications.

Payments: The payments subsector provides the infrastructure for consumer crypto applications to embed payment functionality within their platforms. This includes not only facilitating straightforward peer-to-peer transactions but also enabling more complex operations like micropayments or automated smart contract executions for recurring expenses. Additionally, payment on and off ramps provide critical gateways for users to onboard funds to consumer crypto applications.

DePIN: The DePIN subsector is comprised of peer-to-peer networks where individuals contribute physical infrastructure resources such as data storage, network connectivity, energy grids, and more in return for rewards according to a protocol's incentive mechanism. These networks are included as infrastructure in the context of consumer crypto as they produce physical and digital resources that can be leveraged to support everyday consumer activities.

Network: The network subsector refers to the underlying blockchain infrastructure that consumer crypto applications are built on as well as network infrastructure built on top of the consensus layer that can be leveraged by consumer crypto applications. Blockchains designed with architectures that prioritize scalability are particularly relevant, as they are better suited to the requirements of consumer crypto applications.

Analytics: This subsector encompasses a range of applications designed to capture and analyze data generated within web3 environments. These tools are designed to give developers insights into user behavior, preferences, and trends, enabling them to tailor their applications more effectively to meet user needs. Additionally, the subsector includes innovative advertising protocols that offer targeted advertising solutions specifically for crypto platforms.

Metaverse: The metaverse subsector encompasses platforms designed to support a wide range of activities within immersive, digital environments. Unlike autonomous worlds at the application layer, which are specifically designed for gaming and entertainment purposes, the general concept of metaverse could be applied to activities outside the scope of consumer crypto. While not an explicit consumer crypto application, metaverse is a platform that can support consumer crypto use cases.

Identity Management: The identity management subsector refers to applications and protocols that allow users to manage and control their identity. It encompasses systems that enable secure authentication, verification, and the safeguarding of personal data across various digital platforms and services. Advances in identity management solutions provide opportunities to reduce user friction across consumer crypto applications. For example, the interoperability of identity credentials enables the use of a single, secure digital identity across multiple services without repeated verifications.

While this taxonomy[1] offers a comprehensive framework that applies to the current landscape and aims to provide categorization for future developments, it's crucial to acknowledge that the subsectors identified are dynamic and subject to change. As new technologies emerge and give rise to innovations at both the application and infrastructure layers, these subsectors will inevitably expand and adapt. This ongoing development may introduce new categories and redefine existing ones. Our framework provides more than just a snapshot of the current state of consumer crypto; it serves as a solid foundation for understanding the space and aids in anticipating future developments.

1 Inclusion of a project or company in this report is not an endorsement of the same. We highlight selected consumer crypto subsectors using representative examples of applications and entities operating in each. Please note that highlighted projects or companies may fit into multiple consumer crypto subsectors. We have categorized projects and companies in the subsectors where we saw them fit primarily. If you feel your organization was miscategorized or think it should be included in future reports, please contact us at research@theblock.co.

PART 2
CURRENT MARKET LANDSCAPE

The previous section outlined a definition and supporting taxonomy of subsectors that comprise consumer crypto. This framework will now be leveraged to explore the current landscape of consumer crypto. The landscape includes both traditional consumer brands and crypto-native companies. Traditional consumer brands are increasingly venturing into the crypto space as they begin to recognize the potential for blockchain technology to change the way they engage with consumers and deliver value. By integrating crypto rails into their existing products and services, these brands are exposing their user base to the benefits of blockchain technology through a familiar and accessible lens. This approach has the potential to help drive mainstream adoption of on-chain consumer products and bridge the gap between the crypto-native community and the broader consumer market. Meanwhile, crypto-native consumer projects are building out the application and infrastructure layers of consumer crypto. These projects are leveraging blockchain technology in creative ways to challenge traditional business models. Understanding the current landscape of both traditional consumer company involvement and crypto-native projects acts as a crucial foundation for envisioning the future of the space in Section 3.

2.1 BLOCKCHAIN-NATIVE CONSUMER CRYPTO APPLICATION LAYER

While it's worth noting how traditional consumer brands are exploring Web3 technologies to enhance their business and improve customer engagement (covered in Section 2.3), our primary focus will be on the crypto-native companies and protocols that are building out the technology and laying the foundation for the next generation of consumer experiences on the blockchain. These projects are not only pushing the boundaries of what's possible in terms of consumer applications but also developing the underlying infrastructure necessary to support mass adoption. By analyzing the nascent market landscape of crypto-native consumer products, we can gain valuable insights into the current state of the industry, identify emerging trends and opportunities, and better understand how these innovative solutions are reshaping the consumer experience. In this sub-section, we will take a deep dive into the application and infrastructure layers of the crypto-native consumer product landscape, exploring the various subsectors, user activity, and venture capital funding that are driving the growth of this space.

At the forefront of the consumer crypto landscape is the application layer, where projects are building user-facing solutions that leverage Web3 technologies to create new experiences and explore innovative

business models. These applications span a wide range of subsectors, each addressing specific aspects of the consumer journey. While this report outlines distinct subsectors to help better understand the consumer crypto landscape, the boundaries are blurred. Given the composable nature of crypto, there is a growing convergence of features and functionality across various application categories. This trend is likely to accelerate, leading to consumer crypto applications that span multiple categories and offer a wide range of functionality within a single platform.

> *"I think there will also be a convergence of many of these sectors, meaning a "product" will be much more horizontal than vertical. The content is the platform."*
> – Robby Yung, Animoca Brands

In the following, we will explore the subsectors that comprise the consumer crypto landscape, outlining the use cases, notable projects, and trends within each:

- Community and Brand Engagement will explore how applications are leveraging NFTs and other crypto-native tools to create deeper and more meaningful connections between creators, brands, and their audiences.
- Decentralized Social will look at how projects are aiming to create more user-centric, transparent, and censorship-resistant social media experiences.
- Gaming will explore how in-game asset ownership, and decentralized gaming economies could change the way that users engage with and derive value from games.
- Media will focus on how on-chain media platforms are creating new models for content monetization and distribution.
- Messaging will cover how projects are building secure, private, and censorship-resistant communication platforms that prioritize user privacy and data sovereignty.

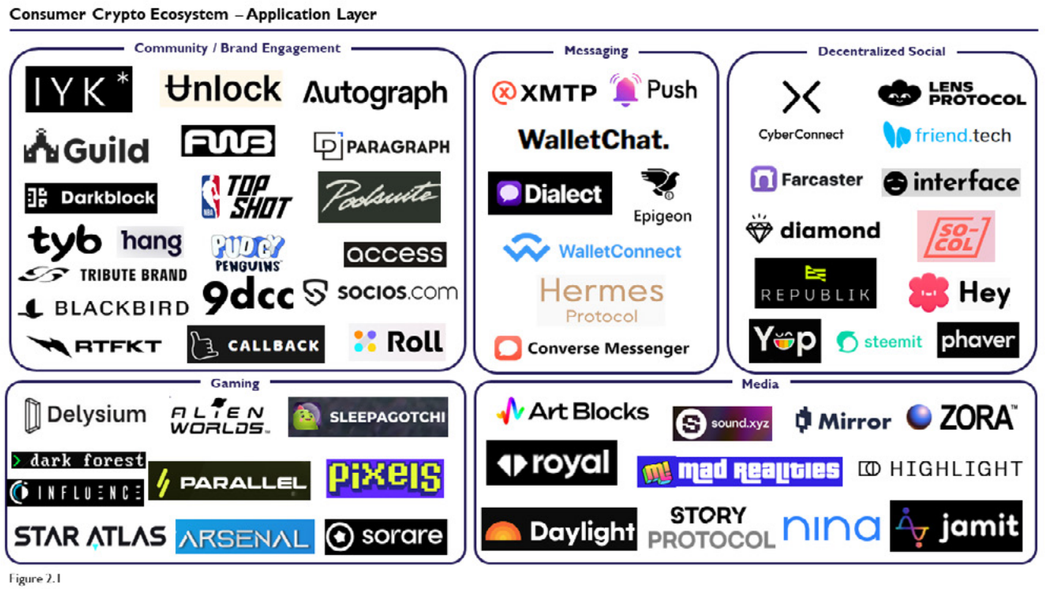


Figure 2.1

2.1.1: COMMUNITY/BRAND ENGAGEMENT

Figure 2.2

The community and brand engagement subsector of consumer crypto encompasses a wide range of applications designed to create stronger connections within communities and between users, creators, and brands. Given the breadth of the community and brand engagement subsector, it is likely that as the consumer crypto space continues to mature and evolve, this subsector will need to be further broken down into more specific and specialized categories. For example, breaking down this subsector into more specific use cases such as NFT ticketing, sports and entertainment, fashion, travel and hospitality, and more will become increasingly important as the number of applications grows and become more specialized. This fragmentation will allow for a more nuanced understanding of each use case as the space evolves. Currently, the main use cases in this subsector include:

- Loyalty reward programs that incentivize and gamify user participation
- NFTs and digital collectibles that enable new forms of ownership and monetization
- Social and fan tokens that provide exclusive access and governance rights to community members, and
- Subscription and membership products that offer ongoing benefits and perks to users.

LOYALTY REWARD PROGRAMS

Loyalty reward programs have long been a staple of the consumer engagement landscape, with brands across various industries using these initiatives to incentivize repeat purchases, foster brand loyalty, and gather valuable customer data. With that said, many traditional loyalty programs face low user engagement and redemption rates. In fact, according to data from PassKit, the average loyalty program has a redemption rate of only around 14%, indicating that a vast majority of program members are not actively participating or finding value in these offerings. This low engagement can be attributed to several factors, including complex redemption processes, limited reward options, lack of personalization, and the siloed nature of many loyalty programs. Consumers often find themselves juggling multiple loyalty accounts, each with its own set of rules, points, and redemption thresholds, leading to confusion. Furthermore, the rewards offered by these programs are often generic and fail to align with the unique preferences and behaviors of individual customers, lowering their perceived value.

Web3 technologies are particularly well-suited to address these shortcomings and improve the loyalty rewards landscape. By leveraging web3 elements, brands can create loyalty programs that are more engaging, flexible, and rewarding for their customers. One of the key advantages of Web3-powered loyalty programs is the ability to create tokenized rewards that hold real value and can be easily exchanged, traded, or redeemed across different platforms and ecosystems. This interoperability breaks down the silos that characterize traditional loyalty programs, allowing customers to consolidate and use their rewards in a more seamless way. Tokenization also enables the creation of more diverse and personalized reward options, such as unique experiences, limited-edition products, or even fractional ownership of high-value assets, catering to the individual preferences of each customer. Moreover, the transparency and immutability of blockchain technology can help build trust and engagement among program members. By providing a clear and auditable record of points earned, redeemed, and expired, brands can create a sense of fairness and accountability, encouraging customers to actively participate in the program. Web3 loyalty programs could also involve customers in the decision making and development process by leveraging governance mechanisms such as token voting or DAO structures. As the potential for Web3-powered loyalty programs becomes increasingly apparent, several innovative solutions have emerged to capitalize on this opportunity.

One notable example is Blackbird, a platform that enables restaurants to curate dining experiences for their members. By leveraging NFTs and blockchain-based rewards, Blackbird allows restaurants to identify, engage, and reward their most loyal customers in creative ways, such as offering exclusive menu items, private events, or even chef-prepared meals at home. Blackbird has already gained traction in the restaurant industry, with over 100 restaurants across four major U.S cities adopting the platform to offer unique rewards and experiences to their customers. Another prominent player in the space is TYB, which recently launched its loyalty solution on the Shopify App Store, making it the first end-to-end Web3 community-powered loyalty platform to tap into Shopify's millions of merchants. Built on the Avalanche blockchain, TYB enables brands to directly connect with, engage, and reward fans for taking specific actions, such as referring friends, writing reviews, and creating and sharing social media content. Major consumer brands like JuneShine, Figlia, Body, Loverboy, 54 Thrones, and Topicals have already been using TYB's white-label solution to improve engagement with their fans. Similarly, Hang is helping companies convert their traditional loyalty programs into NFTs via a Web3-powered platform. Hang offers a solution that allows customers to own their loyalty outright. The project has already attracted several big-name clients, such as Ulta Beauty, Asics, Budweiser, Bleacher Report, and Cinemark, showcasing the growing interest in NFT-based loyalty programs.

NFTs AND DIGITAL COLLECTIBLES

NFTs have emerged as a fundamental tool that represents ownership of a specific item, such as artwork or collectibles and is stored on a blockchain, ensuring its authenticity and scarcity. NFTs are being leveraged across the various subsectors we've outlined in this report, including both the application and infrastructure

layers. NFTs enable verifiable ownership and scarcity of digital assets across different mediums, making them suitable for a wide range of use cases. This has led to their adoption in areas as diverse as art, gaming, virtual real estate, and identity management. In the following we discuss NFTs and digital collectibles in the context of community and brand engagement, leaving out their role in other on-chain consumer use cases.

While many picture-for-profile (PFP) NFT collections, driven primarily by speculative interests, struggle to create real value or foster genuine communities, this report highlights those that have successfully built a strong brand and dedicated community. PFP NFTs enhance community engagement by serving as a digital representation of a user's identity and belonging to a community. When users display their PFP NFTs as their avatar on social media platforms or in online communities, they showcase their affiliation with a particular creator, brand, or movement. This public display of support helps to create a sense of camaraderie and shared identity among token holders, building a stronger emotional connection between members of that community. Certain PFP NFT collections, such as CryptoPunks or Bored Ape Yacht Club, have become highly sought-after status symbols within the crypto community and beyond. Owning a rare or valuable PFP NFT can confer a sense of prestige and influence, similar to owning a luxury item in the physical world.

> *"NFT-permissioned art...will represent the ultimate way to Flex social standing in a purely digital world."*
> – Arthur Hayes

Digi-Physical NFTs, which are digital tokens linked to physical objects, offer a bridge between digital ownership and real-world tangible value. These NFTs are authenticated using blockchain technology and can represent a wide range of physical assets, such as artworks, fashion, merchandise, property deeds, and tickets. By integrating unique identifiers like QR codes or NFC technology, Digi-Physical NFTs ensure the authenticity and provenance of the physical items they represent. This linkage provides a secure and verifiable way to track ownership and transaction history, effectively combating counterfeiting and enhancing consumer trust. Brands like Adidas, GAP, and Nike have successfully launched Digi-Physical NFTs, linking digital tokens to tangible clothing items, while well-known artists like Beeple and Damien Hirst have created physical representations of their NFT art. IYK is a project that focuses on enabling brands to create digi-physical link by embedding NFC chips into their products. IYK's platform offers a user-friendly interface for brands to customize and deploy these experiences without needing extensive technical knowledge. In sum, digi-physical NFTs not only offer collectors and consumers exclusive and tangible items but also open up new opportunities for brands to engage with a digitally inclined audience, driving increased connection between the digital and physical realms.

Digital collectibles, such as virtual trading cards, sports moments, or rare memorabilia, enable users to own and display valuable digital assets. Examples include NBA Top Shot, where fans can buy, sell, and trade officially licensed NBA highlights, and VeVe, a platform for licensed digital collectibles from popular franchises such as Marvel, DC, and Cartoon Network. Blockchain technology is particularly well-suited for collectibles because it ensures scarcity, verifies provenance, and provides immutable proof of ownership, effectively addressing many issues inherent in traditional collectibles, such as counterfeiting, lack of transparency, and difficulties in proving authenticity. Digital collectibles represented as NFTs can also serve purposes such as event tickets or proof of attendance. For instance, protocols like GUTS Tickets and GET Protocol are pioneering the use of blockchain for ticketing, ensuring that tickets are tamper-proof and easily transferable while eliminating fraud and counterfeiting. Additionally, POAP (Proof of Attendance Protocol) is an innovative solution that issues digital badges to attendees as proof of participation in events, both physical and virtual. These digital badges are minted as NFTs, providing a permanent, verifiable record of attendance that can be collected, shared, and traded

SOCIAL AND FAN TOKENS

The rise of social and fan tokens has enabled a shift in the way creators and fans interact, offering a potential solution to the limitations of traditional fan engagement models. These traditional models have long been characterized by a one-way flow of communication, where fans are relegated to the role of passive consumers, mostly lacking the opportunity for active participation and direct interaction with the creators, brands, or sports teams they support. Moreover, traditional engagement models often fail to provide fans with a sense of exclusivity or a tangible stake in the success of their favorite entities. Without a direct sense of ownership or influence, fans may experience a diminished sense of loyalty and engagement over time, all else being equal. In addition to transforming fan engagement, social and fan tokens also present new monetization opportunities for creators and additional revenue streams for

brands. In traditional creator-fan relationships, creators often rely on intermediaries such as advertising networks, sponsorships, or platform revenue-sharing models to monetize their content and engage with their audience. These intermediaries can take a significant cut of the revenue generated by the creator, limiting their earning potential and creative freedom. Social and fan tokens allow creators to establish a direct financial relationship with their fanbase, reducing their reliance on third party platforms.

Social and fan tokens create the opportunity for a more direct and interactive dialogue between creators and their fans, which could lead to a stronger sense of community and shared identity. One of the key ways social and fan tokens can be used to enhance community engagement is through token-gated access to exclusive content, events, or experiences. For example, creators can use their tokens to offer one-on-one interactions, such as virtual meet-and-greets or personalized shoutouts, to their token holders. These exclusive experiences can deepen the emotional connection between the creator and their fans while creating a sense of exclusivity and value for token holders. Social and fan tokens can also be used to facilitate fan participation in the creative process itself. Creators can use these tokens to gather feedback, ideas, or contributions from their fanbase, giving fans a say in the direction of the creator's work. For example, a musician could use their token to allow fans to vote on the setlist for an upcoming concert, or a writer could use their token to let fans decide on the plot direction for their next book. This level of fan involvement creates a sense of shared ownership and investment in the creator's success.

Another way social and fan tokens can enhance community engagement is through the creation of token-based reward systems. Creators can incentivize desired behaviors or contributions within their community by rewarding fans with tokens for actions such as sharing content, participating in discussions, or creating fan art. These reward systems can create a more interactive community experience, where fans are motivated to contribute and engage with each other. Social and fan tokens can also be used to create decentralized autonomous organizations (DAOs) around a creator or brand, giving fans a formal say in the governance and decision-making of the community. Holding tokens then enables fans to propose and vote on initiatives, partnerships, or projects, giving them a voice and ensuring the community aligns with the collective interests and values of the group. Moreover, this alignment of interests between creators, brands, and fans could enable a more symbiotic relationship. As fans hold tokens that represent a stake in the success of their favorite entities, they are more likely to actively promote and support them, driving increased engagement and revenue. This alignment of incentives can create a virtuous cycle, where the success of the creator or brand directly benefits the fans, and vice versa. Several projects have emerged that leverage social and fan tokens.

One notable example is Socios, a blockchain-based sports app that allows fans to buy, trade, and earn rewards with fan tokens from their favorite sports teams. Socios enables fans to access exclusive content, participate in team-related decision-making processes, and gain VIP experiences. The platform has established partnerships with numerous high-profile soccer clubs, such as Juventus, Inter Milan, FC Barcelona, and Arsenal, as well as teams from various other sports, including 13 NFL franchises. Another prominent project in the space is Roll, a platform that allows creators to mint their own branded social tokens. In addition, Roll has introduced various tools, such as Roll Memberships, which enables creators to set up on-chain membership tiers, and Roll Staking, which allows creators to reward their most loyal fans through staking mechanisms. Friends With Benefits (FWB) is a decentralized social club that uses its own token ($FWB) to gate access to an exclusive community of artists, creators, and crypto enthusiasts. FWB offers token holders access to private chat rooms, offline events, and governance rights, creating a unique blend of online and offline experiences. The group has attracted high-profile members and has been valued at $100 million (more details on venture funding will be provided below), showcasing the potential for tokenized social clubs to create valuable communities.

Another innovative project in this space is time.fun, a platform that allows creators to tokenize their time in minutes and let fans trade and redeem time with them. Creators can create a time experience on a bonding curve, allowing people to buy and sell minutes of their time. As creators provide more value to their fans, the value of their time should naturally increase due to market demand. Fans can redeem minutes for one-on-one experiences like meetings or direct messages. The platform also supports token-gated Telegram groups, where the time.fun bot manages invites and removals based on token ownership. Creators earn ETH from trading fees and redemptions when people trade their time tokens. Part of these fees also goes toward a timeholder fund that creators can use for initiatives like gifting ETH to loyal fans or hosting giveaways. The time.fun contract is designed to be extendable, with plans for more products to be built using tokenized minutes as the base currency.

SUBSCRIPTION AND MEMBERSHIP PRODUCTS

Subscription and membership models have been foundational elements of the digital economy for years,

providing businesses with a reliable revenue stream and users with access to exclusive content and services. However, these traditional models have several limitations. One significant issue is the lack of ownership and control for users. In most cases, users do not own their subscription data or digital assets, which limits their ability to monetize or transfer these assets independently. This lack of ownership can be particularly problematic for creators who rely on these platforms to build their audience and generate income, as they are often at the mercy of the platform's terms and conditions. Additionally, traditional models often rely on centralized authorities to manage user identities and access rights, creating single points of failure and leaving users vulnerable to data breaches and privacy violations. The siloed nature of these platforms can also make it difficult for users to manage multiple subscriptions or memberships across different services, leading to a fragmented and inconvenient user experience.

Integrating Web3 elements into subscription and membership products can address many of the shortcomings of traditional models. Smart contracts can automate the management of subscription and membership agreements, reducing the need for intermediaries and providing a more efficient way to handle payments and access rights. Additionally, Web3 solutions can enable greater interoperability between different platforms and services, allowing users to easily manage and transfer their subscriptions and memberships across multiple providers. Enhanced security through decentralized identity management can also mitigate the risks of data breaches and privacy violations. On-chain technology can facilitate transparent pricing, billing, and user-controlled data, offering a more user-centric approach to digital memberships. Additionally, the ability to own your subscription rights, often through an NFT, adds tangible value to the user. This ownership aspect also helps to align incentives and create mutually beneficial relationships between platforms, creators, and users.

Several projects are already leveraging on-chain technologies to support subscription and membership products. Unlock Protocol is a decentralized protocol that enables creators to easily monetize their content and services through customizable NFT-based memberships. By using Unlock, creators can offer exclusive access to their content, communities, and experiences, while retaining control over their subscription terms and pricing. Unlock Protocol has formed partnerships with other web3 projects, such as Livepeer and Zora, to expand the functionality of their platform. These collaborations enable creators to integrate video streaming and NFT minting capabilities into their Unlock-powered membership offerings. Similarly, Access Protocol (see disclaimer) is a blockchain-based solution that provides a universal identity and access management system for subscription and membership services. With Access, users can create a single, secure identity that can be used across multiple platforms and services, streamlining the subscription and membership process, and reducing the risk of data breaches. Other notable products in this space include PoolSuite, a Web3 membership platform that combines NFTs with real-world perks and experiences, and Guild, a decentralized autonomous organization (DAO) tooling and infrastructure provider that enables communities to easily create and manage their own membership-based organizations on the blockchain.

VENTURE FUNDING AND USER GROWTH

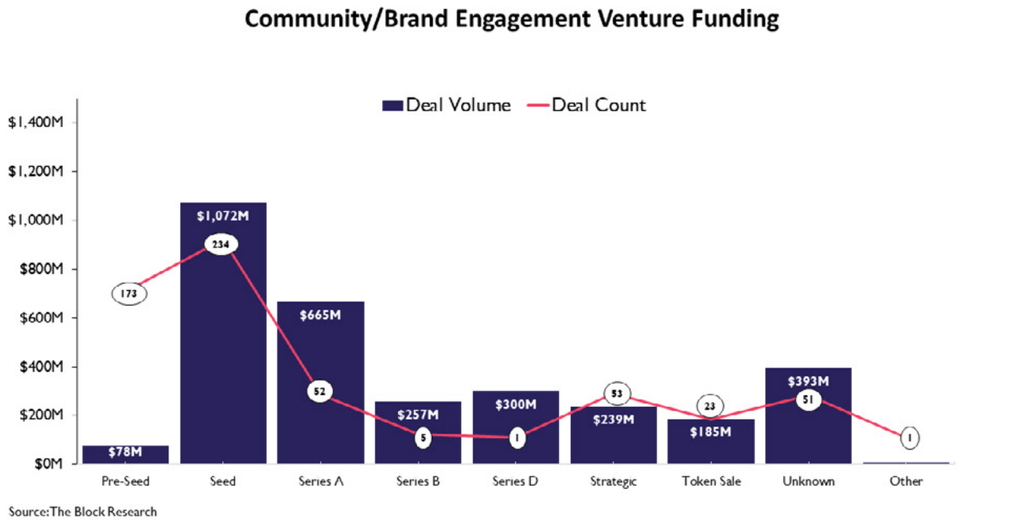
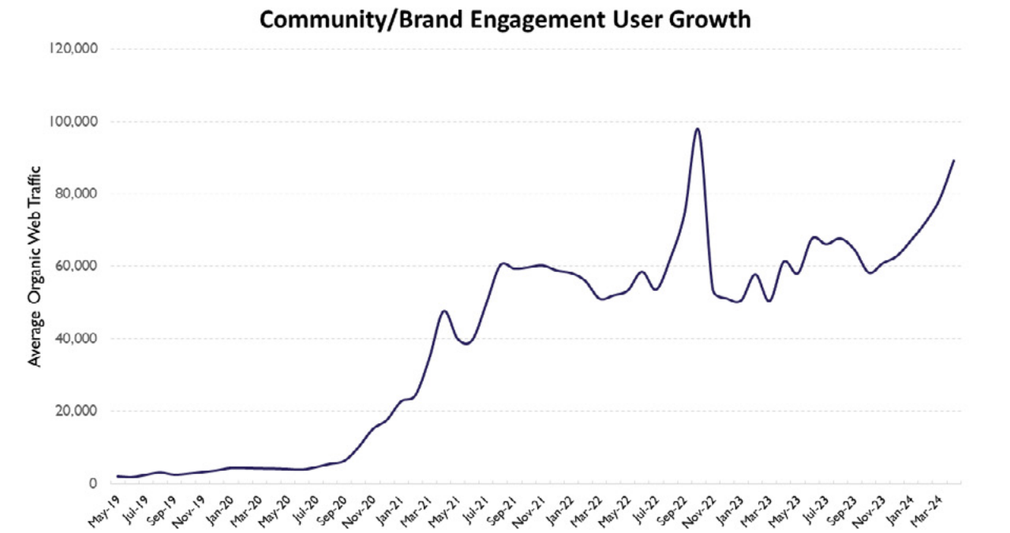


Figure 2.3

THE BLOCK PRO · RESEARCH

Based on data gathered from The Block's deals dashboard, the community and brand engagement subsector has raised roughly $3.2 billion across 593 deals over the five years from 2019 to 2023. Figure 2.3 shows a concentration of funding in earlier stages. The series A, seed, and pre-seed stages together account for 57% of deal volume and 77% of deal count in the community and brand engagement subsector, a funding distribution typical of emerging industries.

This influx of capital has coincided with strong user activity growth. Figure 2.4 shows the average organic web traffic of the set of applications we've categorized under community and brand engagement in the application layer ecosystem map. Using monthly average organic web traffic as a proxy for user activity allows us to compare activity more easily across subsectors. For more information on the methodology used to estimate user activity, see Appendix 2.



Source:The Block Research

Figure 2.4

THE BLOCK PRO · RESEARCH

Together, these funding and user metrics paint a promising picture for the community and brand engagement subsector. The significant venture capital investment and the marked increase in user activity suggest that this space is expanding and could be poised for strong growth in the future. As more projects mature and refine their offerings, we can expect this corner of the consumer crypto landscape to play an increasingly important role in shaping the future of customer-brand interactions.

2.1.2: DECENTRALIZED SOCIAL

Figure 2.5

The Decentralized Social (DeSo) subsector encompasses blockchain-powered social networking applications that enable users to create, share, and exchange information and content with others in a decentralized manner. DeSo represents a shift in the way users interact, share content, and engage with online communities. By leveraging blockchain technology and cryptoeconomic primitives, DeSo applications aim to address the inherent limitations and centralization issues prevalent in traditional social media platforms. At its core, DeSo is characterized by its emphasis on censorship resistance, user control over data and content ownership, and the alignment of incentives through tokenization. With billions of users actively engaged on traditional social media platforms worldwide, there is a clear demand for social networking services. As the awareness of decentralized alternatives grows, DeSo could capture a portion of this market by offering more user control and addressing centralization issues.

DeSo applications introduce several key innovations that differentiate them from their centralized counterparts. At the heart of DeSo platforms lie self-sovereign user profiles, enabled by crypto wallets, which allow individuals to maintain portable and verifiable identities across multiple applications. This means that users can seamlessly navigate the DeSo ecosystem without the need to create separate accounts for each platform, while retaining ownership and control over their personal data and social graph. Furthermore, DeSo applications often incorporate native payment functionalities, such as tipping, crowdfunding, and token-based rewards, which open up new avenues for creator monetization and incentive alignment with users. By enabling direct, peer-to-peer transactions and eliminating the need for intermediaries, these platforms could allow creators to build deeper, more meaningful relationships with their audience and unlock new revenue streams beyond the limitations of traditional advertising models. DeSo platforms also unlock utility for users by providing them with greater control over their data, identity, and assets, enabling them to participate in the value they help create and benefit from the growth of the networks they contribute to. Moreover, the composability and interoperability of DeSo building blocks foster a dynamic ecosystem where developers can create innovative, cross-platform user experiences. Just

as DeFi has flourished through the "money lego" approach, DeSo's modular architecture allows developers to build upon existing primitives, such as social tokens, reputation systems, and decentralized storage, to create highly customized and interconnected applications. This helps to encourage the formation of healthy developer communities that collaborate and build off each other's successes.

The evolution of DeSo can be traced back to early protocols like Steemit, which pioneered the concept of blockchain-based social networking when it launched in March 2016. Built on the Steem blockchain and its native cryptocurrency STEEM, Steemit was designed as a decentralized blogging and social media platform that rewarded users for creating and curating content. The platform introduced an innovative reward system where users' upvotes and comments directly influenced the distribution of token rewards, aligning incentives between content creators and consumers. This early effort laid the groundwork for future iterations of on-chain social applications such as Farcaster, Lens Protocol and Friend.tech.

Farcaster leverages a unique architecture that combines an on-chain registry for securing user identities with an off-chain network of user-operated servers called “Hubs” for storing social data. This hybrid approach allows Farcaster to achieve a balance between security, efficiency, and real-time updates across the network. One of Farcaster's key innovations is the introduction of "Frames," which enables users to transform their posts into interactive applications, such as polls, galleries, and even NFT minting platforms. Frames have enhanced user engagement by allowing for more dynamic and interactive content.

Lens Protocol is a decentralized social graph built on the Polygon blockchain that utilizes ProfileNFTs as users' identities, allowing them to own their content and engage with the network through customizable modules like "follow," "collect," and "reference." These ProfileNFTs are unique non-fungible tokens that represent a user's account within the Lens ecosystem. By minting a ProfileNFT, users gain control over their profile and can interact with the protocol, publish content, and connect with other users. One of the key features of Lens Protocol is its modular architecture, which enables developers to create custom user experiences and monetization strategies. The "follow" module allows users to create FollowNFTs when they follow another profile, signifying a connection between the two users. The "collect" module enables users to save and collect posts they appreciate by minting CollectNFTs, which can be customized to require payment or other conditions. The "reference" module is used when users comment on or mirror (similar to retweeting) another user's post, creating a ReferenceNFT that links to the original content. This modular approach makes Lens Protocol highly adaptable and composable, allowing developers to build a wide range of applications on top of the protocol. These applications can leverage the social graph and interact with ProfileNFTs, FollowNFTs, CollectNFTs, and ReferenceNFTs to create new user experiences and monetization opportunities.

Friend.tech has introduced a unique model that allows users to monetize their social connections and exclusive content. The platform's core mechanic revolves around users buying and selling "keys" that are linked to Twitter (now X) accounts. By purchasing a user's keys, individuals gain access to that user's private in-app chatrooms and exclusive content, creating a direct monetary relationship between creators and their audience. Friend.tech's key pricing model is based on a bonding curve, meaning that as more users buy a creator's keys, the price increases, benefiting both the creator through higher fees and early adopters who can sell their appreciated keys for a profit. This approach sets Friend.tech apart from traditional social media platforms, as it enables users to directly invest in and benefit from the popularity of their favorite creators, while also providing creators with a new way to monetize their content and engage with their most dedicated fans.

VENTURE FUNDING AND USER GROWTH

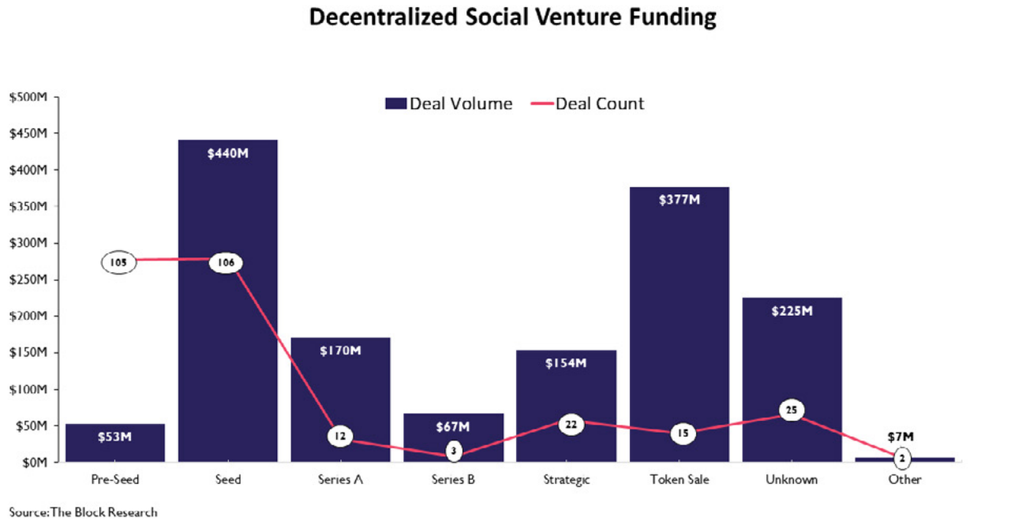
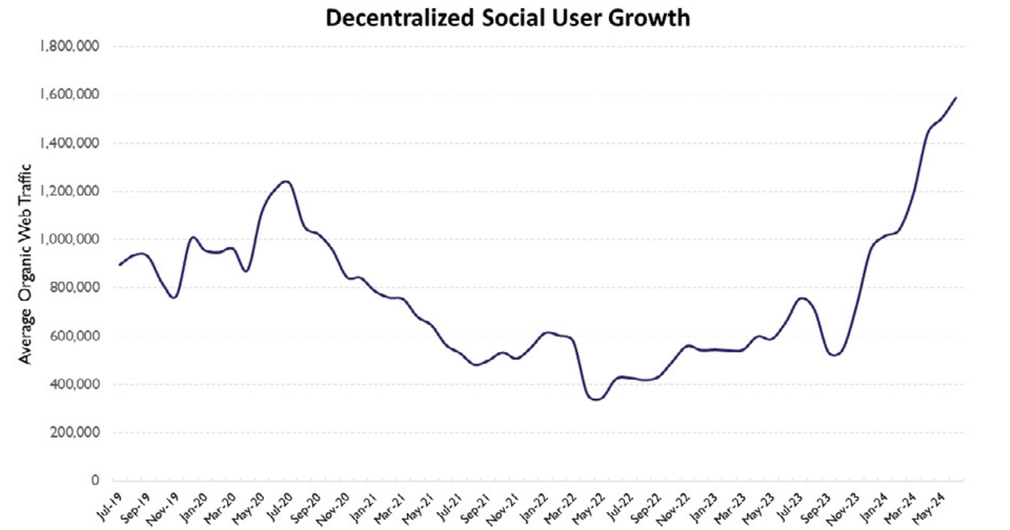


Figure 2.6

THE BLOCK PRO · RESEARCH

Based on data gathered from The Block's deals dashboard, the decentralized social subsector has raised roughly $1.5 billion across 290 deals over the five years from 2019 to 2023. Figure 2.6 illustrates that the top three funding rounds by deal volume in the DeSo subsector are Seed, Token Sale, and Series A, collectively accounting for nearly two-thirds of the total funding. It's worth noting that the token sale deal volume is proportionately higher than other subsectors, largely due to a $200M private token sale by 'DeSo' blockchain in September of 2021.

The adoption and growth of the DeSo subsector has been characterized by cyclical narratives and user acquisition strategies. Applications like Friend.tech and Farcaster have driven significant user activity and transaction volume, often aided by tokenization and financial incentives. While the sustainability of these growth cycles remains a challenge for most DeSo platforms, a few, such as Farcaster, have demonstrated signs of achieving sustainable growth. This user retention challenge is evidenced by Figure 2.7, which highlights periods of declining user activity despite an overall upward trend.



Source: The Block Research

Figure 2.7

THE BLOCK PRO · RESEARCH

The substantial funding raised by prominent projects, coupled with the growth in user adoption, indicates that decentralized social networks are gaining traction and recognition within the broader Web3 ecosystem. As these platforms continue to innovate and address the challenges associated with centralized social media, they are well-positioned to attract a larger user base seeking alternatives to traditional social networks.

2.1.3: GAMING

Figure 2.8

The traditional gaming industry has experienced tremendous growth over the past few decades, evolving into a global entertainment medium that attracts millions of players worldwide. With a market size exceeding $200 billion in 2022 according to a PwC report and a diverse array of genres, platforms, and experiences, gaming has become an integral part of modern culture. Conventional video games have made steady progress in storytelling, visuals, and interaction, offering enjoyable experiences for gamers. Despite these positive developments, the gaming industry has long been dominated by centralized platforms and publishers, which has led to several issues that can negatively impact players' experiences. Traditional gaming models often restrict players' ability to truly own, trade, or monetize their virtual items, leaving them at the mercy of the game developers' decisions. This lack of genuine ownership means that players' in-game assets and progress are vulnerable to server shutdowns or discontinuation, potentially resulting in the loss of countless hours of gameplay and investment. Furthermore, the siloed nature of traditional gaming ecosystems limits interoperability, preventing players from transferring their hard-earned assets and achievements across different games or platforms.

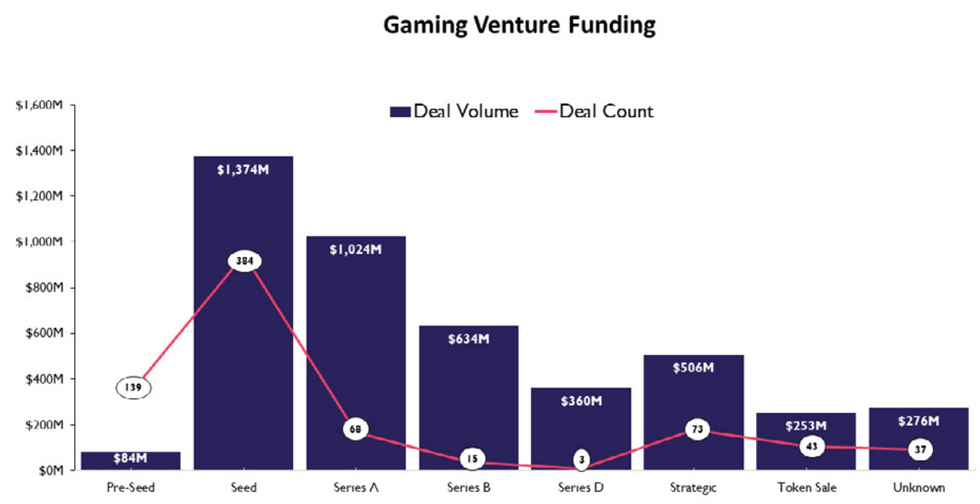
The emergence of on-chain gaming is set to complement and improve the traditional gaming industry by leveraging blockchain technology to redefine the relationship between players, developers, and in-game assets. By representing in-game items as non-fungible tokens (NFTs) on the blockchain, on-chain games create unique, player-driven economies where users can genuinely own, sell, and trade their digital assets. This approach addresses the limitations of traditional gaming models, where centralized entities control all aspects of the game, including assets, rules, and data, leaving players with little to no control over their virtual property. In contrast, on-chain games offer true ownership of digital assets, as NFTs are secured

on the blockchain and can be freely traded or sold by players, giving them a greater stake in the game's economy and direction. Moreover, the open-source nature of on-chain games enables permissionless innovation, allowing developers to create mods (modifications to the original game), plugins, and custom game modes that can interoperate with the main game.

Several on-chain games showcase the unique potential of this subsector. Dark Forest, one of the earliest fully on-chain games, combines space exploration and conquest with cryptographic technologies like zk-SNARKs to enable hidden information and strategic gameplay. By leveraging the transparency and immutability of the blockchain, Dark Forest creates a trustless environment where players can engage in complex, multi-layered strategies without the need for centralized authority. The use of zk-SNARKs allows players to explore the universe and make moves without revealing their coordinates, adding an element of secrecy and strategy to the game. Sorare, another on-chain game, combines fantasy sports with NFT collectibles. Built on the Ethereum blockchain, Sorare allows users to collect, trade, and manage virtual sports teams using NFT player cards. These cards represent real-world players, and their performance in the game is based on their actual performance in real-life matches. Influence, a space strategy MMO built on the Starknet blockchain using the Dojo engine (covered in section 2.3), offers a unique blend of game theory and on-chain logic. Set in a procedurally generated asteroid belt, players compete through mining, building, trading, researching, and fighting. The game's economy is entirely on-chain, with all in-game assets represented as tokens. This allows players to trade game assets in-game or on secondary markets. Pixels, a blockchain-based farming and social game built on the Ronin network, allows players to farm crops, craft items, and interact with other players in a shared world. The game's economy is driven by the PIXEL token, which can be earned through gameplay and used to purchase in-game items or traded on exchanges.

Autonomous worlds represent a newer and more ambitious category within the on-chain gaming landscape. Autonomous worlds are virtual environments created with a primary focus on gaming experiences. These user-generated environments allow players to create, own, and monetize their content and experiences. By leveraging the composability and interoperability of on-chain assets and smart contracts, autonomous worlds aim to create vast, interconnected ecosystems that support gaming, social interaction, and economic activity. Realms Eternum, which launched in August of 2021, exemplifies this concept by aiming to create a player-driven universe where users can own land, create and trade NFTs, and participate in governance decisions that shape this world's future. Another notable example is Decentraland, a decentralized virtual reality platform where players can buy, develop, and monetize virtual land, creating immersive experiences and economies. As the on-chain gaming industry matures, autonomous worlds are set to expand the possibilities of user-generated content, player ownership, and decentralized governance.

VENTURE FUNDING AND USER GROWTH



Source: The Block Research

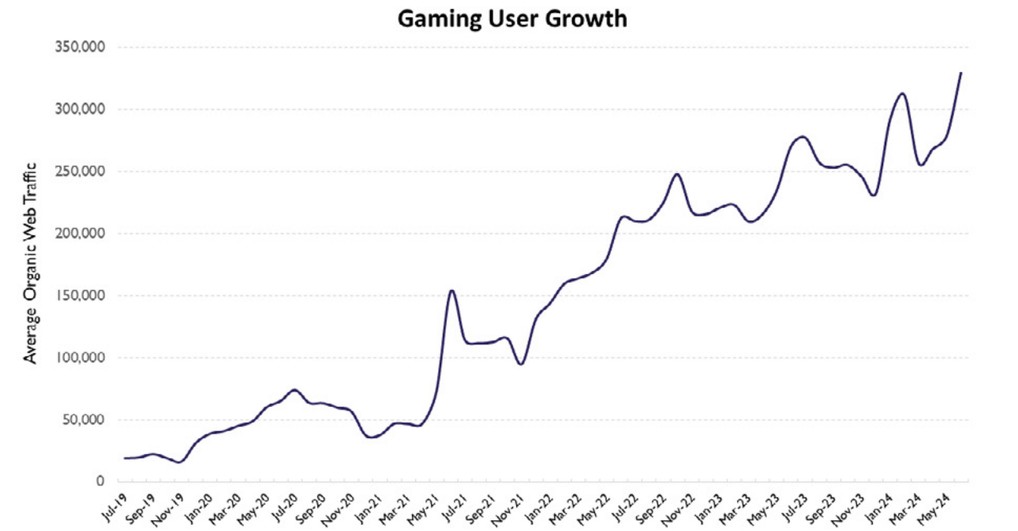
Figure 2.9

THE BLOCK PRO · RESEARCH

Based on data gathered from The Block's deals dashboard, the on-chain gaming subsector has raised roughly $4.5 billion across 762 deals over the five years from 2019 to 2023. Figure 2.9 shows a clear concentration of funding in the Seed and Series A stages, which collectively account for 53% of deal volume and 59% of deal count. Additionally, there is a relatively higher level of funding in later stages compared to other subsectors. This higher level of funding reflects the growing maturity of the on-chain gaming space, as well as the increased confidence among investors in the long-term potential of this subsector.

The presence of larger, later-stage deals suggests that some projects have successfully demonstrated product-market fit and are now scaling up their operations to capture a larger share of the market.

The surge in investment over the five years from 2019 to 2023 has been accompanied by a notable increase in user activity within the on-chain gaming space. Figure 2.10 shows that on-chain games have experienced a particularly steep upward trajectory in user activity compared to other subsectors, suggesting that this nascent industry is gaining significant traction. Additionally, the rise in user activity has remained fairly steady, suggesting that these applications may have higher user retention relative to other consumer crypto subsectors.



Source: The Block Research

Figure 2.10

THE BLOCK PRO · RESEARCH

The strong level of venture capital investment and the rise in user activity suggest the on-chain gaming space has the potential for sustained growth. This subsector could be particularly well-positioned to benefit from a positive flywheel effect in which higher user activity promotes increased funding which in turn attracts more game developers. This influx of talent leads to the creation of higher-quality games, further driving user engagement and growth. The positive momentum already generated in this cycle of growth and investment positions the on-chain gaming subsector to become a significant contributor to the future of the gaming industry.

2.1.4: MEDIA

Figure 2.11

The on-chain media subsector comprises applications that are transforming how content is created, authenticated, and distributed by leveraging blockchain technology. Traditional media, encompassing art, podcasts, music, video, blogs, and articles, has long been subject to limitations and constraints imposed by centralized platforms and intermediaries. These centralized entities often control the distribution channels, dictate the terms of monetization, and retain a significant portion of the revenue generated by content creators. Furthermore, traditional media's reliance on advertising revenue can lead to a misalignment of incentives between creators and their audience.

On-chain media applications utilize the immutable and transparent nature of blockchain technology to authenticate and establish ownership of digital content. By representing media assets as NFTs or other blockchain-based tokens, creators can prove their authorship and maintain control over the distribution and monetization of their work. Smart contracts enable automated royalty payments, ensuring that creators receive a fair share of the revenue each time their content is consumed or resold. Furthermore, on-chain media platforms often prioritize direct engagement between creators and their audience, eliminating the need for intermediaries and enabling more efficient value transfer. This direct relationship creates a sense of community and allows creators to build sustainable careers based on the support of their dedicated followers.

Several protocols and applications have emerged within the on-chain media subsector, each addressing specific aspects of content creation and distribution. For example, story protocol changes the management and monetization of intellectual property (IP) by providing a standardized system for registering, tracking, and licensing IP assets. Story Protocol consists of data structures ("IP legos") that record the provenance and attribution of IP, and modules that enable functionalities such as programmable licensing. This system

promotes collaboration, remixing, and fair compensation for creators while ensuring the authenticity and ownership of IP without relying on intermediaries.

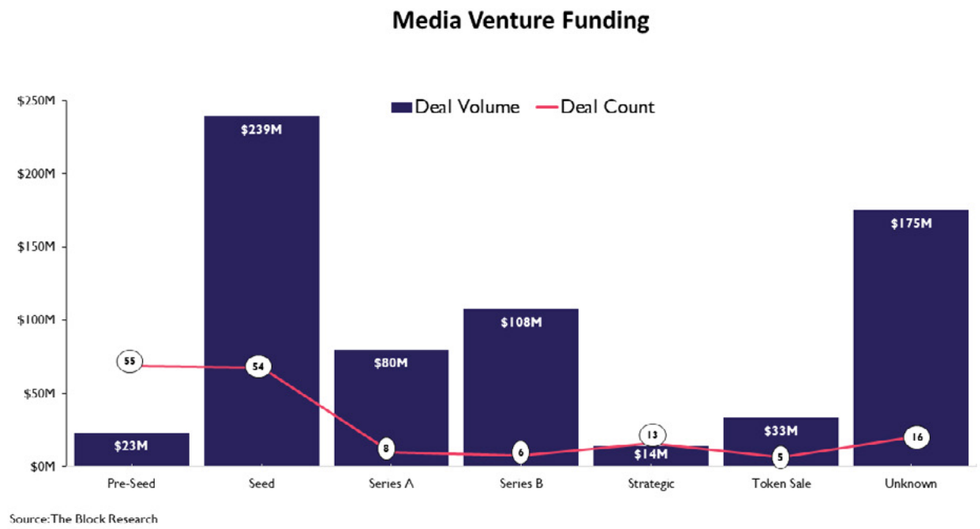
Sound aims to help musicians monetize their work and break away from the economics of streaming platforms. Sound enables artists to release their tracks as NFTs and engage directly with their fanbase. The platform aims to address the issues of discoverability and fair compensation by allowing artists to launch listening parties for new releases, where fans can purchase limited edition NFTs of the song. These NFTs grant fans unique benefits, such as the ability to leave a public comment on the song and access exclusive communities on Discord. Sound's "golden egg" feature adds an element of gamification, rewarding one lucky fan with a unique 1/1 edition of the song. Through its Sound Studio feature, the platform enables artists to mint high-quality NFTs while retaining 100% of the proceeds and earning a 10% share of every resale, without giving up ownership of their master or publishing rights.

Zora has established itself as a leading general-purpose protocol for creating, minting, and trading various types of media NFTs. Originally launched as a fashion-focused platform with its own token (FAME) in 2020, Zora has since expanded its scope to encompass art, music, and video. In August 2023, Zora introduced the Protocol Rewards system, which dynamically adjusts minting fees and gives artists the majority of the revenue, generating over 42.6 ETH in referral fees across 358,000 mints in less than three months. To address scalability concerns, Zora launched its own Layer 2 network in June 2023, reducing operational costs and incentivizing on-chain media creation. Within four months, the network has processed over 9.1 million transactions and witnessed 3,864 ETH bridged.

VENTURE FUNDING AND USER GROWTH

Based on data gathered from The Block's deals dashboard, the decentralized social subsector has raised roughly $672 million across 157 deals over the five years from 2019 to 2023. Figure 2.12 shows a concentration of funding in earlier stages. The series A, seed, and pre-seed stages account for 51% of deal volume and 75% of deal count. Over 80% of the Series B deals occurred in 2021 or later, indicating the sector's growing maturity as projects advance beyond initial funding stages.

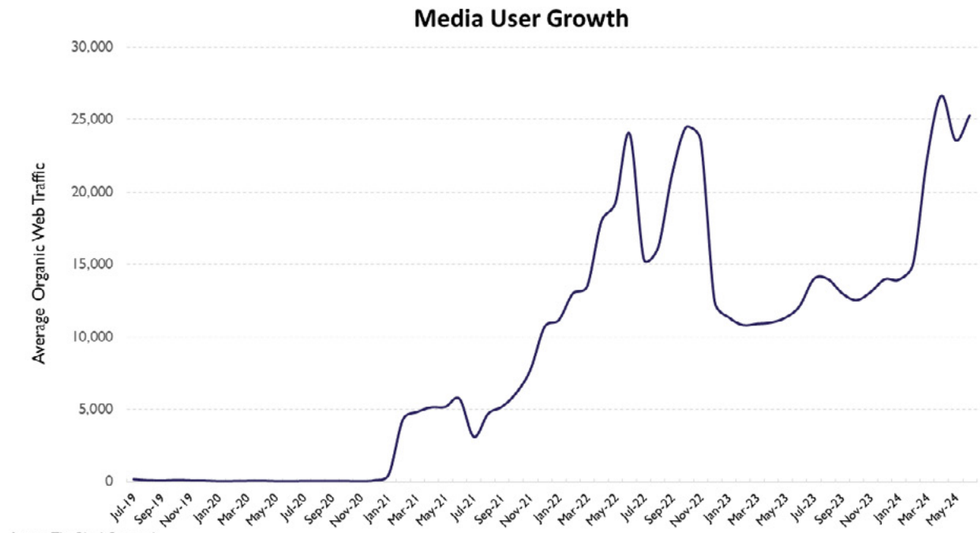
User growth in the on-chain media subsector has shown a steady upward trend since early 2021, with several notable spikes in average organic web traffic, as shown in figure 2.13. This consistent increase indicates a growing interest and engagement in decentralized media platforms. Despite occasional fluctuations, the overall trend remains positive, suggesting that this subsector is gradually gaining traction.



Source: The Block Research

Figure 2.12

THE BLOCK PRO · RESEARCH



Source: The Block Research
Note: Mirror was excluded due to its disproportionate traffic skewing the overall trend
Figure 2.13

THE BLOCK PRO · RESEARCH

The observed trends in funding and user metrics underscore the potential of the decentralized media subsector. With substantial venture capital investment and rising user engagement, the sector shows clear signs of growth and development. As more projects reach maturity and enhance their offerings, decentralized media platforms are set to influence the future of media consumption and distribution.

2.1.5: MESSAGING

On-chain messaging introduces a decentralized alternative to traditional messaging applications like WhatsApp, Telegram, and Signal. Traditional messaging protocols rely heavily on centralized infrastructure to store and manage user messages. This centralized approach has several drawbacks. Firstly, it makes user data vulnerable to breaches and unauthorized access, as centralized servers are common targets for hackers. Secondly, users lack control over their own data, as it is stored and managed by the service providers. This can lead to privacy concerns, as companies may have access to and potentially misuse personal information. Additionally, centralized platforms are susceptible to censorship, as governments or other entities can pressure providers to restrict or monitor communications. Lastly, the need for users to create separate accounts and profiles for each application leads to a fragmented and inefficient communication experience, complicating user interactions across different platforms.

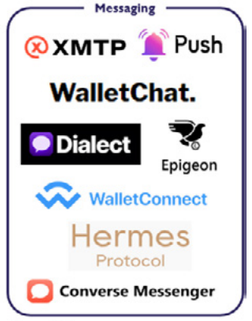


Figure 2.14

On-chain messaging protocols aim to address the limitations of centralized messaging platforms. In on-chain messaging, communication occurs directly between wallet addresses, eliminating the need for centralized intermediaries. When a user sends a message, it is often encrypted and stored on a decentralized network, such as IPFS or a blockchain, rather than on a centralized server. This decentralized approach ensures that no single entity has control over the data, reducing the risk of breaches, unauthorized access, and potential misuse of personal information. Additionally, on-chain messaging protocols often employ end-to-end encryption, ensuring that only the intended recipients can decrypt and read the messages. This encryption is typically performed using the recipient's public key, which is derived from their wallet address. As a result, even if the messages are stored on a public blockchain or decentralized storage solution, they remain private and secure. The use of wallet addresses as a unified identity across different applications is another key advantage of on-chain messaging. Users can communicate seamlessly across various platforms without the need to create separate accounts or profiles for each application. This not only simplifies user interactions but also reduces the risk of censorship, as there is no central authority that can restrict or monitor communications.

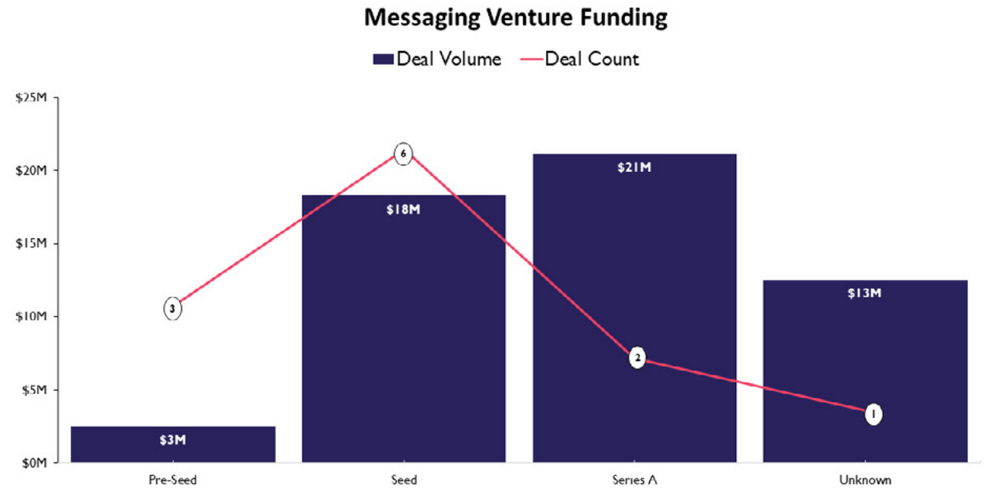
Several on-chain messaging protocols have been introduced, showcasing the potential of decentralized communication solutions. XMTP (Extensible Message Transport Protocol) is a decentralized messaging protocol that enables secure, private, and interoperable communication between wallet addresses across different blockchains. By leveraging a three-layered architecture consisting of a peer-to-peer network, client API, and application layer, XMTP empowers developers to easily integrate messaging functionality into their applications. The protocol utilizes a topic-based system to organize and store messages, ensuring privacy and efficiency. XMTP's partnerships with prominent Web3 projects, such as Coinbase Wallet, Lens Protocol, and Unstoppable Domains, have led to its adoption by over 1.9 million Web3 identities as of May 2023.

Push Protocol is a decentralized communication middleware that allows smart contracts and dApps to send push notifications directly to users' wallets, providing a secure, spam-resistant, and censorship-resistant alternative to traditional centralized notification systems. By enabling users to subscribe to notification channels using their blockchain addresses, Push Protocol enhances privacy and reduces the risk of hacks and phishing attacks. Channel owners can send notifications in various formats, which can be stored on-chain or off-chain using IPFS. The protocol integrates with popular wallets like MetaMask, allowing users to receive notifications without installing a separate app. Push Nodes, operated by the protocol's developers, validate and deliver notifications to subscribers.

Dialect, an on-chain messaging protocol built on Solana, introduced the concept of smart messages in which a user can transform plain text into interactive media. For example, users can share minted NFTs within the messaging app, with the plain text transforming into a preview of the artwork. Recipients can then view and interact with the NFT directly within the conversation, initiating bids or purchases without leaving the app. Dialect plans to add further functionality including the ability to auction NFTs and tip

within the app. One of Dialect's most innovative features is its use of compressed NFTs, made possible by Solana's state compression technology. By dramatically lowering minting costs, Dialect enables users to share NFT stickers on a mass scale. Dialect has already gained significant traction through collaborations with various Solana-based projects, having minted and distributed over 1.5 million NFT stickers across communities such as Monke DAO, Okay Bears, and Four Six.

VENTURE FUNDING AND USER GROWTH

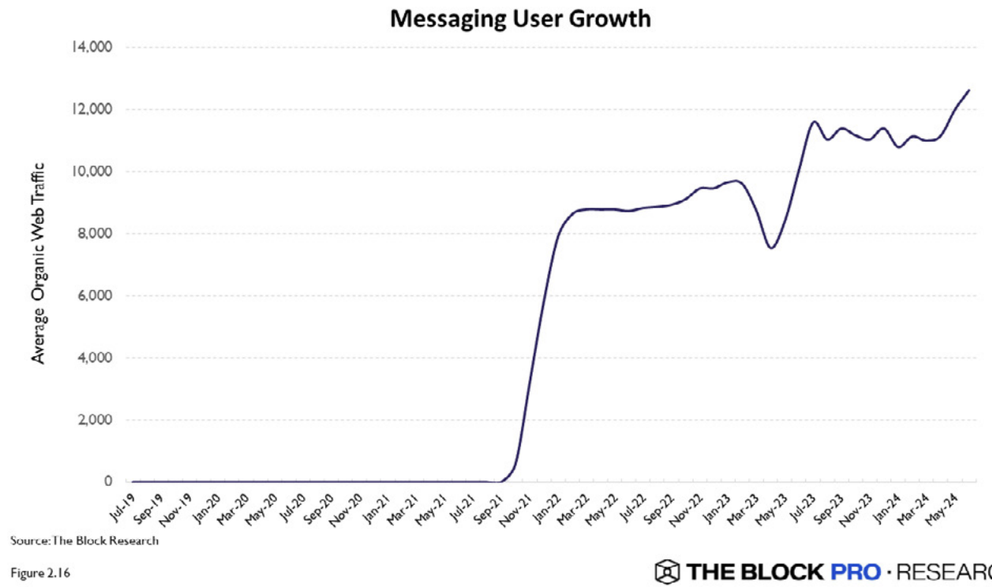


Source: The Block Research

Figure 2.15

THE BLOCK PRO · RESEARCH

Based on data gathered from The Block's deals dashboard, the on-chain messaging subsector has raised roughly $54 million across 12 deals over the five years from 2019 to 2023. Figure 2.15 illustrates that all categorized funding occurred in Series A or earlier stages. This pattern likely reflects the absence of a breakout application demonstrating high levels of user growth and concrete revenue generation, which would typically attract later-stage investment. The early-stage focus suggests that while there is interest and potential in the on-chain messaging space, it is still in a nascent phase, with many projects working towards achieving meaningful adoption.



Source: The Block Research

Figure 2.16

THE BLOCK PRO · RESEARCH

Although aggregate user activity in the on-chain messaging subsector lags behind that of other subsectors, the trend is positive. Since late November 2021, user activity has shown steady growth, even in the face of comparatively lower levels of venture capital funding, as shown in figure 2.16. This consistent increase in user engagement indicates a growing interest in on-chain messaging platforms, suggesting potential for future expansion as the technology and market mature.

While funding and user activity for on-chain messaging protocols remain relatively small in absolute terms, both metrics have shown meaningful growth over time, indicating a positive trajectory. Venture funding for these protocols increased from $0.75 million in deal volume in 2020 to $1.91 million in 2021, and then surged to $51.70 million in 2022. This upward trend in investment coincided with increases in user activity. The growth in funding and user activity highlights growing awareness and confidence in the potential of on-chain messaging platforms.

2.2: BLOCKCHAIN-NATIVE CONSUMER CRYPTO INFRASTRUCTURE LAYER

After exploring the various subsectors within the consumer crypto application layer, it's crucial to understand the underlying infrastructure that enables and supports these applications. The relationship between apps and infrastructure in the crypto space is a dynamic and symbiotic one, characterized by the 'apps-infrastructure cycle', a pattern identified by Dani Grant and Nick Grossman in The Myth of The Infrastructure Phase.

The apps-infrastructure cycle suggests that apps inspire infrastructure, which in turn inspires new apps. This pattern has been evident throughout the evolution of crypto, from the creation of Bitcoin and the subsequent emergence of wallets and exchanges to the introduction of Ethereum and the rise of decentralized finance (DeFi) and non-fungible tokens (NFTs). The cyclical relationship between apps and infrastructure also helped drive the evolution of web2. For example, the emergence of social media platforms like Facebook, Twitter, and Instagram in the late 2000s and early 2010s led to a massive increase in user-generated content and data. To handle this growing demand, cloud computing infrastructure providers such as Amazon Web Services (AWS), Microsoft Azure, and Google Cloud Platform (GCP) emerged, offering scalable storage, computing, and networking solutions. The availability of cloud infrastructure enabled the development of new social media apps with more advanced features, such as real-time video streaming (Facebook Live), ephemeral content (Instagram Stories), and live audio rooms (X Spaces).

Today, we are witnessing the emergence of a robust infrastructure stack designed to support the next generation of consumer crypto applications. This stack includes low-fee blockchains that enable fast and inexpensive transactions, embedded wallets that simplify user onboarding and management of digital assets, on-and-off ramps that facilitate conversion between fiat and crypto, and identity protocols that enable portable and interoperable user profiles across different platforms.

These infrastructure components are crucial in addressing the limitations and pain points (discussed in Section 3.1) that have hindered the widespread adoption of consumer crypto applications in the past, such as slow processing times, high transaction fees, complex user interfaces, and fragmented user experiences. By providing a more seamless, user-friendly, and interconnected foundation, the current infrastructure stack is paving the way for a new wave of consumer crypto applications that can attract a broader, mainstream audience. As new consumer crypto applications emerge and gain traction, they will

likely inspire further innovation and development at the infrastructure level, creating a mutually reinforcing loop.

In the following, we will take a closer look at the key components of the consumer crypto infrastructure stack, examining how they are evolving to support the growth and development of the application layer. By understanding the interplay between apps and infrastructure, we can gain valuable insights into the future trajectory of the consumer crypto landscape in Section 3.

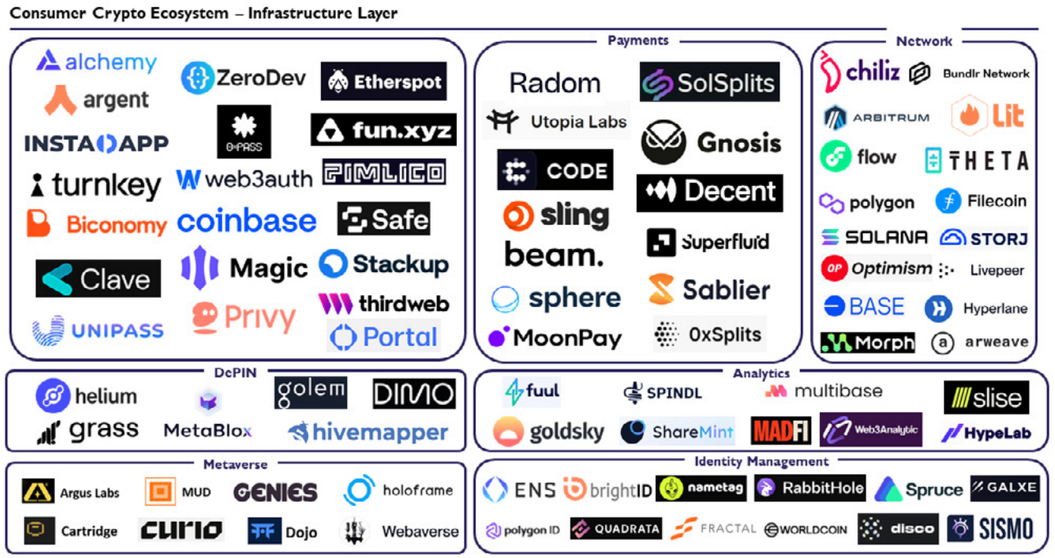


Figure 2.17

2.2.1: WALLETS

Wallets serve as the essential gateway for users to interact with decentralized applications and manage users' digital assets. A cryptocurrency wallet is a software program that allows users to store, send, and receive digital currencies, as well as interact with blockchain networks. The first iteration of wallet solutions included complex onboarding processes, the need for users to

Figure 2.18

manage private keys, and clunky user interfaces. Given its importance, enhancing the user experience of wallets has been a key priority in driving mainstream adoption of on-chain products. This is where innovations like account abstraction and embedded wallets come into play, aiming to streamline the user experience and lower the barriers to entry for consumers.

> *"[One] thing that I'm really excited about and I think we need to solve is building better wallet experiences that just work for everyday people."*
> – Jesse Pollak, Base

Account abstraction is a concept that seeks to improve the programmability and flexibility of user accounts on blockchain networks. Instead of relying solely on externally owned accounts (EOAs) controlled by private keys, account abstraction enables the creation of smart contract wallets that can be programmed with custom logic and security features. This allows for more user-friendly onboarding experiences, such as using email or social media logins, as well as advanced functionalities like social recovery, gas fee sponsorship, and multi-signature transactions. By abstracting away the complexities of private key management and providing improved user experiences, account abstraction has the potential to significantly enhance the adoption of consumer crypto applications. On Ethereum the ERC-4337 standard was introduced in March of 2023 to standardize the creation and usage of smart contract wallets. Many wallet solutions are now incorporating this new standard into their products. Thirdweb's Wallet-as-a-Service offering, for example, leverages ERC-4337 to provide developers with a comprehensive toolkit for building user-friendly wallets with features like instant onboarding, gasless transactions, and bring-your-own auth which allows users to authenticate using their existing credentials from third-party identity providers instead of creating new accounts for each service. Similar account abstraction initiatives and standards are being explored and implemented on other blockchains.

Embedded wallets and wallet-as-a-service (WaaS) solutions take this concept further by providing developers with easy-to-integrate wallet infrastructure that can be seamlessly incorporated into their applications. Embedded wallets are digital wallets that are built directly into applications, allowing users to manage their assets and interact with the blockchain without the need to switch between different apps or websites. On the other hand, WaaS refers to solutions that provide ready-made cryptocurrency wallet infrastructure for applications and platforms, enabling businesses to offer wallet services without the complexity of building and maintaining the underlying technology stack themselves. WaaS providers offer a range of wallet types, including custodial wallets, non-custodial wallets, smart wallets, and multi-signature wallets, catering to different use cases and user preferences. These solutions often include features like customizable user interfaces, gasless transactions, and enhanced security measures, allowing developers to focus on building their core products while leveraging a robust and user-friendly wallet infrastructure. For example, Privy's embedded wallet library supports an auth flow with familiar log-in methods, embedded wallets that are EVM-compatible and support all core wallet functions, integration with fiat on-ramps, gas sponsorship, and account abstraction. Privy's wallet-as-a-service has already been leveraged by many well-known on-chain platforms including Opensea, Blackbird, Zora, Friend.tech, and POAP.

2.2.2: PAYMENTS

On-chain payments infrastructure plays a vital role in the world of digital assets, serving two main functions: facilitating the on and off-ramping between traditional finance and cryptocurrencies, and enabling transactions within the web3 ecosystem itself. On and off ramping solutions allow users to convert fiat currencies into cryptocurrencies and vice versa, making it easier for individuals to enter and exit the crypto space. On-chain payments infrastructure streamlines the process of spending and managing cryptocurrencies for consumers, enhancing the utility of their on-chain funds.

Figure 2.19

Fiat on-ramps and off-ramps play an important role in the consumer crypto experience. On-ramps allow users to convert their fiat currencies into cryptocurrencies, providing an entry point into the crypto ecosystem. These on-ramps often integrate with traditional payment methods such as bank transfers, credit/debit cards, and popular payment platforms like PayPal or Venmo. By offering familiar and convenient payment options, on-ramps lower the barrier to entry for consumers interested in interacting on-chain. Off-ramps, on the other hand, enable users to convert their cryptocurrencies back into fiat currencies. They provide a means for users to realize the value of their digital assets and withdraw funds to their bank accounts or other traditional financial channels. Off-ramps are also crucial for merchants and businesses that accept cryptocurrency payments, as they allow them to convert the received crypto into fiat for operational expenses and financial reporting. MoonPay, for example, offers user-friendly on-ramp and off-ramp solutions that seamlessly integrate with websites and web3 applications, enabling users to

easily convert between fiat and crypto. The platform supports a wide range of payment methods, including credit/debit cards, bank transfers, and mobile payment options. By providing a customizable widget, pre-filling user information, and offering social sign-in options, these solutions are making it more convenient and accessible for users to enter and navigate the crypto ecosystem. However, despite these innovations in on-ramp and off-ramp services, centralized exchanges still serve as the main on and off ramps for retail users given their established infrastructure, liquidity, familiarity among consumers, and lower fees in some cases.

Payment applications and protocols in the crypto ecosystem offer a range of solutions that enhance the user experience by providing efficient, secure, and user-friendly ways to transfer and manage digital assets. These applications leverage blockchain technology to enable features such as near-instant settlement, low transaction costs, and global accessibility. For example, GnosisPay is a decentralized payment network that facilitates fast and secure transactions on the Gnosis Chain, offering features like gasless transactions and account abstraction for added convenience. Similarly, Solana Pay and SolSplits are built on the Solana blockchain, with Solana Pay enabling merchants to accept digital asset payments and SolSplits allowing for the splitting of payments among multiple recipients. Payment automation platforms like Sablier and Superfluid introduce new ways to manage and distribute funds, with Sablier enabling continuous, real-time payouts and Superfluid facilitating the creation of payment streams for subscriptions, salaries, and rewards. By providing a wide array of payment options and features, these applications cater to various use cases and user preferences, ultimately making digital asset transactions more accessible and user-friendly for both consumers and businesses operating on-chain.

2.2.3: NETWORK

The network subsector of the infrastructure layer refers to the underlying systems and protocols that enable the efficient and secure transfer of digital assets, execution of smart contracts, and storage of data. We've defined the subsector to encompass both blockchain layer networks and networks built atop existing consensus layers. This infrastructure forms the backbone of the crypto ecosystem, providing the foundation for decentralized applications and services to function. The first iterations of blockchain networks, such as Bitcoin and Ethereum, revolutionized the concept of decentralized

Figure 2.20

transactions and programmable money. However, these early networks faced challenges in terms of scalability, high transaction costs, and slow confirmation times, limiting their potential for large-scale adoption in consumer-facing applications.

The emergence of new blockchain networks, such as Solana, Base, and Flow, has brought significant improvements to the network infrastructure layer. These networks prioritize fast transaction speeds, low latency, and cost-effective operations, making them more suitable for consumer-oriented use cases. Solana, for example, leverages a consensus mechanism called Proof of History (PoH) to achieve high throughput and low transaction fees, enabling many on-chain consumer applications that otherwise wouldn't be possible. Base, a layer-2 blockchain, also combines low gas fees and fast transaction finality, creating a platform for developers focused on consumer products or services. Flow, designed by Dapper Labs, focuses on usability and onboarding, with a strong emphasis on gaming and digital collectibles, as demonstrated by the success of NBA Top Shot.

In addition to blockchain networks, other network infrastructure components play a crucial role in the consumer crypto landscape. Decentralized storage solutions like Filecoin provide secure and resilient data storage, ensuring the integrity and availability of user data and digital assets. Video streaming platforms such as Livepeer and Theta tackle the challenges of decentralized video delivery, enabling efficient and cost-effective video streaming for dApps and content creators. Interoperability protocols like Hyperlane facilitate communication and asset transfer between different blockchain networks, promoting a more connected ecosystem. These infrastructure projects address critical aspects of the consumer experience, including data management, content delivery, and cross-chain compatibility.

2.2.4: IDENTITY MANAGEMENT

Figure 2.21

The identity management subsector refers to systems and protocols that enable users to manage their digital identities in a decentralized, self-sovereign manner. These solutions aim to give users control over their personal data, allowing them to selectively share information with third parties while maintaining privacy and security. On-chain identity management solutions address the limitations of traditional centralized identity systems, which are often fragmented, insecure, and lack user control. For example, in a fully centralized ID model, an issuer such as a website or email service provides users with login credentials, which are used exclusively to access the issuer's platform. The issuer owns and controls the credentials, and users have no ownership over the IDs, meaning the issuer can revoke the user's credentials at any time. In a decentralized ID model, verifiable credentials are owned by the user and issued and stored on a decentralized ledger. The basic structure of a decentralized ID model includes a decentralized identifier (DID), with the most common example being a user's wallet address, which they own through their private key. Verifiable credentials, such as KYC/AML information, are then linked to the identifier, providing a way to authenticate and verify the user's identity. There are several types of on-chain identity solutions that cater to different consumer use cases and vary in structure and functionality.

Proof-of-personhood protocols are identity management solutions that aim to establish a one-to-one correspondence between a user and their digital identity. These protocols employ various methods to verify that a user is a unique individual, such as social graphs, biometric data, or physical world interactions. Bright ID, for example, uses a social graph-based approach where users vouch for each other's uniqueness, creating a network of trust. Worldcoin, on the other hand, utilizes biometric data obtained through a specialized device called the Orb, which scans users' irises to generate a unique identifier. Proof-of-personhood protocols are particularly useful in scenarios where Sybil resistance is crucial, such as decentralized governance, distributing airdrops, or preventing spam and manipulation on social media or online marketplaces.

Identity-specific blockchains are dedicated platforms designed to manage digital identities and provide a foundation for decentralized applications (dApps) that require secure and efficient identity management. Idena is a proof-of-person blockchain that ensures each user has only one account by employing a consensus mechanism called Proof-of-Person. Users participate in regular validation sessions where they solve CAPTCHA-like puzzles, proving their humanness and uniqueness. Ontology is another blockchain platform focused on digital identity and data management. It offers a suite of tools and protocols for creating, managing, and verifying decentralized identities, as well as facilitating data exchange and collaboration among multiple parties.

There are many other on-chain identity platforms that offer a comprehensive set of tools and standards for managing decentralized identities across various networks and applications. SpruceID is a notable example, working on an open-source stack that enables users to control their identity using Ethereum-based accounts. Their efforts include developing the Sign-in with Ethereum standard, which allows users to authenticate with dApps using their Ethereum wallet, providing a secure single-sign-on experience. Sismo, another identity platform, focuses on privacy-preserving identity management using zero-knowledge proofs. Their ZK Badges are a non-transferable NFT or 'soul-bound token' that represents identity claims without revealing sensitive information. Galxe is a collaborative credential infrastructure that enables brands and communities to create and issue digital credentials in the form of NFTs. These credentials can represent achievements, memberships, or other attributes, allowing users to build a verifiable on-chain reputation.

2.2.5: METAVERSE

The Metaverse, a term used to describe a collective virtual shared space, may likely be a crucial infrastructure component in the context of consumer crypto. It serves as a digital environment where users can interact with each other, digital assets, and decentralized applications in a more immersive and engaging manner. Metaverse platforms could offer a user-friendly and intuitive interface for consumers to access and interact with various on-chain products and services. Note that while we discussed autonomous worlds as part of the gaming subsector within the application layer, we place the broader concept of Metaverse in the infrastructure layer. Whereas autonomous worlds are specifically tailored for gaming use cases, the Metaverse serves as the foundational layer for a wide range of potential applications.

Figure 2.22

Metaverse platforms enable a broad spectrum of consumer use cases. One prominent example is virtual commerce, where users can buy, sell, and trade digital assets, such as virtual clothing, accessories, and even real estate. This creates new opportunities for brands and businesses to engage with consumers. The Metaverse may also reshape entertainment, allowing users to attend virtual concerts, movie premieres, and other live events from the comfort of their own homes. These experiences can be enhanced with features like customizable avatars, interactive elements, and immersive social interactions, making them more engaging than traditional online events. Moreover, Metaverse platforms facilitate community building by providing a shared virtual space where users can connect and collaborate. Users can participate in group activities, attend virtual meetups, and host their own events.

Several metaverse studios, platforms, and open-source frameworks are already contributing towards bringing these use cases to life. For example, MUD is an open-source framework that simplifies the development of on-chain applications by providing tools for automatic indexing, standardized storage, and seamless client synchronization. This reduces complexity and development time, making it ideal for creating scalable, user-friendly metaverse applications with robust features like access control and upgradability. Dojo, another open-source tool, focuses on creating composable and interconnected virtual spaces, allowing developers to deploy decentralized applications seamlessly within the Metaverse. In addition to open-source initiatives, several studios are dedicated to building on-chain virtual worlds. Curio Research's Keystone toolkit revolutionizes the development of on-chain games by combining NFTs with augmented reality (AR) to create highly interactive and immersive experiences. Argus Labs is another prominent player in this space, focusing on developing on-chain games and virtual worlds that leverage blockchain technology for asset ownership and governance.

Established metaverse platforms such as Decentraland and The Sandbox have already garnered meaningful attention and user adoption. These platforms offer users the opportunity to explore, create, and monetize their own virtual experiences. Decentraland, for instance, allows users to purchase virtual land, build and customize their own environments, and participate in a wide range of activities, including virtual events, gaming, and social interactions. Similarly, The Sandbox empowers users to create and monetize their own gaming experiences using its intuitive voxel-based building tools. Additionally, projects like Genies are working on creating interoperable 3D avatars that can be used across different metaverse platforms. By developing a standardized and customizable avatar system, Genies aims to provide users with a consistent and personalized representation of themselves throughout the Metaverse.

2.2.6: ANALYTICS

Figure 2.23

Web3 advertising and growth analytics platforms play a vital role in the consumer crypto ecosystem by providing projects and developers with the tools and insights needed to effectively reach and engage their target audiences. These platforms create solutions that aid in user acquisition, advertising, and growth optimization. By aggregating data from various sources and analyzing user behavior across different touchpoints, these platforms enable projects to make data-driven decisions, measure the effectiveness of their marketing efforts, and ultimately drive adoption and growth.

One notable player in the web3 advertising space is Spindl, a protocol that utilizes user activity attribution to connect off-chain and on-chain identities. By tracking user interactions across different channels and platforms, Spindl helps projects attribute conversions and optimize their advertising strategies. Similarly, MadFi offers a decentralized advertising solution that leverages token-based incentives to reward users for engaging with ads and sharing data. This approach aims to create a more transparent and fair advertising ecosystem, where users have control over their data and can benefit from their attention. Other platforms, such as Slise and Hypelab, provide a suite of tools for web3 marketing, user acquisition, and growth analytics. Slise focuses on helping projects create targeted advertising campaigns and measure their performance using on-chain data and attribution models. Hypelab offers a comprehensive platform for managing and optimizing web3 marketing efforts, including features like user segmentation, A/B testing, and multi-channel campaign management.

These platforms aim to provide projects with the insights and capabilities needed to effectively reach and engage their target audiences. In addition to advertising and growth analytics, some platforms are exploring new approaches to user acquisition and engagement. For example, ShareMint is a platform that enables projects to create NFT-based referral programs, incentivizing users to share and promote their favorite products and services. Fuul, another player in this space, focuses on helping projects build and manage token-gated communities, using NFTs and other on-chain assets to create exclusive experiences and rewards for their most engaged users.

2.2.7: DEPIN

Figure 2.24

Decentralized Physical Infrastructure Networks (DePIN) are an emerging category of crypto networks that leverage token incentives to deploy location-dependent hardware devices and generate non-fungible, consumable resources. These networks play a crucial role in the consumer crypto ecosystem by enabling the creation and monetization of unique, real-world data assets that can power a wide range of consumer-facing applications and services. By incentivizing individuals to contribute their hardware and data, DePIN solutions create user-owned infrastructure that can compete with centralized alternatives.

One notable example of DePIN in the consumer crypto space is Hivemapper, a decentralized mapping network that leverages user-owned dashcams to collect and monetize real-world mapping data. By incentivizing individuals to install Hivemapper-compatible dashcams in their vehicles, the network generates a constant stream of up-to-date, high-quality mapping data that can be used by various consumer applications, such as navigation apps, ride-sharing services, and autonomous vehicles. This user-owned approach not only democratizes the mapping data industry but also enhances privacy by minimizing centralized control and reducing the risk of mass data collection and misuse, creating more privacy-preserving datasets compared to centralized alternatives like Google Maps.

Another promising DePIN platform is DIMO, a user-owned mobility network that allows individual car owners to collect and monetize their vehicle data. By connecting their cars to the DIMO network using a compatible device or the DIMO app, users can contribute valuable data on vehicle performance, battery health, and driving behavior. This aggregated data can then power a range of consumer-facing applications and services, such as battery intelligence and energy management tools, vehicle commerce platforms, and usage-based insurance products. By empowering individuals to own and monetize their vehicle data, DIMO creates a decentralized marketplace that can unlock new possibilities for consumers.

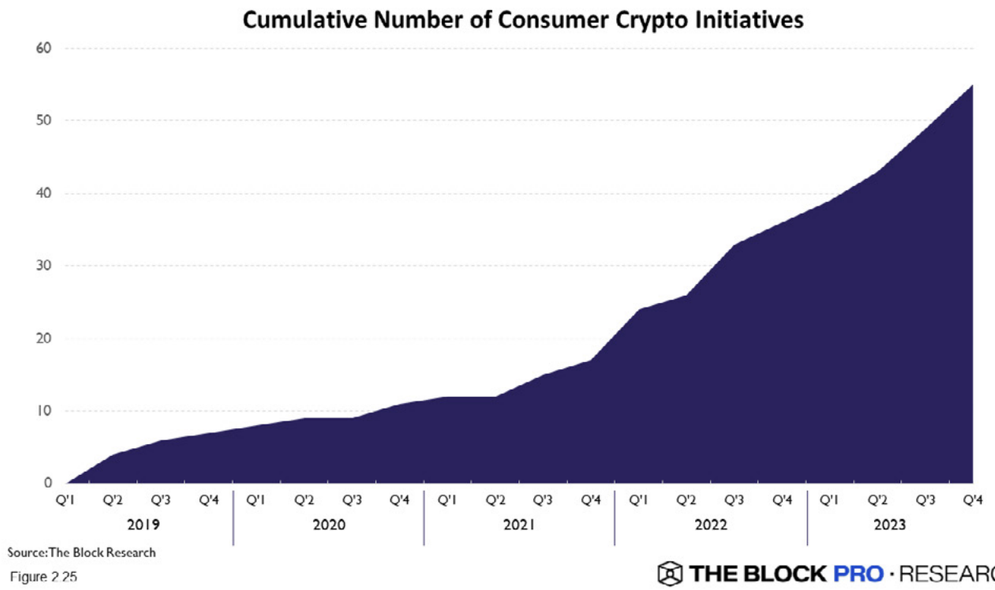
2.3: TRADITIONAL COMPANY ANALYSIS

Blockchain technology and the rise of consumer crypto have not gone unnoticed by traditional companies in the consumer industry. The interest and involvement of traditional consumer brands in the crypto space is significant for several reasons. Firstly, these companies have well-established customer bases, brand recognition, and market penetration, which could help drive mainstream adoption of consumer crypto solutions. Secondly, the integration of crypto rails by traditional companies could lead to increased legitimacy and trust in blockchain-based solutions among consumers who may be hesitant to engage with crypto-native platforms. Additionally, as these established brands integrate crypto rails into their existing products and services, they can leverage their extensive resources, expertise, and customer insights. This increased knowledge and capital could help accelerate the development of more user-friendly, scalable, and commercially viable consumer crypto solutions. This section will explore the extent to which traditional companies are adopting crypto rails, the maturity of their implementations, and the types of solutions they are employing.

The adoption of crypto rails by traditional companies has been steadily increasing in recent years. Although there are numerous analyses that demonstrate a clear trend of growing institutional adoption across crypto in general, granular data specifically measuring the penetration and adoption patterns among consumer-facing companies remains limited. To better understand the penetration of crypto rails among traditional consumer companies, The Block conducted its own analysis. Starting with the Fortune 100 as the initial dataset, we screened out non-consumer-oriented companies and ran Google queries with a set of relevant keywords to identify crypto initiatives. The search results were then manually filtered to include only initiatives that would be considered an on-chain consumer initiative according to the definition provided in the introduction of this report. We categorized each initiative into one of our previously defined subsectors, removing any duplicates from the analysis. While not exhaustive, this analysis aims to uncover broader trends in consumer crypto adoption among traditional companies. For a description of our methodology, please refer to Appendix 1.

From our analysis, we identified that just under one-third of the Fortune 100 companies had at least one consumer crypto initiative at some stage of development. Specifically, 27 of the companies examined had publicly announced a consumer crypto project, indicating a high level of penetration among the traditional

consumer companies in the Fortune 100. From these 27 companies, we identified a total of 55 initiatives spread across the five years from 2019 to 2023. As shown in Figure 2.13, the number of initiatives announced more than doubled from seven throughout 2019 to reach nineteen in both 2022 and 2023.



Source: The Block Research
Figure 2.25

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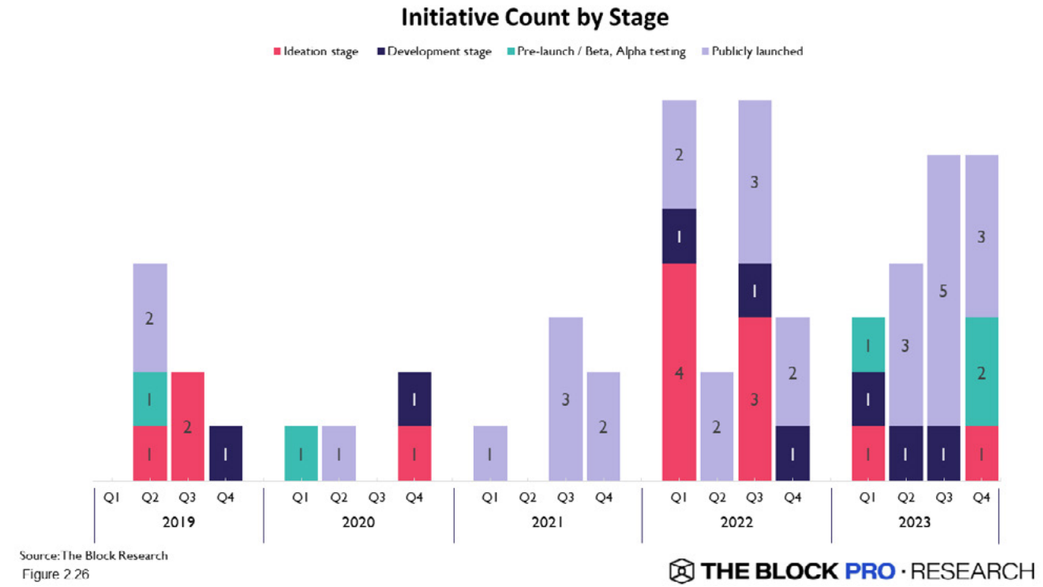
Furthermore, the data in Figure 2.25 suggests that the maturity of crypto initiatives has increased over the five-year period from 2019 to 2023. In our analysis, we categorize each initiative into one of four progressive stages: ideation, development, pre-launch/testing, and public launch, to measure maturity. The percentage of initiatives in the ideation stage decreased from 43% in 2019 down to 37% and 11% in 2022 and 2023, respectively. Meanwhile, the percentage of publicly launched initiatives grew from around 29% in 2019 to reach 47% and 58% in 2022 and 2023, respectively. This trend suggests that companies are progressively moving beyond the initial ideation phase and are actively working on developing and refining their consumer crypto efforts.



Source: The Block Research
Figure 2.26

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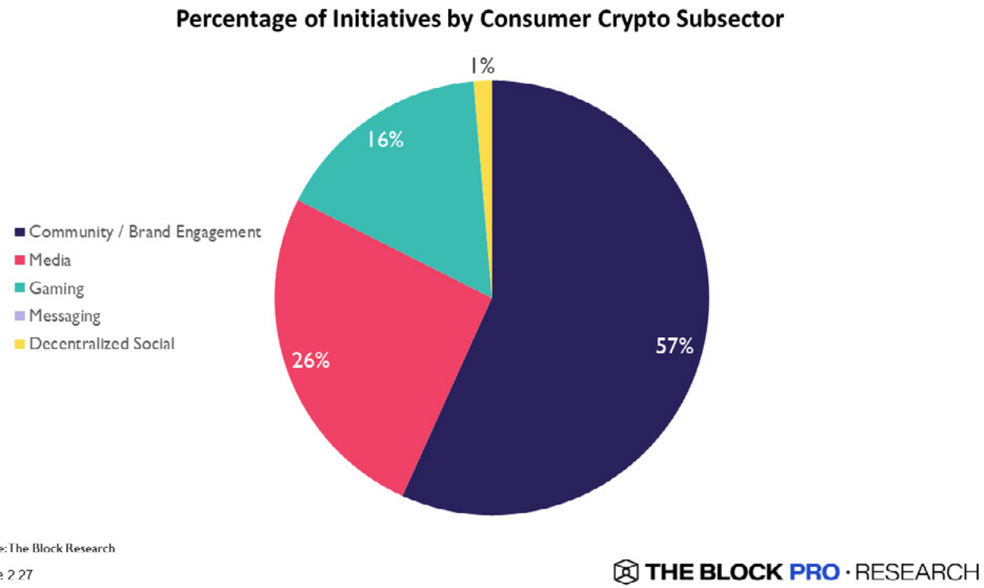
The increasing maturity of crypto initiatives among Fortune 100 companies can be attributed to various factors, such as the accumulation of knowledge and experience over time, the development of more robust infrastructure and tools, and the growing acceptance and attention attributed to blockchain technologies.

During our analysis, we classified each initiative into one or more relevant consumer crypto subsectors, recognizing that some initiatives may span multiple categories. Our analysis identified a clear concentration of initiatives within three key subsectors: community and brand engagement, media, and gaming. Together, these subsectors encompassed 99% of initiatives. Approximately 57% of the identified initiatives fell into the community and brand engagement category, which includes use cases such as loyalty programs and NFT launches offering unique experiences or digital collectibles. 26% of the projects were classified under media which had meaningful overlap with community/brand engagement as many NFT launches incorporated media elements. A prime example of this convergence is Coca-Cola's World Cup NFT campaign, which blended media content with a brand engagement initiative. The gaming subsector accounted for 16% of initiatives with over two-thirds occurring throughout 2022 and 2023.



Source: The Block Research

Figure 2.27

It's no surprise that these subsectors emerged as the most popular areas of focus for traditional consumer companies as they offer the most tangible and immediate opportunities for brands to connect with their target audiences. Moreover, the applications and tools in these subsectors are relatively more mature and popular while possessing clear analogs to large, lucrative traditional markets that consumer brands are already familiar with. In contrast, subsectors like messaging and decentralized social, while promising in their own right, present more complex challenges with a less directly translatable value proposition for traditional consumer companies. These subsectors often involve more technical complexities, regulatory uncertainties, and a steeper learning curve for both brands and consumers. As a result, it's understandable that companies may be more hesitant to allocate resources and take on the risks associated with these less mature and established areas.

Our analysis also showed differences in the level of consumer crypto penetration across different industries within the traditional consumer sector. The technology, retail, and food and beverage industries emerged as clear leaders, collectively accounting for 65% of the identified initiatives. Among these, technology

companies demonstrated the highest level of adoption, with 27% of the initiatives. This finding aligns with the tech sector's well-established track record of being at the forefront of adopting and experimenting with emerging technologies. The retail and food and beverage industries followed closely with 20% and 18%, respectively. The remaining six industries included in the analysis showed a more modest level of penetration, with each accounting for less than 10% of the total initiatives. With that said, it's important to note that the observed distribution of consumer crypto penetration across industries could be skewed by the choice of the Fortune 100 as our initial dataset, since that list may over or underrepresent certain sectors compared to their actual market prevalence.

To illustrate the varied outcomes of traditional companies venturing into consumer crypto, we'll examine two contrasting case studies. The first, Starbucks Odyssey Experience, demonstrates the challenges faced when implementing blockchain technology in a traditional loyalty program. The second, Nike's acquisition of RTFKT and the launch of Crypto Kicks, showcases a successful integration of NFTs into a brand's core offering.

CASE STUDY 1

STARBUCKS ODYSSEY EXPERIENCE

Starbucks, a global coffee chain and Fortune 500 company, launched the Starbucks Odyssey Experience in 2022 as part of its broader loyalty program. The initiative aimed to leverage NFTs and blockchain technology to offer unique rewards and experiences to customers, with a focus on younger, tech-savvy consumers. More specifically, Starbucks Odyssey offered Starbucks rewards members and Starbucks employees the opportunity to earn and purchase digital collectibles to unlock access to new benefits and experiences.

The Starbucks Odyssey program attracted a lot of attention given the prominence and success of its existing rewards program. Around the time of Odyssey's launch in December 2022, Starbucks' loyalty program boasted nearly 30 million members, who collectively drove over 50% of the company's revenue in the United States. The integration of Web3 technology into such a massive and well-established loyalty program represented the largest-scale effort of its kind at the time. As a result, the Odyssey initiative was widely viewed as a pioneering experiment that would gauge the effectiveness and viability of incorporating Web3 elements into traditional loyalty programs.

In December 2022, Starbucks launched the Odyssey Experience by offering a collection of 2,000 NFTs called "Journey Stamps" on the Polygon blockchain. Each Journey Stamp was priced at $100, and the entire collection sold out in less than 20 minutes, despite cooling enthusiasm for NFTs in the broader market. Members could accumulate stamps in Odyssey by either purchasing “limited-edition stamps” or through completing “Journeys” which include activities such as playing interactive games or completing various challenges. As stamps are collected, members earn points which can be used to access various benefits and experiences. For example, some of the benefits that Odyssey points could access included a virtual coffee class, Starbucks merchandise, and a Delta Airlines gift card. One of the more notable rewards that required a higher tier of points to access included an exclusive Starbucks Reserve Roastery experience for the member and a friend, at one of the three iconic locations in New York, Chicago, or Seattle.

Despite initial excitement, the program faced challenges and was ultimately discontinued in March of 2024, just over a year after its initial rollout. While Starbucks has not publicly disclosed detailed data on the program's performance, it’s likely that the company experienced lower-than-expected participation and struggled to make meaningful improvements in customer engagement. The underperformance of Starbucks Odyssey highlights the challenges that traditional brands face when attempting to leverage Web3 technologies to engage with their broader customer bases. Educating mainstream consumers about NFTs, blockchain, and associated concepts remains difficult. The technical complexity of these technologies and the lack of user-friendly abstractions can be intimidating and confusing for the average consumer. Moreover, the value proposition of NFTs and blockchain-based loyalty programs may not be immediately apparent or compelling to the majority of Starbucks customers. Customers may perceive the Web3 elements as gimmicky or unnecessary, failing to see how they enhance the core experience of earning rewards and enjoying their favorite Starbucks products. Without a clear and compelling reason to engage with the NFT-based features, many customers may simply choose to ignore them or stick to the traditional aspects of the loyalty program.

The discontinuation of the Starbucks Odyssey Experience serves as a valuable lesson for other traditional brands considering the integration of Web3 technologies into their customer engagement strategies. It highlights the importance of carefully evaluating the readiness of the target audience, the clarity of the value proposition, and the ease of use for participants. Companies must ensure that on-chain integrations align with the needs, preferences, and behaviors of their core customer base. Failure to do so can result in initiatives that fail to gain traction and ultimately lead to wasted resources and missed opportunities.

Although the Starbucks Odyssey initiative ultimately failed, it demonstrates the willingness of traditional brands to experiment with and integrate on-chain technology into their business. As the space matures, the development of more intuitive and accessible consumer crypto products, coupled with growing consumer awareness and acceptance, will likely create a more favorable environment for traditional companies to invest in similar initiatives. The lessons learned from these early efforts could help inform more successful and impactful initiatives in the future.

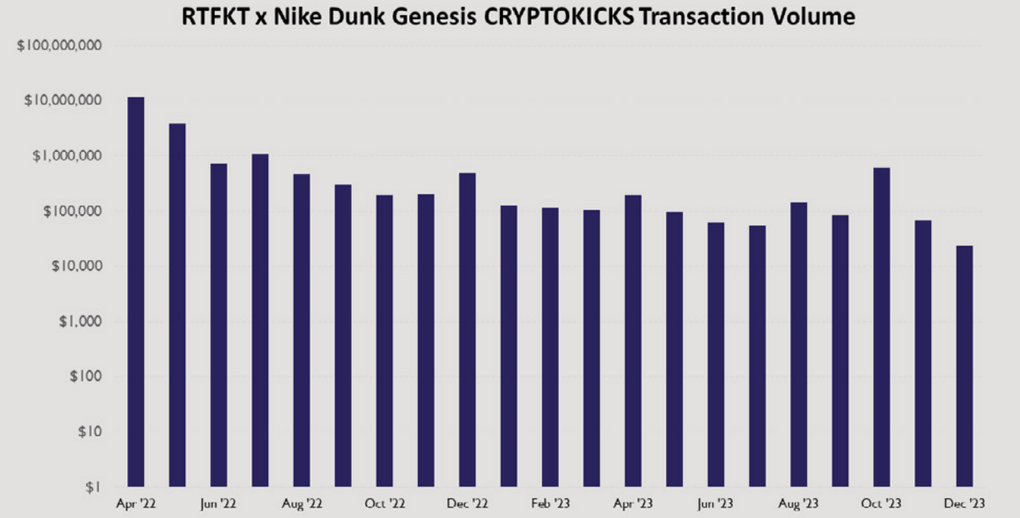
While the Starbucks Odyssey experience illustrates the potential challenges of implementing blockchain technology in traditional loyalty programs, not all attempts by established brands to enter the Web3 space have faced similar setbacks. In contrast to Starbucks' experience, some companies have found success by aligning their blockchain initiatives more closely with their core products and existing customer behaviors. A prime example of this more successful approach can be seen in Nike's venture into the world of digital collectibles and NFTs.

CASE STUDY 2

NIKE'S ACQUISITION OF RTFKT & CRYPTO KICKS LAUNCH

Nike, a global leader in athletic footwear and apparel, has been exploring opportunities in the Web3 space to enhance customer engagement and unlock new growth opportunities. In order to accelerate their entry into the space, Nike announced the acquisition of RTFKT studios in December of 2021, a virtual fashion brand known for creating NFT collectibles.

In April 2022, Nike and RTFKT released Crypto Kicks Genesis, an NFT sneaker collection that gives owners the right to claim a matching physical pair. NFT holders can redeem the physical sneakers during forging events. The forging process involves a transaction where users claim the physical product, provide shipping details, and have their NFT marked as redeemed in the process. During the forging event, trading is temporarily suspended to prevent immediate resale after redemption.



Source: Cryptoslam

Figure 2.28

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The RTFKT x Nike Dunk Genesis NFT collection performed extremely well with over $21M in total transaction volume through the end of 2023 since its launch in April of 2022. Additionally, over that same period, monthly transaction volume never dropped below $10,000 and the average monthly transaction volume was over $1M.

The NFT trading volume generated by Nike's Crypto Kicks collection has outperformed the efforts of many other brands including Adidas, Gucci, Dolce & Gabanna, Hugo, Lacoste, Prada, and others. Several factors contributed to Nike's outsized success. Firstly, Nike's acquisition of RTFKT brought in talent with expertise in the Web3 space, which helped ensure a smooth launch and ongoing management of the Crypto Kicks project. The RTFKT team's deep understanding of the NFT market, relationships with creators, and proven ability to cultivate and engage communities are valuable assets that are difficult to build in-house. Secondly, Nike and RTFKT tailored the NFT drop to fit within the context of Nike's business. The company has had proven product-market fit with sneaker drop events, with strong demand from a passionate customer base. By tying the Crypto Kicks NFTs to exclusive sneakers, Nike created a clear and unique value proposition that resonated with its customers. Additionally, the forging events have helped sustain trading volume over time and effectively set a price floor for the collection. As long as there are unredeemed NFTs available in the market, collectors have an incentive to acquire them to participate in upcoming forging events. This ongoing cycle of buying, holding, and redeeming NFTs has effectively maintained trading activity and kept the Crypto Kicks collection relevant and desirable.

Nike's successful venture into Web3 and NFTs provides valuable insights for other companies. Most importantly, aligning web3 elements with the company's core business and leveraging existing product-market fit is crucial. Traditional brands looking to leverage on-chain consumer products need to carefully position their efforts around a clear and unique value proposition to ensure effective customer engagement. As on-chain consumer products mature and expand, the opportunities for traditional brands to leverage these tools effectively in ways that directly enhance the value offered to customers will become more widespread.

PART 3
THE ROAD AHEAD FOR CONSUMER CRYPTO

The consumer crypto landscape is still in its early stages, with many challenges yet to be faced and opportunities to be explored. While the future is notoriously difficult to predict, we can extend ideas from the current consumer crypto landscape and anticipate how the space may evolve by making assumptions around which user pain points are likely to be addressed, which emerging technologies are likely to be leveraged, and what trends are likely to gain momentum, largely leveraging insights from interviews with key ecosystem participants. In this section, we will explore the future of consumer crypto by addressing the most pressing user pain points, such as high transaction fees, complex user interfaces, and fragmented experiences across platforms. We will discuss how these challenges are likely to be resolved through the adoption of new technologies, such as low fee blockchain networks, user-friendly app designs, and interoperable identity protocols.

Furthermore, we will examine how existing consumer crypto subsectors, such as community and brand engagement, media and entertainment, gaming, and decentralized social and messaging, are likely to evolve and expand in the coming years. We will also explore the potential emergence of entirely new subsectors, such as decentralized e-commerce, personal finance, and health and wellness, which could be unlocked by the unique capabilities of blockchain technology and crypto-native assets. Finally, we will cover the infrastructure layer and discuss how it will need to develop to support the growth and innovation of the consumer crypto ecosystem. This will include an analysis of the key infrastructure components, such as scalable and interoperable blockchain networks, decentralized storage and computation solutions, privacy and security frameworks, technical abstraction, and developer tools and platforms. By providing a glimpse into the future of consumer crypto, this section aims to equip stakeholders with the insights and knowledge necessary to navigate the rapidly evolving landscape and capitalize on the opportunities that lie ahead.

3.1: BARRIERS TO MAINSTREAM ADOPTION

As the consumer crypto ecosystem continues to progress, it is becoming increasingly apparent that there are pain points and market gaps that need to be addressed in order to onboard a wider audience and drive mainstream adoption. While on-chain consumer products have demonstrated potential in terms of enabling new forms of value creation, ownership, and participation, they have also faced a number of challenges that have hindered their accessibility, usability, and overall user experience.

3.1.1: USER EXPERIENCE

One of the most prominent pain points for users interacting with on-chain consumer products is the issue of high transaction fees and slow confirmation times. Many popular blockchain networks, such as Ethereum, have struggled with scalability limitations, leading to periods of network congestion and exorbitant gas fees. During those episodes it is prohibitively expensive for many users to engage with on-chain applications, particularly those involving frequent transactions or complex smart contract interactions. For example, during the height of the DeFi and NFT boom in 2021, average transaction fees on Ethereum skyrocketed to over $60, rendering many consumer-facing applications infeasible for the average user. While the emergence of layer-2 scaling solutions and alternative blockchain networks has helped alleviate some of these issues, the problem of high fees and slow transactions remains a significant barrier to entry for many consumers. In fact, for on-chain consumer products to achieve widespread adoption, blockchain fees of any kind will likely have to be abstracted away from the user experience. The average user is accustomed to web2 applications that offer experiences without the need to manage and pay for individual transactions.

If on-chain consumer products are to compete with their web2 counterparts, they will need to find ways to hide the complexity and cost of blockchain transactions from end-users, either through clever design patterns, gas subsidies, or other approaches. Moreover, on-chain consumer products will need to achieve throughput and scalability that is comparable to popular web2 applications. For context, social media giants like Facebook and Twitter handle hundreds of millions of daily active users, processing billions of posts, likes, and other interactions in real-time. Similarly, e-commerce platforms like Amazon and Alibaba routinely manage millions of concurrent users and transactions during peak shopping periods. In contrast, even the most advanced blockchain networks today can only handle a few thousand transactions per second at best, with confirmation times ranging from a few seconds to several minutes.

Another major pain point for consumers is the complexity of user interfaces and onboarding processes associated with many on-chain products. Compared to traditional web2 applications, which have benefited from decades of design refinement and user testing, many web3 products still suffer from confusing layouts, technical jargon, and convoluted user flows. This is particularly evident in the realm of decentralized finance (DeFi), where users are often required to navigate a dizzying array of protocols, tokens, and smart contracts in order to access even basic financial services. For example, to participate in a typical yield farming opportunity, a user may need to first acquire a specific governance token, then stake that token in a liquidity pool, and finally deposit their liquidity provider (LP) tokens into a separate yield aggregator protocol. This multi-step process can be incredibly daunting for newcomers and acts as a significant deterrent to wider adoption. Similar usability challenges can be observed in other on-chain products, such as NFT marketplaces and DeSo platforms. For instance, many popular NFT marketplaces, like OpenSea and Rarible, still require users to connect their wallets, navigate multiple tabs and filters, and manage complex bidding and auction mechanisms in order to purchase or sell digital assets. The process of creating and minting new NFTs can be even more confusing, often involving technical steps like uploading metadata to IPFS and interacting with smart contract interfaces. Similarly, early DeSo platforms, like Steemit and Hive, often present users with unfamiliar terminology and governance models, such as upvoting, downvoting, and staking mechanisms that can be difficult to understand and engage with for the average user. While some progress has been made in recent years to improve the usability and accessibility of on-chain consumer products, there is still a significant gap between the user experience of web3 applications and their web2 counterparts. This push for more intuitive a more user experience will require developers to leverage several key infrastructure components such as wallets and key management solutions, various abstraction layers and middleware, and interoperable identity solutions.

In addition to complexity at the individual product level, consumers also face the challenge of fragmented user experiences across different platforms and ecosystems. Unlike web2 applications, which have largely converged around a handful of dominant platforms and standards (e.g., social media, e-commerce, etc.), the web3 landscape remains highly fragmented and siloed. Users are often required to manage multiple wallets, accounts, and identities across different blockchain networks, leading to a disjointed and inconsistent user experience. For example, a user who holds NFTs on the Ethereum blockchain may struggle to use those assets on a separate platform built on the Solana network, due to differences in token standards, wallet compatibility, and cross-chain bridging mechanisms. This lack of interoperability and portability creates significant friction for users looking to navigate the broader web3 ecosystem and limits the potential for network effects and composability. While improved interoperability is essential for the growth and adoption of on-chain consumer products, it is equally important that this interoperability is largely hidden from the end-user. Just as web2 users don't need to understand the underlying technical details of how different platforms and services interact and exchange data, web3 users should be able to

navigate and interact with different blockchain networks and applications without having to worry about the specific technical implementation or compatibility issues. To achieve this goal, on-chain consumer products will need to prioritize the development of user interfaces and experiences that abstract away the complexity of underlying blockchain technologies and present a unified, consistent view of the user's assets, data, and interactions across different networks. This concept of chain abstraction may involve the creation of multi-chain wallets and identity solutions that can automatically detect and switch between different blockchain networks based on the specific use case or application, as well as the development of standardized data models and API interfaces that can enable communication and interoperability between different platforms and services.

When it comes to designing on-chain consumer products, the ultimate goal should be to abstract away the blockchain technology so completely that users are not even aware they are interacting with a product built on a decentralized network. Just as most users of web2 applications don't need to understand the intricacies of databases, servers, and APIs to enjoy a seamless and intuitive experience, users of on-chain products should be able to engage with these applications without any knowledge of the underlying blockchain infrastructure. In many ways, the success of on-chain consumer products will depend on their ability to hide the complexity of blockchain technologies behind a familiar and user-friendly interface. Users should be able to sign up, log in, and interact with these products using the same methods and conventions they are already accustomed to from their experiences with web2 applications. This might include using their email address or social media profile to create an account or using traditional payment methods like credit cards or bank transfers to directly fund their wallet. Behind the scenes, the on-chain product would handle all of the necessary blockchain interactions, such as creating and managing user wallets, executing smart contract functions, and processing transactions on the appropriate network. However, these technical details should be completely hidden to the end-user, who should be able to focus solely on the core value proposition and functionality of the product itself.

3.1.2: PUBLIC PERCEPTION AND USER AWARENESS

One challenge blocking the broader adoption of on-chain consumer products is the negative public perception of the crypto space in general. Over the years, crypto has experienced a series of high-profile scams, hacks, and market manipulations, which have eroded public trust and cast a shadow over the

entire industry. From the collapse of Mt. Gox in 2014 to the more recent implosion of FTX in 2022, these incidents have reinforced the perception that crypto is a risky and unreliable investment, prone to fraud and abuse. The volatility of cryptocurrency prices has further contributed to the public's skepticism and wariness. The wild price swings of Bitcoin and other digital assets have made it difficult for the average consumer to view the space as having practical use cases. Instead, many people see cryptocurrencies as speculative instruments, driven more by hype and speculation than by real-world utility or adoption. Another factor contributing to the negative public perception of crypto is the perceived complexity and opacity of blockchain technology itself. For many consumers, concepts like decentralization, consensus mechanisms, and smart contracts can seem esoteric and intimidating, making it difficult to understand the value proposition of on-chain products. This lack of understanding is often compounded by the use of technical jargon and insider language within the crypto community, making the space feel overwhelming and difficult to get started.

In addition to some level of negative public perception, there is a general lack of awareness around existing on-chain consumer products and their benefits over traditional incumbent solutions. This is mostly due to the early stage of most on-chain consumer products. While there are many promising projects in the space, many are still working to refine their user experience and value proposition. In some cases, the benefits of using an on-chain product may not yet be sufficiently compelling or differentiated from existing solutions to justify the perceived risks and switching costs for consumers. As a result, there is a limited track record of success stories or case studies that can help to validate the potential of on-chain products and build confidence among consumers. Until there are more examples of on-chain products delivering tangible value and solving urgent problems for consumers, it may be challenging to build broader awareness and adoption. As we'll discuss in the following section on regulation, a well-defined regulatory environment could help provide the necessary guardrails to build consumer trust and encourage adoption.

3.1.3: REGULATORY UNCERTAINTY

Regulatory uncertainty is another significant factor that is likely limiting the mainstream adoption of on-chain consumer products. The lack of clear and consistent regulatory frameworks across different jurisdictions creates a challenging environment for projects to navigate. Instead, there is a prevalence of a "regulation-by-enforcement" approach in the U.S, where regulatory agencies rely on enforcement actions to define the

boundaries of acceptable behavior, rather than providing clear guidelines upfront. This approach creates significant uncertainty for on-chain projects, as they may be unsure whether their products or services are compliant with existing regulations, or if they could be subject to future enforcement actions. This uncertainty can also discourage users from experimenting with new on-chain products as they may fear the potential legal and financial consequences of running afoul of regulators.

Another concern is the perceived inadequacy of consumer protection measures in the on-chain space. While many projects strive to build more secure and user-friendly products, the absence of clear regulatory standards around issues like custodianship, disclosure, and dispute resolution could leave consumers feeling vulnerable to fraud, hacks, or exploitation. This perceived lack of protection can make mainstream consumers hesitant to engage with these products, especially if they have experienced or heard of negative outcomes in the past.

> *"Web3 applications need a level of consumer assurances and protection that people are used to from other consumer internet services."*
> – Scott Duke Kominers, a16z crypto

The lack of standardization across different countries and regions further complicates the regulatory landscape for on-chain projects. As these projects seek to scale and expand globally, they may encounter a patchwork of conflicting or inconsistent regulations that make it difficult to operate across borders. This fragmentation can create significant compliance burdens and costs for projects, as they may need to tailor their products or services to meet the specific requirements of each jurisdiction they operate in.

Finally, the legal risks and uncertainties surrounding on-chain products can limit their ability to form partnerships or collaborations with mainstream brands and businesses. Many traditional companies may be hesitant to engage with on-chain projects, even if they see potential benefits or synergies, due to the fear of future regulatory actions or reputational damage. This reluctance can make it harder for on-chain projects to tap into established distribution channels, customer bases, or expertise.

3.2: EVOLUTION OF EXISTING CONSUMER CRYPTO SUBSECTORS

As we look into the future of consumer crypto, it's important to consider how the various subsectors we've explored throughout this report may evolve and interact with one another. Although the applications comprising these subsectors are still in relatively early stages of development, they will grow significantly in the coming years, driven by a combination of technological advancements, changing user behaviors and expectations, as well as new business models and incentive structures.

One of the key trends we will see across these subsectors is increased composability and interoperability across the ecosystem. As consumer crypto matures, we will see more integration between various platforms and services, enabling new use cases and value propositions to emerge at the intersection of multiple subsectors. In addition to the convergence of features and functionality within the consumer crypto ecosystem, there will also be increased integration with web2 products. Given that web2 elements and web3 elements will likely have different trade-offs for certain use cases, pairing them together in complementary ways could leverage the strength of both. This integration will facilitate a smoother transition for users between web2 and web3 environments and will help accelerate the overall adoption of on-chain products and services. This could take the form of crypto-enabled payment options on e-commerce sites, decentralized identity solutions for social media logins, or blockchain-based supply chain tracking for physical goods.

Another critical area of focus for the future of consumer crypto will be user experience and design. To support this focus on usability, we will see the emergence of new primitives and building blocks that make it easier for developers to create and deploy consumer-facing applications. These will include standardized identity protocols, interoperable data formats, and plug-and-play modules for common functionalities like payments, messaging, and file storage. By lowering the barriers to entry and providing a more streamlined development experience, these primitives will help to accelerate experimentation in the consumer crypto space. This increased experimentation will allow for faster iteration around new token designs, staking mechanisms, and other cryptoeconomic primitives that better align the interests of users, developers, and other stakeholders. By creating more sustainable and equitable value capture and distribution models, these experiments will help to drive long-term growth and adoption of consumer crypto applications.

However, it's important to note that while these new economic models may offer user benefits, they may also come with certain trade-offs. For example, in a decentralized ecosystem where users own their data, they may need to pay for services that were previously provided for free in web2 platforms.

3.2.1: COMMUNITY AND BRAND ENGAGEMENT

While it is impossible to predict the exact future of the community and brand engagement subsector, we can make informed guesses based on the current landscape of applications and identified market gaps. Given the breadth of potential use cases that the community and brand engagement subsector covers, it's hard to pinpoint a single direction or outcome. In the following, we'll explore potential future developments aimed at specific use cases while realizing that the subsector's future will likely fork in many different directions given its wide scope.

The next iteration of digi-physical NFT platforms will become more immersive and interactive, leveraging advanced technologies to enable dynamic, context-aware interactions between NFTs and the real world. Although digi-physical NFTs have been growing in interest recently, many projects still struggle to create a truly integrated experience between the digital and physical realms. Some digi-physical NFTs feel gimmicky or disconnected, with little meaningful interaction or utility between the online and offline components. Additionally, the process of redeeming or accessing the physical elements associated with these NFTs can be cumbersome and inefficient, requiring users to navigate complex logistics and verification processes. As this space continues to develop, next-generation digi-physical NFT platforms could leverage advanced technologies such as augmented reality, IoT devices, and geolocation to enable dynamic, context-aware interactions between NFTs and the real world. For example, a fashion brand could release a limited-edition digi-physical NFT that represents a unique, customizable jacket. As the owner wears the physical jacket in different locations or to specific events, the NFT could evolve and gain new digital traits or accessories based on those experiences. These digital enhancements could then be used to unlock exclusive online content, discounts, or even collaborative design opportunities with the brand. To streamline the redemption process, platforms will partner with networks of local fulfillment centers and utilize smart contracts to automate the verification and delivery of physical items.

Future on-chain membership and subscription platforms will offer seamless integration with a wide range of products and services, enabling users to curate personalized experiences across multiple platforms. Existing on-chain membership and subscription platforms often struggle with limited interoperability and composability, making it difficult for users to manage and derive value from multiple memberships across different projects. Additionally, many current solutions rely on simple token-gating mechanisms, which can lead to a binary and inflexible user experience, where members either have full access or no access at all, with little room for granular permissions or customization. A lack of integration with traditional products and services also makes it harder to create a compelling value proposition that would appeal to a wider user base. Considering that these issues could be solved with time, it's exciting to imagine where this could lead.

For example, imagine a decentralized membership platform that seamlessly integrates with a wide range of news and content providers, allowing users to curate a personalized content feed from multiple sources. By holding a unique NFT, users could access their customized content bundle across various platforms, without the need for separate subscriptions or logins. In this way, a user could subscribe to receive news about their local sports teams for example. Rather than subscribing to multiple news sites to receive content covering both home and away games, users could manage one subscription that aggregates news from multiple sources. These NFT-based memberships will simplify the user experience and provide enhanced privacy and security, as users' personal data will be stored on decentralized networks, granting them full control over their information. Moreover, such platforms could incorporate token incentives for content creators, rewarding them based on user engagement and enabling a more direct relationship between creators and their audience.

3.2.2: DECENTRALIZED SOCIAL

As users become increasingly aware of the pitfalls associated with traditional social media, the appeal of decentralized social media will grow. With the landscape maturing, we will see the emergence of more scalable DeSo platforms that offer a user experience comparable to web2 incumbents, with the technical components of blockchain abstracted away. In addition, there will be increased interoperability between different decentralized social media platforms, allowing users to carry their identities, assets, and data

across various platforms without the need for multiple logins or data silos. This could create a more cohesive social media ecosystem, where users can interact across different networks.

Future iterations of DeSo platforms will enhance the user experience by offering unique features enabled by user ownership of data. Although some DeSo applications have shown signs of product-market fit such as Farcaster, the majority of existing platforms fail to provide a clear value proposition that is differentiated from traditional incumbents. For example, imagine a decentralized professional networking platform that puts users in control of their data and online presence. Unlike traditional platforms like LinkedIn, where user data is owned and monetized by the company, this decentralized alternative allows users to store their professional information, such as work experience, skills, and endorsements, in a secure, self-sovereign digital wallet. The platform could leverage token-based incentives to encourage users to contribute valuable content, such as industry insights, job listings, or professional development resources. Users who create high-quality content or provide valuable services, such as mentorship or networking introductions, are rewarded with tokens that can be used to access premium features, such as advanced search tools or personalized career advice. This incentive model creates a more meritocratic and engaging environment, where users are encouraged to share their knowledge and support one another's professional growth.

Decentralized social media platforms will offer users the ability to select and customize the algorithms that curate their content feed. While traditional platforms could theoretically implement this feature, their centralized nature and business models often prioritize control over user data and content curation for targeted advertising and revenue generation, making such user-driven customization less feasible. For example, envision a decentralized social media platform that puts users in the driver's seat by allowing them to choose and customize the algorithms that curate their content feed. At the core of the platform could be a marketplace of algorithms, where developers can submit their own content curation algorithms, and users can browse, select, and even modify the algorithms that power their personal feed. This optionality would be important given that even open-sourced algorithms are largely black boxes. Each algorithm could be open-source and accompanied by a clear description of its functionality, target audience, and content prioritization criteria. Users can choose algorithms based on their specific interests, privacy preferences, or content discovery goals, ensuring a more personalized experience. For example, a user who values privacy and wants to minimize data collection can opt for an algorithm that prioritizes content based solely on their explicit interactions, such as likes, comments, and follows, without tracking their browsing behavior or personal information. Another user who wants to discover niche content and engage with like-minded individuals can choose an algorithm that optimizes for community engagement and topic-specific discussions. To further empower users, platforms will integrate token-based feedback and governance systems, allowing users to provide input on algorithms, content moderation, and platform upgrades. This could create a more competitive and user-centric content curation ecosystem, where developers are incentivized to create algorithms that prioritize user satisfaction rather than advertising revenue or data collection.

3.2.3: GAMING

The future of on-chain gaming will expand to a diverse range of genres, platforms, and economic models that cater to different player preferences and demographics. While early on-chain games often focused on simple, crypto-native mechanics such as NFT collectibles and play-to-earn models, future on-chain games will combine triple-A game quality with new features like user-generated content, player-owned assets, and cross-game interoperability, to drive meaningful adoption.

As the interoperability of on-chain games improves, the utility of owning in-game assets will increase. One of the main advantages of on-chain games over traditional games is the ability for players to own in-game assets. These assets are typically represented as NFTs, allowing players to buy, sell, and trade them on open marketplaces. This ownership model not only gives players more control over their gaming experience but also enables them to derive real-world value from their in-game achievements and investments. In traditional games, players do not truly own their in-game assets; instead, they are merely granted a license to use them within the confines of the game. This means that players cannot freely trade, sell, or transfer these assets outside the game's platform, and they risk losing access to their investments if the game is shut down or if their account is banned. For example, imagine a future where on-chain gaming assets, such as NFT characters, items, and virtual lands, are not confined to a single game or platform, but can be seamlessly used and traded across multiple gaming experiences. In this scenario, a player who owns a rare NFT sword in one game could use that same sword in another game that supports the same standards, without having to repurchase or transfer the asset manually.

This cross-platform interoperability will provide players with greater flexibility and ownership over their in-game assets and create a more interconnected and collaborative gaming ecosystem. As more games adopt interoperable standards and protocols, we will see the emergence of a thriving metaverse-like ecosystem, where players can move seamlessly between different gaming experiences, social networks, and virtual worlds, all while maintaining their unique identity, assets, and achievements. Traditional games are unlikely to reach this level of interoperability due to their closed and proprietary nature, with game publishers focused on maintaining control over their intellectual property. Additionally, there are technical and logistical complexities associated with ensuring asset transfers across game engines and ecosystems that would require collaboration between competing game studios. On-chain gaming, however, is much better suited to support interoperability given its permissionless nature and composability. While some on-chain gaming studios may choose to create siloed ecosystems, others will likely opt to leverage existing on-chain games as a foundation for their own projects. By adopting shared standards and protocols, these developers can enable interoperability between their games and the original platform. Building on top of an established on-chain game will allow developers to more quickly bootstrap adoption by tapping into an existing user base and ecosystem.

The open and composable nature of blockchain technology will empower players to create and share their own gaming experiences, using the assets and tools provided by the underlying platform. The ability to build on top of existing game assets and mechanics is a key benefit of on-chain games. This open development environment allows players and developers to introduce new features, mods, and enhancements. For example, imagine a sandbox-style gaming platform that provides players with a set of basic building blocks, such as terrain tiles, object templates, and scripting tools. Using these building blocks, players could create their own custom game worlds, quests, and challenges, which could then be shared with and played by other users on the platform.

These player-created experiences could range from simple mini-games and puzzle challenges to complex, multi-player adventures and role-playing scenarios. Players could even build upon and remix each other's creations, leading to a constantly evolving ecosystem of user-generated content. For example, a player could create a treasure hunt game where participants must solve a series of puzzles and challenges to find a hidden NFT prize. Another player could then take that treasure hunt game and integrate it into a larger, open-world adventure game, where the treasure hunt becomes just one of many quests and activities available to players. To incentivize and reward player creativity, platforms will implement systems where creators can earn a share of the rewards or fees generated by their content, based on its popularity and engagement levels. This could create a new economy of player-driven content creation and curation, where the most successful and innovative creators are able to build their own following and monetize their skills and ideas.

3.2.4: MEDIA

NFTs will be the key element that shifts the way we think about media ownership and provenance on on-chain media platforms. By representing digital media assets as unique, verifiable tokens, creators can assert their ownership rights, track the provenance of their work, and enable new forms of monetization, such as fractional ownership or programmatic royalties in which a portion of the proceeds from each sale of the NFT is distributed back to the original creator or rights holder. This could unlock a media ecosystem in which creators are fairly compensated for their work and consumers can enjoy a wider variety of high-quality content. Additionally, these on-chain media assets will be increasingly leveraged across the broader consumer crypto ecosystem, integrating with other applications and services as interoperability and user adoption improve.

On-chain media platforms will be well-positioned for a deeper integration of fan engagement tools when compared to traditional media, allowing artists to build more interactive communities. Fans could participate in decision-making processes, earn rewards for their support, and access exclusive content. For example, imagine a decentralized music streaming platform that allows for a more direct connection between artists and their fans. Unlike traditional streaming services, where artists often receive only a small fraction of the revenue generated by their music, this platform would allow listeners to directly support their favorite artists through a variety of mechanisms. For example, users could stake the platform's native tokens to vote on which artists or albums should receive featured placement or promotional support. The more tokens a user stakes, the greater their influence on the platform's curation and discovery processes. Artists, in turn, could receive a portion of the staking rewards generated by their supporters, creating a more direct and transparent connection between creator and consumer. Additionally, the platform could enable artists to launch crowdfunding campaigns for new releases, tours, or special projects. Fans could contribute to these campaigns using the platform's tokens, potentially

unlocking exclusive rewards such as limited-edition merchandise, behind-the-scenes content, or early access to new music. By allowing artists to tap into the collective support of their fanbase, this model will provide a more sustainable and community-driven alternative to traditional music industry funding. To further incentivize user participation, the platform could implement a reward system for various forms of engagement. For instance, users who curate popular playlists, share content on social media, or provide thoughtful feedback and reviews could earn tokens or other rewards. These rewards could be used to access premium features, such as ad-free listening or offline playback, or to purchase exclusive content from their favorite artists. This decentralized streaming service will create a more organic and engaged community around music discovery and promotion. Artists would benefit from a more direct and equitable relationship with their fans, while listeners would have the opportunity to shape the platform's direction and be rewarded for their contributions.

Blockchain technology will enable the creation of dynamic, interactive media assets such as artwork or music. Building on the potential of on-chain media, imagine an art platform that leverages blockchain technology to enable these "living" artworks, which could take many forms, from digital paintings that change based on viewer engagement to generative sculptures that react to real-world data feeds. For example, an artist could create a digital installation that visualizes the platform's token economy in real-time, with the artwork's colors, shapes, and movements reflecting market fluctuations, user activity, and other on-chain data. As more users interact with the platform and the token economy evolves, the artwork would continuously adapt and transform, creating a unique and ever-changing experience. Another artist might create an interactive music composition that allows viewers to influence the piece's progression by making micro-transactions or contributing their own sounds and visuals. The artwork could incorporate elements of gamification, rewarding users for their participation and encouraging deeper engagement with the creative process. Viewers will no longer be passive observers but active participants in the creative process, directly influencing the artwork and its interpretation.

This could lead to the emergence of entirely new artistic mediums and experiences, as creators experiment with the possibilities afforded by blockchain technology and real-time data integration. Moreover, the use of blockchain technology will enable new models of ownership and monetization for these interactive artworks. For instance, viewers who significantly contribute to an artwork's development could be granted fractional ownership rights, allowing them to benefit from the piece's appreciation in value over time. Artists could also set up smart contracts that automatically allocate a portion of any sales or royalties to the artwork's co-creators, ensuring a more equitable distribution of rewards.

3.2.5: MESSAGING

As consumer crypto continues to mature and experiences increased adoption, we will see the emergence of more sophisticated and feature-rich messaging platforms that leverage the unique properties of blockchain to enable secure, private, and censorship-resistant communication. In addition to standalone platforms, messaging applications will be increasingly integrated into other subsectors, such as decentralized social media, gaming, and various marketplaces, to enhance their functionality and user experience. The demand for secure and encrypted messaging platforms, such as Telegram and Signal, has already been demonstrated, highlighting the growing concern among users regarding privacy and data sovereignty. On-chain messaging solutions have the potential to further improve upon this value proposition by leveraging the inherent security and immutability of blockchain technology. By storing messages and user data on a decentralized network, these platforms can provide an added layer of protection against censorship, surveillance, and data breaches.

On-chain messaging platforms will leverage their ability to interact with smart contracts, enabling a wide range of automated and programmable functionalities. For instance, a messaging application could be used to trigger a smart contract that automatically executes a financial transaction or updates a user's reputation score based on their messaging activity. In the context of decentralized finance (DeFi), a messaging platform could be integrated with a lending protocol, allowing users to request and approve loans directly through the messaging interface. Imagine a scenario where a user wants to borrow funds from a decentralized lending platform. Instead of navigating to the lending platform's website and going through a lengthy application process, the user could simply send a message to the lending protocol's smart contract address, specifying the desired loan amount and terms. The lending protocol's smart contract could then automatically assess the user's creditworthiness based on their on-chain history and reputation score, which could be derived from their messaging activity and other on-chain interactions. If the user meets the lending criteria, the smart contract could instantly approve the loan and transfer the funds to the user's wallet, all without requiring any manual intervention from the lending platform's

administrators. Similarly, the user could easily repay the loan by sending a message to the smart contract with the repayment amount, which would automatically update their outstanding balance and reputation score. Compared to centralized messaging platforms like WeChat, on-chain messaging platforms will offer users greater control over their data and privacy, allowing them to choose to store their information on decentralized storage solutions or even port their data across different messaging platforms. This increased data portability could facilitate greater competition as users would not be locked into a single platform, and new entrants could more easily compete by offering unique features or better user experiences.

Future on-chain messaging applications will leverage composability to create even more sophisticated and feature-rich user experiences. Looking ahead, we can envision a decentralized messaging platform that not only facilitates secure and private communication but also serves as a hub for various web3 activities and services. For example, the messaging platform could integrate with a decentralized identity solution, such as Spruce or Galxe, allowing users to easily verify their identity and build their on-chain reputation across multiple applications. Users could then leverage their verified identity and reputation to access a range of services and opportunities within the messaging platform, such as participating in token-gated communities or receiving exclusive content and offers from brands. The messaging platform will feature a built-in token economy, enabling users to earn and spend tokens based on their activity and value creation within the ecosystem. For instance, users could earn tokens for referring new members, moderating content, or providing helpful resources and support to other users.

These tokens could then be used to unlock premium features, such as advanced messaging capabilities, personalized avatars, or access to exclusive channels and events. Moreover, the messaging platform will integrate with a variety of other web3 applications and services, such as decentralized marketplaces, prediction markets, or even virtual worlds and gaming platforms. Users could navigate between these different applications within the messaging interface, using their verified identity and token balance to access and participate in various activities. For example, a user could discover a new NFT art collection through a conversation with a friend on the messaging platform, then instantly purchase the NFT using their token balance, and showcase their new acquisition in their personalized gallery within the messaging app. They could then invite their friends to view the gallery and even vote on their favorite pieces, with the winners receiving token rewards.

3.3: EMERGENCE OF NEW CONSUMER CRYPTO SUBSECTORS

As we've explored the potential future developments and innovations within the existing subsectors of the consumer crypto ecosystem, we'll now consider the emergence of entirely new subsectors that could reshape the landscape in coming years. The rapid pace of technological advancement, coupled with the growing adoption of blockchain technologies, creates fertile ground for the creation of new use cases and applications that we may not yet be able to fully imagine. In this section, we will consider some areas where new consumer crypto subsectors could arise, while acknowledging that the possibilities are vast and the discussion here is by no means exhaustive.

> *"Crypto has the potential to have application in essentially every consumer internet service category that exists and many physical goods contexts as well."*
> – Scott Duke Kominers, a16z crypto

3.3.1 ON-CHAIN AI AGENTS

One area of future growth is the development of on-chain AI agents – intelligent, autonomous software programs that can operate and interact on blockchain networks, opening up a wide range of new possibilities for consumer applications and services.

One future application of on-chain AI agents will be the concept of personal AI companion tokens – unique, tokenized digital assistants that are trained on a user's personal data and can be customized, owned, and even traded or licensed on open marketplaces. Imagine a platform that allows users to create their own AI companion by securely uploading and training the agent on their personal data, such as their social media activity, browsing history, and communication patterns. The resulting AI would be a highly personalized digital assistant that can help users navigate online, providing tailored recommendations, filtering content, and even automating routine tasks. Users would have full ownership and control over their AI companion, represented as a unique NFT token. They could customize its appearance, personality, and capabilities through a user-friendly interface, and even collaborate with other users or developers to add new features or skills to their AI. The platform could also provide a marketplace where users can buy, sell, or license their AI companion tokens to others, creating a new economy of intelligent, user-centric digital assistants. The use of blockchain technology and NFTs would enable these AI companions to be

truly owned and controlled by their users, with all data and training happening on decentralized networks to ensure privacy and security. The unique traits and capabilities of each AI would be encoded into its NFT metadata, allowing for easy verification and transfer of ownership.

Compared to traditional, centralized AI assistants like Siri or Alexa, personal AI companion tokens will offer several benefits. Firstly, users will be able to access new economic opportunities enabled through the ownership and trading of these tokens. This would incentivize the development of more advanced and useful AI companions as users aim to create more impactful models that appreciate in value over time. Secondly, the decentralized nature of the platform would ensure that users' personal data remains private and secure, with no central entity having access to or control over the information used to train the AI.

While the concept of Personal AI Companion Tokens highlights one compelling application, on-chain AI agents have numerous other potential consumer use cases. These autonomous software programs can power self-executing smart contract workflows, which can be applied in many different contexts such as governance mechanisms for decentralized autonomous organizations (DAOs), providing validated data inputs as oracles, or acting as personalized financial advisors.

3.3.2 TOKENIZED PERSONAL DATA ECONOMIES

Another promising area for future growth in the consumer crypto space is the emergence of tokenized personal data economies – decentralized systems that allow individuals to monetize and control access to their personal information using blockchain technology and token-based incentives.

Within this new framework, users will earn tokens by providing their personal data to interested parties, such as advertisers, researchers, or application developers. This will include a wide range of information, from demographic and psychographic data to online browsing and purchasing behavior. By tokenizing this data and making it available on decentralized marketplaces, users will be able to generate passive income streams while maintaining control over how their data is used and shared. To maximize their bargaining power and ensure fair compensation for their data, users could join together in data unions or cooperatives. These collective entities would allow individuals to pool their data together and negotiate better terms with potential buyers. Data unions could also provide additional services to their members, such as data cleaning, anonymization, and analysis, to increase the value and utility of the data being sold. Decentralized data marketplaces will play a key role in facilitating the exchange of tokenized personal data. These platforms will enable users to list their data tokens for sale, set their own prices and terms of use, and receive payment in a secure and transparent manner. Buyers, in turn, could browse and purchase the specific data sets they need, with the assurance that the data has been voluntarily provided and fairly compensated. To further enhance the value and liquidity of these data tokens, they could be integrated into the broader decentralized finance (DeFi) ecosystem. Users could lend out their data tokens to earn interest or use them as collateral to borrow other cryptocurrencies. This could open up new avenues for users to leverage their personal data as a financial asset, while still maintaining control over its use and distribution.

These tokenized personal data economies will also integrate zero-knowledge proof cryptography. Zero-knowledge proofs allow one party to prove to another party that a certain statement is true, without revealing any additional information beyond the validity of the statement itself. In a tokenized data context, this technique will enable users to prove they possess certain data attributes or meet specific criteria without disclosing the actual underlying personal data. For example, an advertising buyer could verify a user fits their target demographic while the user's raw age, location, or preferences remain encrypted and private. This approach alleviates concerns around indiscriminate data sharing and strengthens user privacy assurances. Additionally, the mathematical guarantees of zero-knowledge proofs establish a robust foundation of authenticity and integrity for data listings on decentralized marketplaces. Buyers gain confidence that the data is legitimate, and users maintain control. As encryption and privacy-preserving technologies like this become more robust and accessible, their integration will be crucial for establishing user-driven data economies.

Creating more equitable data economies represents more than just new monetization models – it has the potential to restructure the digital identity stack and change the power dynamics between individuals and institutions, with blockchains likely playing a large role in this shift.

PART 4
REGULATION AND CONSUMER CRYPTO

Given the early stage of on-chain consumer products, the regulatory landscape remains largely undeveloped, creating uncertainties for various stakeholders. As these products gain traction, they are likely to face increased regulatory scrutiny. At a high level, regulation typically covers two key aspects:

- Consumer protection, which is a focus across all jurisdictions (covered with examples in Section 4.1).
- Investor protection, primarily through securities regulation, which varies by region and aims to ensure a level playing field between issuers and investors (to be covered by regions in Section 4.2).

This section will explore the regulatory direction for on-chain consumer products, examining past enforcement actions and their potential implications. We will then provide an overview of regulatory frameworks in North America, Europe, and Asia, highlighting key differences and their potential impact on consumer crypto development and adoption.

4.1 ON-CHAIN CONSUMER REGULATORY DIRECTION

To understand the potential regulatory direction for on-chain consumer products, it's instructive to examine past enforcement actions. While these cases do not directly involve on-chain consumer-facing applications, they provide insights into how regulators could approach this emerging space. The following section will discuss notable enforcement actions and their relevance to on-chain consumer products.

4.1.1 FACEBOOK-CAMBRIDGE ANALYTICA

The Facebook-Cambridge Analytica case highlights the potential risks and regulatory implications of mishandling user data, which could hold lessons for on-chain consumer products. In 2018, it was revealed that Cambridge Analytica, a political consulting firm, had harvested the personal data of millions of Facebook users without their consent. The data was collected through a third-party application that used Facebook's platform, with the information then being used to build psychographic profiles for targeted political advertising. The scandal raised concerns about Facebook's data privacy practices and its ability to protect user information from misuse by third parties. The case led to increased regulatory scrutiny of Facebook and other tech giants, with lawmakers in the U.S. and Europe calling for stricter data protection measures. In 2019, the Federal Trade Commission (FTC) imposed a record-breaking $5 billion penalty on

Facebook for violating consumer privacy. The company was also required to implement a comprehensive privacy program and submit to regular audits.

While the Facebook-Cambridge Analytica case involved a centralized platform, it offers valuable insights into how regulators may approach data privacy issues in the context of on-chain consumer products:

- Data ownership and control: One of the key value propositions of on-chain consumer products is giving users greater control over their data. However, if these products fail to provide adequate safeguards or transparently communicate data usage, they could face similar backlash to Facebook. Projects will need to prioritize user privacy and implement robust measures to prevent unauthorized access or misuse of personal information.
- Third-party risk: Just as Facebook faced criticism for allowing third-party apps to access user data, on-chain consumer products will need to carefully vet and monitor any external integrations or partnerships. Regulators may hold projects accountable for the actions of their ecosystem partners, making it crucial to establish clear guidelines.
- Consent and transparency: The Cambridge Analytica scandal highlighted the importance of obtaining explicit user consent for data collection and sharing. To the extent that on-chain consumer products store user data off-chain, they will need to prioritize transparency, clearly communicating what data is being collected, how it will be used, and with whom it may be shared. Failure to obtain proper consent could result in regulatory enforcement.
- Decentralization and accountability: While decentralization is a core feature of many on-chain products, it does not absolve projects of responsibility for user protection. Regulators may still seek to hold projects accountable for data breaches or misuse, even if the underlying infrastructure is decentralized. Projects will need to strike a balance between decentralization and maintaining sufficient oversight to ensure compliance.
- Global regulatory coordination: The Facebook case prompted global conversations about data privacy, with regulators in multiple jurisdictions launching investigations. As on-chain consumer products operate across borders, they will need to navigate an increasingly complex web of international data protection regulations, such as the EU's General Data Protection Regulation (GDPR).

The Facebook-Cambridge Analytica case underscores the importance of prioritizing user privacy and data security in the development of on-chain consumer products. As these products handle sensitive user information and interact with external ecosystems, they will need to implement robust data protection measures, obtain clear user consent, and maintain transparency to avoid regulatory enforcement. With that said, this risk is likely to be less pronounced for on-chain consumer products since user data will typically be stored on-chain and owned by the users themselves, offering users greater control over their personal information.

4.1.2 APPLE APP STORE ANTITRUST

In 2020, Epic Games, the creator of the popular video game Fortnite, filed an antitrust lawsuit against Apple, alleging that the company's App Store practices were anticompetitive. The case centered around Apple's 30% commission on in-app purchases and its prohibition on alternative payment methods or app stores. Epic argued that these policies stifled innovation, limited consumer choice, and allowed Apple to maintain a monopoly over iOS app distribution.

The case attracted significant attention from regulators and industry stakeholders, with many developers echoing Epic's concerns about Apple's App Store practices. In 2021, a U.S. District Court ruled that Apple's prohibition on alternative payment methods was anticompetitive but stopped short of declaring the company a monopoly. The court ordered Apple to allow developers to direct users to external payment options, a decision that could have far-reaching implications for the app ecosystem. While the Apple App Store case involves a centralized platform, it offers valuable insights into how regulators may approach issues of centralized control and competition in the context of on-chain consumer products:

- Decentralization and user choice: One of the key value propositions of on-chain consumer products is providing users with greater choice and control over their digital experiences. However, if these products become overly dominant or restrict user options, they could face similar antitrust scrutiny to Apple.
- Fee structures and revenue sharing: The Apple case highlighted concerns about the fairness of the company's 30% commission on in-app purchases. While on-chain consumer products will need to carefully consider their fee structures and revenue-sharing models, they inherently face less regulatory

risk in this area. The open nature of Web3 typically results in more transparent and competitive fee structures, reducing the likelihood of exploitative or anticompetitive practices. Nevertheless, maintaining clear communication about fees will be crucial for user and regulator trust.

- Interoperability and ecosystem openness: Apple's prohibition on alternative app stores and payment methods was a central issue in the antitrust case. In contrast, on-chain consumer products are inherently designed for interoperability and openness, aligning naturally with regulatory preferences. The decentralized nature of Web3 typically avoids walled gardens, promoting user choice and reducing antitrust concerns. By continuing to embrace open ecosystems and allowing for alternative integrations, on-chain projects can maintain this regulatory advantage.

- Regulatory scrutiny of dominant platforms: As on-chain consumer products grow in popularity, dominant platforms may emerge that attract regulatory attention. Projects will need to be mindful of their market position and ensure that their practices do not run afoul of antitrust laws. This will become increasingly important as these platforms scale.

The Apple App Store antitrust case underscores the importance of fostering competition and avoiding over-dominant control in the development of on-chain consumer products. As these products seek to provide users with greater choice and autonomy, they will need to prioritize open fee structures and user optionality.

4.1.3 AMAZON IN-APP PURCHASE POLICIES

In 2014, Amazon faced regulatory action from the Federal Trade Commission (FTC) over its in-app purchase policies. The FTC filed a complaint alleging that Amazon had violated the FTC Act by allowing children to make unauthorized in-app purchases without parental consent. The complaint stated that Amazon's app store interface made it easy for children to make purchases without realizing they were spending real money, and that the company had not adequately informed parents about the potential for such purchases or provided them with sufficient controls to prevent them.

As part of the settlement, Amazon agreed to refund over $70 million in unauthorized in-app purchases made by children and to change its app store practices to obtain express informed consent for in-app purchases.

The company was also required to provide clear and conspicuous notices about in-app purchases and to give account holders the option to withdraw their consent for future in-app purchases at any time.

The Amazon in-app purchases settlement highlights considerations for on-chain consumer products:

- User protection and informed consent: As on-chain consumer products reach a more mainstream audience, applications that enable various financial transactions will need to ensure that users, particularly vulnerable groups such as children, are adequately protected and informed about the nature and consequences of their actions. This may involve implementing clear notices, consent mechanisms, and user controls to prevent unauthorized or unintended purchases.

- Transparency and user education: The FTC's complaint against Amazon emphasized the importance of clearly communicating the potential for in-app purchases and educating users about how such purchases work. On-chain consumer products will need to prioritize transparency and user education, ensuring that users understand the financial implications of their actions within the app or platform.

- Regulatory compliance and consumer protection: The Amazon case demonstrates the willingness of regulators like the FTC to take action against companies that fail to protect consumers or obtain proper consent for financial transactions. On-chain consumer products will need to navigate a complex web of consumer protection regulations, such as the FTC Act and the Children's Online Privacy Protection Act (COPPA), to avoid similar enforcement actions.

The Amazon in-app purchases settlement underscores the importance of designing on-chain consumer products with user protection and informed consent at the forefront. As these products handle sensitive financial transactions and interact with potentially vulnerable user groups, they will need to implement robust user controls, clear communication, and safeguards to avoid enforcement actions and maintain user trust.

The Facebook-Cambridge Analytica, Apple app store antitrust, and Amazon in-app purchase cases provide a window into the potential regulatory challenges that on-chain consumer products may face as they gain mainstream adoption. While these examples are far from exhaustive, they illustrate the importance of proactively addressing key issues such as data privacy, user choice, fair competition, and consumer

protection. As on-chain consumer products continue to scale, it will be crucial for projects to carefully consider the design of their platforms, fee structures, and ecosystem relationships to mitigate the risk of regulatory enforcement.

4.2: REGULATORY OVERVIEW BY REGION

As the cryptocurrency industry continues to mature, regulatory frameworks play a crucial role in shaping the development and adoption of digital assets across different regions. The regulatory environment in each region impacts the direction of on-chain consumer products, either providing clarity and support for innovation or introducing uncertainty and constraints. The Chainalysis 2023 Global Crypto Adoption Index identifies North America, Europe, and Asia/Oceania as the three largest cryptocurrency markets, accounting for 24.4%, 26.5%, and 28.1% of global on-chain activity, respectively. This section will focus on a high-level overview of key markets within these three regions, considering they are estimated to collectively account for roughly 80% of global on-chain activity. By examining the similarities, differences, and potential implications of these regulatory approaches, we aim to provide greater context around the future development and growth of on-chain consumer products across these key markets.

> *"These varied [regulatory] approaches require that businesses operating in the consumer crypto space must be agile, well-informed, and compliant with local laws, which can differ not only by country but sometimes even within regions in a single country. This complexity highlights the need for ongoing dialogue between the crypto sector and regulators to ensure both innovation and consumer protection."*
> – Cecilia Hsueh, Morph

4.2.1: NORTH AMERICA

The regulatory approach to cryptocurrencies in the United States has been a combination of regulation-by-enforcement and the application of existing financial market frameworks. This approach is consistent with how U.S. regulators have historically responded to new innovations, particularly in the financial services sector. This regulatory stance is largely driven by the inherent lag between the rapid pace of innovation and regulators' ability to comprehensively understand the intricacies of emerging technologies. While this more reactive approach could help minimize the risk of a premature or misguided regulatory framework, it also increases uncertainty and likely suppresses innovation due to concerns over potential regulatory actions. As projects building on-chain consumer products navigate the regulatory landscape in the U.S., they should consider various factors including the different approaches taken by various regulatory bodies, asset classification, and enforcement direction.

The primary regulatory hurdle in the U.S. stems from the overlapping nature of existing laws and regulations. Multiple federal and state-level agencies oversee digital assets, each categorizing them differently based on their function. The IRS considers cryptocurrencies as property for tax purposes, while FinCEN views them more singularly as monetary instruments, applying AML and KYC regulations. The CFTC leans toward classifying digital assets as commodities, while the SEC primarily views them as securities. State-level regulations add another layer of complexity on top of federal oversight. Every state has the authority to create its own regulatory framework, resulting in a patchwork of varying requirements across the country. Each agency seeks to enforce its mandate, leading to inherent tension and ambiguity regarding jurisdictional boundaries. This regulatory complexity is likely to continue without new legislation. Although enforcement actions directly targeting consumer crypto offerings have been limited so far, a handful of cases offer some insights into potential enforcement direction.

NBA Top Shot litigation: In February 2023, a federal judge in the Southern District of New York allowed a securities class action lawsuit to proceed against Dapper Labs, the creator of NBA Top Shot NFTs, setting a precedent for NFTs to potentially be considered securities under federal law. The court found that Top Shots met the criteria of the Howey Test, which determines whether an asset is an investment contract, and therefore a security. Key factors in this decision included Dapper Labs' use of a private blockchain, promotional materials suggesting an expectation of profits, and the distinction between Top Shots and traditional collectibles due to the issuer's control over the underlying blockchain and secondary market.

This case highlights the importance of considering the unique characteristics of NFTs and the platforms on which they are issued when assessing their regulatory status. While the court's decision does not definitively classify all NFTs as securities, it provides a framework for evaluating NFT projects on a case-by-case basis. The outcome of this lawsuit could have significant implications for the broader NFT market and may signal further legal action and increased regulatory scrutiny. As the consumer crypto landscape continues to grow, it is crucial for NFT issuers to carefully consider the design and promotion of their offerings to mitigate potential securities law risks and ensure compliance with applicable regulations.

bZx Dao litigation: In March 2023, a California federal court made a significant ruling in a class action lawsuit, Sarcuni v. bZx DAO, which could have far-reaching implications for the legal status of decentralized autonomous organizations (DAOs). The court allowed the case to proceed on the basis that the bZx DAO, which operated a crypto-based protocol, could be considered a general partnership. This meant that individual token holders might be held liable as partners for losses arising from a $55 million hack of the protocol. The court's decision hinged on factors such as token holders' rights to participate in DAO governance, the potential to share in profits and losses, and contributions made to the DAO. Notably, the court suggested that merely holding governance tokens, even without actively voting, could be sufficient to establish partner status and liability.

While not setting a binding legal precedent, the bZx DAO case highlights the complex challenges courts face in applying traditional legal frameworks to DAO structures which could hold implications for consumer crypto projects.

4.2.2: EUROPE

The European Union (EU) has taken a significant step towards establishing a comprehensive regulatory framework for the crypto industry with the approval of the Markets in Crypto-Assets (MiCA) regulation. Proposed by the European Commission in September 2020, MiCA aims to create a framework for the crypto-asset sector across the EU. MiCA covers a wide range of crypto-assets, including utility tokens, asset-referenced tokens, and stablecoins, as well as service providers such as trading venues and wallets. The regulation will supersede conflicting national legislation within EU member states, replacing the current fragmented regulatory landscape. Once a crypto-asset service provider obtains a license from a regulator in one country, they will be permitted to operate across all 27 member states under this new framework.

While MiCA creates a uniform legal framework that covers a wide range of crypto assets and services, it doesn't directly address on-chain consumer products. Utility tokens facilitating access to products or services would likely fall under MiCA's regulatory purview, but the treatment of offerings like NFTs and other consumer-facing protocols is still unclear. The regulation aims to provide a framework for stakeholders to operate with greater certainty, but its principles-based approach leaves room for evolving guidance as new use cases emerge. As on-chain consumer applications grow, ESMA may issue additional rules addressing areas like fractional ownership of NFTs, play-to-earn gaming models, or other blockchain-powered consumer apps. Compliance obligations such as disclosure requirements, investor protection safeguards, and potential licensing needs could impact how these consumer-focused offerings operate and are structured within the EU market. Although enforcement actions targeting on-chain consumer products have been limited in the EU so far, a few notable cases provide insight into potential regulatory direction:

Sorare: In October 2021, the French National Gambling Authority (ANJ) launched an investigation into Sorare, a blockchain-based fantasy football platform and determined it should be classified as a gambling service. Sorare, which allows users to buy, sell, and trade digital player cards as NFTs to be used in fantasy football games, was required to make changes to its platform. Sorare introduced enabled access for free users to ensure that the platform remains inclusive and less dependent on monetary transactions. The platform also strengthened measures to protect minors and prevent excessive gambling, including more rigorous user verification and spending limits.

This case highlights the potential for on-chain gaming and collectible projects to face regulatory scrutiny based on their specific mechanics and features. Projects will need to carefully consider how their platforms may be perceived by regulators and ensure compliance with applicable laws, such as gambling regulations.

Decentraland: In November 2021, the Spanish National Securities Market Commission (CNMV) issued a warning to investors about the risks associated with buying virtual land in Decentraland, a decentralized virtual world platform. The CNMV cautioned that virtual land purchases are not regulated and that investors may be exposed to fraud, price volatility, and liquidity risks.

While not an enforcement action per se, the CNMV's warning underscores the regulatory challenges facing metaverse and virtual world projects. As these platforms grow in popularity, on-chain consumer projects operating in this space may face increased scrutiny and will need to prioritize investor protection and risk disclosure.

4.2.3: ASIA

Asia has seen a diverse range of regulatory approaches to cryptocurrencies and blockchain technology. While countries like China and India maintain a conservative stance, countries like Japan and South Korea are introducing regulatory frameworks that aim to be cautiously supportive. On the other end of the spectrum, Singapore takes a more progressive approach to cryptocurrency regulation, potentially positioning itself as a hub for blockchain innovation. This section will look at two noteworthy regions at opposite ends of the spectrum in regulatory development – China and Singapore.

I. CHINA

China has taken a stringent approach to cryptocurrencies, with the People's Bank of China (PBoC) banning initial coin offerings (ICOs) and cryptocurrency exchanges in 2017. In September 2021, the PBoC issued a notice declaring all cryptocurrency-related activities illegal, including trading, mining, and foreign exchanges serving Chinese users. This move effectively shut down the crypto industry in China, forcing major exchanges and mining operations to relocate overseas.

However, it's worth noting that while China has numerous prohibitions, law enforcement can be selective. As long as an activity doesn't cause major issues, it may operate in a grey area, even if technically prohibited. Projects that align with government priorities or maintain a low profile might find ways to operate, despite the restrictive environment. This dynamic might create pockets of opportunity for on-chain consumer products, though operators need to remain cautious as regulatory tolerance can shift quickly.

Under this regulatory environment, on-chain consumer products in China would likely face significant challenges. Any products involving cryptocurrencies or token-based incentives would be prohibited, limiting the potential for decentralized applications and token economies. Although enforcement actions targeting on-chain consumer products have been limited in China due to the blanket ban on cryptocurrencies, a few notable cases provide insight into the government's stance:

NFT Platforms: In October 2021, the National Internet Finance Association of China, the China Banking Association, and the Securities Association of China jointly issued a statement warning against the risks of investing in non-fungible tokens (NFTs). The associations cautioned that NFTs could be used for money laundering, speculation, and fraud, and urged investors to exercise caution. While not an outright ban, this warning signaled the government's wariness towards the growing NFT market and its potential impact on financial stability.

Blockchain-based Gaming: In September 2019, the People's Daily, the official newspaper of the Chinese Communist Party, published an article criticizing blockchain-based games and play-to-earn models. The article argued that these games were promoting gambling and speculation under the guise of blockchain innovation and called for stricter regulation of the sector. While not a specific enforcement action, the People's Daily article reflects the government's negative perception of blockchain-based gaming and the potential for regulatory crackdowns on projects operating in this space.

On-chain consumer projects in China will need to navigate a complex and potentially restrictive regulatory environment. Successful projects will likely need to align with the government's vision for a centralized, state-controlled blockchain infrastructure and demonstrate clear benefits to the national agenda. China's central bank has been actively developing its own digital currency, the digital yuan or e-CNY. The digital yuan is designed to operate within China's centralized financial system and is fully controlled by the PBoC. The development of the digital yuan highlights the government's desire to harness the benefits of blockchain technology while maintaining strict control over the financial sector.

II.SINGAPORE

Singapore has taken a more progressive approach to crypto regulation, positioning itself as a hub for blockchain innovation in Asia. The Monetary Authority of Singapore (MAS) has been proactive in engaging with the crypto industry and providing guidance on regulatory compliance. In January 2020, the Payment Services Act (PSA) came into effect, introducing a licensing framework for digital payment token (DPT) services, which include cryptocurrency exchanges and custody services. Under the PSA, utility tokens that do not represent ownership rights or promise future returns are not considered securities, while asset-backed tokens and securities tokens are subject to prospectus requirements and licensing obligations.

For on-chain consumer products in Singapore, the regulatory environment is relatively supportive, albeit with some restrictions. Decentralized applications and token economies are permitted, provided they comply with the PSA and other relevant regulations. Consumer protection is a key priority for MAS, so projects would need to implement robust security measures, disclose risks clearly, and have adequate dispute resolution mechanisms in place. However, certain types of consumer products may face additional

scrutiny or restrictions. For example, stablecoin issuers may be subject to more stringent requirements, such as maintaining adequate reserves and providing regular audits. Gambling or gaming applications may also be restricted, as Singapore has strict laws on online gambling. A few notable cases provide insight into the regulatory approach:

Binance: In September 2021, the MAS placed Binance.com, the global cryptocurrency exchange, on its Investor Alert List, warning that the platform was not licensed or regulated by the authority. The MAS also stated that Binance may have violated the Payment Services Act by providing payment services to Singapore residents without an appropriate license. In response, Binance ceased offering certain products and services to Singapore users and announced plans to establish a local entity to comply with regulations. Despite Singapore's more progressive approach, on-chain consumer projects will still need to ensure they have the appropriate approvals and safeguards in place to avoid regulatory enforcement.

Three Arrows Capital: In June 2022, the MAS reprimanded Three Arrows Capital (3AC), a Singapore-based cryptocurrency hedge fund, for providing false information and exceeding its allowable assets under management (AUM) threshold. The MAS also issued a notice of intention to withdraw 3AC's registered fund management company status. While not directly related to on-chain consumer products, the case highlights the MAS's willingness to take action against crypto-related entities that violate regulations or engage in misconduct.

4.2.4 IMPLICATIONS FOR ON-CHAIN CONSUMER PRODUCTS

The diverse regulatory approaches across North America, Europe, and Asia hold implications for the future of consumer crypto. These differences are likely to shape the development, adoption, and innovation of on-chain consumer products in various ways:

- Innovation Hubs: Regions with more supportive regulatory environments, such as Singapore, may emerge as hubs for consumer crypto innovation. We might see a concentration of startups and projects in these areas, potentially leading to accelerated development of user-friendly applications.
- Market Fragmentation: The varied regulatory landscape could result in a fragmented global market for consumer crypto products. Applications may need to be tailored to comply with specific regional requirements, potentially limiting their global scalability.
- Adoption Rates: Countries with clearer regulatory frameworks, like those under the EU's MiCA, might see faster adoption of consumer crypto products due to increased investor confidence and regulatory certainty.
- Product Design: The regulatory approach in different regions could influence the design of consumer crypto products. For instance, products developed in more restrictive environments like China might focus more on underlying blockchain technology rather than cryptocurrencies or tokens.
- Cross-Border Collaboration: The disparate regulatory landscape might encourage more cross-border collaboration between projects and regulators to establish international standards for consumer crypto applications.
- Regulatory Competition: Importantly, innovation flourishing in more relaxed regulatory environments could influence other jurisdictions to reconsider and potentially relax their regulatory requirements. This creates a game theory dynamic where regions might compete to attract innovation and investment in the consumer crypto space, potentially leading to a gradual harmonization of regulatory approaches over time.

These insights suggest that the consumer crypto landscape will likely evolve unevenly across different regions, at least initially. While this presents challenges, it also creates an environment where different regulatory approaches can be observed and compared. Projects that can navigate these diverse regulatory environments and adapt their products accordingly may be best positioned for global success in the consumer crypto space. Moreover, the competitive dynamics between regulatory jurisdictions could ultimately drive a more favorable environment for consumer crypto development globally.

PART 5
CONCLUSION & OUTLOOK

Throughout this report, we have defined, mapped, and analyzed the emerging sector of consumer crypto. Our goal was to provide a clear overview and taxonomy of consumer crypto, which is crucial for understanding its potential impact on the global consumer landscape. By establishing a common language and framework, we aim to facilitate more focused discussions, guide investment decisions, and inform regulatory approaches in this field.

Our analysis has identified several notable trends and developments in the consumer crypto space:

1. Mainstream Adoption Potential: Nearly one-third of Fortune 100 companies have consumer crypto initiatives in development, signaling growing recognition of blockchain's potential in consumer applications. Additionally, certain on-chain consumer products are showing signs of product-market fit.
2. Infrastructure Development: The emergence of user-friendly wallets, efficient payment systems, and robust identity management solutions is laying the groundwork for more accessible consumer crypto experiences.
3. Regulatory Competition: The varied global regulatory landscape is creating a 'natural experiment' in consumer crypto development. This divergence may lead to unexpected innovations in less regulated markets, potentially forcing stricter jurisdictions to reconsider their approach to remain competitive.
4. Emerging Use Cases: The rise of on-chain AI agents and tokenized personal data markets could revolutionize how consumers interact with digital services and manage their personal information.
5. User Experience as a Key Driver: The success of consumer crypto will largely depend on its ability to abstract away technical complexities and deliver intuitive, value-additive experiences to users.

Consumer crypto represents a growing field at the intersection of blockchain technology and the consumer landscape. While still early in its development, this sector shows potential to reshape how individuals interact and transact in their everyday lives. The building blocks are being put in place across the application and infrastructure layers to enable a more user-owned, transparent, and directly monetizable consumer experience. It is often argued that decentralized ledger technology will become the backbone of large parts of the global financial infrastructure. This raises an intriguing question: If the future financial system is expected to leverage crypto rails, can we anticipate a similar transformation in consumer industries?

APPENDIX 1

TRADITIONAL COMPANY ANALYSIS METHODOLOGY

We outline below the methodology employed in our analysis of traditional company involvement in the consumer crypto industry. Our approach was designed to ensure a comprehensive and accurate assessment of the penetration and maturity of consumer crypto initiatives among leading traditional companies.

DATASET SELECTION AND REFINEMENT

To establish a representative sample for our research, we selected the companies included in the 2023 Fortune 100 list as the initial dataset. This list comprises some of the largest and most influential companies in the United States, across a range of industries. From this initial list, we excluded companies that were not primarily focused on consumer-oriented products and services, as defined by the MSCI's Global Industry Classification Standard (GICS). This refinement process yielded a subset of 33 companies, allowing us to concentrate our efforts on evaluating the penetration of consumer crypto initiatives specifically within industries directly serving end consumers.

While our analysis was not exhaustive, as it did not encompass the entirety of the traditional consumer company landscape, we deliberately concentrated on this specific cohort to strike a balance between the scale of our scope and the volume of consumer crypto initiatives. By focusing on this representative sample of leading consumer-oriented companies, we aimed to gather a sufficient volume of initiatives to uncover indicative trends and patterns in consumer crypto adoption among traditional players.

DATA COLLECTION AND VERIFICATION:

After identifying the subset of companies for analysis, we developed a set of relevant keywords related to consumer crypto initiatives, such as "blockchain," "crypto," "NFTs," "metaverse," and "digital assets." We then paired each company name with these keywords to construct targeted Google search queries. The search results were scraped to extract the links to articles and press releases discussing consumer crypto initiatives launched by the selected companies.

To ensure the accuracy and relevance of the collected data, we manually reviewed each link and recorded the pertinent information in a structured Excel document. During this process, we excluded any initiatives that were either duplicates of those already recorded or did not align with our definition of consumer crypto. For each valid initiative identified, we documented key details such as the announcement date of the article, the stage of the initiative (ideation, development, pre-launch/beta testing, or publicly launched), and the primary industry of the company launching the initiative.

DATA ANALYSIS AND VISUALIZATION:

With the collected data organized in a structured format, we analyzed the data to evaluate the penetration and maturity of traditional company involvement in consumer crypto over time. We aggregated the initiatives by year, stage, and industry to identify emerging patterns and trends. To facilitate a clear understanding of the findings, we created visual representations of the data, including charts that showcase the growth in consumer crypto initiatives over the five-year period from 2019 to 2023 and the distribution of initiatives across different stages of development.

NOTES ON METHODOLOGY:

While our methodology provides valuable insights into the adoption of consumer crypto initiatives among leading traditional companies, it is important to acknowledge the limitations of our approach. The analysis relies on publicly available information sourced through Google search queries, which may not capture all relevant initiatives, particularly those that are not widely publicized or are in stealth mode. Additionally, the manual data collection and verification process, while thorough, may be subject to some level of human error or interpretation. Despite these limitations, we believe that our methodology offers a robust and systematic approach to assessing the state of consumer crypto adoption among traditional companies.

APPENDIX 2

CRYPTO-NATIVE USER ACTIVITY METHODOLOGY

We outline below the methodology employed in our analysis of user growth across consumer crypto subsectors using web traffic data. Our approach was designed to provide a consistent and comparable metric for evaluating the adoption and growth of various consumer crypto applications, even when other types of user data may not be uniformly available or applicable.

DATASET SELECTION:

To establish a representative sample for our research, we identified a set of leading consumer crypto applications across each of the key subsectors outlined in Section 2. These applications were selected based on factors such as their prominence within their respective subsectors, the availability of reliable web traffic data, and their overall relevance to the consumer crypto landscape.

While this sample may not encompass the entirety of the consumer crypto application space, we deliberately focused on a diverse set of leading applications to provide indicative insights into the growth trends and patterns within each subsector. By selecting applications with significant market presence and user adoption, we aimed to capture a representative picture of the overall growth dynamics across the consumer crypto landscape.

DATA COLLECTION AND VERIFICATION:

To gather web traffic data for the selected consumer crypto applications, we utilized the Ahrefs platform. Ahrefs provides comprehensive website traffic data, including estimates of average monthly organic search traffic for a given domain. Organic traffic refers to the number of visitors a website receives each month from unpaid search engine results. Ahrefs calculates this metric by:

1. Identifying all the keywords for which the target website ranks in the top 100 organic search results.
2. Estimating the search traffic the target website receives from each keyword based on its ranking position, monthly search volume, and Ahrefs' estimated click-through rate (CTR) for that position.
3. Summing up the traffic estimations for each keyword to arrive at an overall organic traffic estimate.

While these organic traffic estimates do not represent exact traffic figures, they provide a consistent and comparable metric for evaluating relative user growth over time.

DATA ANALYSIS AND VISUALIZATION:

With the web traffic data collected and verified, we analyzed the data to assess the growth trajectories and relative adoption rates of the selected consumer crypto applications. We aggregated the data by subsector and over time to identify emerging patterns and trends in user growth. To facilitate a clear understanding of the findings, we created visual representations of the data, including charts that showcase the month-over-month growth in organic traffic for each application, as well as comparative analyses of growth rates across different subsectors.

NOTES ON METHODOLOGY:

While our methodology provides valuable insights into the user growth dynamics of consumer crypto applications, it is important to acknowledge the limitations of relying solely on web traffic data. Factors such as the use of mobile apps, the prevalence of direct traffic, or the impact of paid advertising campaigns may not be fully captured by organic traffic estimates alone. Moreover, web traffic data does not provide a complete picture of user engagement, retention, or monetization, which are critical factors in evaluating the overall success and sustainability of consumer crypto applications. Despite these limitations, we believe that the use of web traffic data offers a valuable and consistent proxy for comparing user growth across a diverse range of consumer crypto applications. By combining these insights with other available data points and qualitative analyses, we aim to provide an overview of the growth trends within the consumer crypto landscape.

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