# Solido Games – An Decentralized Ecosystem for Multichain Game Aggregation, playNFT Trading and Tournaments

Abstract

Combining technologies of the metaverse, blockchain ledgers, and decentralized networks into a unified platform with an intuitive user interface, Solido Games represents the state-of-the art in gaming today bringing players, developers, and NFT traders together in one interactive ecosphere. Solido Games platform includes three important elements (i) a P2E GameFi Aggregator, (ii) a MVP GameFi Launchpad, and (iii) an Metaverse Market for token and NFT trading. Specifically, Solido's P2E GameFi Aggregator provides players convenient access to a wide selection of online and play-to-earn (P2E) games hosted across multiple blockchain networks. In the P2E GameFi Aggregator, players are able to sort and select games by cost, genre, devices, blockchain, NFT and crypto support, popularity, ratings, and by special offers. In its MVP GameFi Launchpad, game makers are able to fund, develop, and launch new games in the Solido ecosphere, and promote their releases to gamers through special offers and token incentives, thereby bridging the gap between players and developers. Another unique innovation of Solido is its Metaverse Market, a market to swap or procure NFTs or exchange crypto (SLG token).
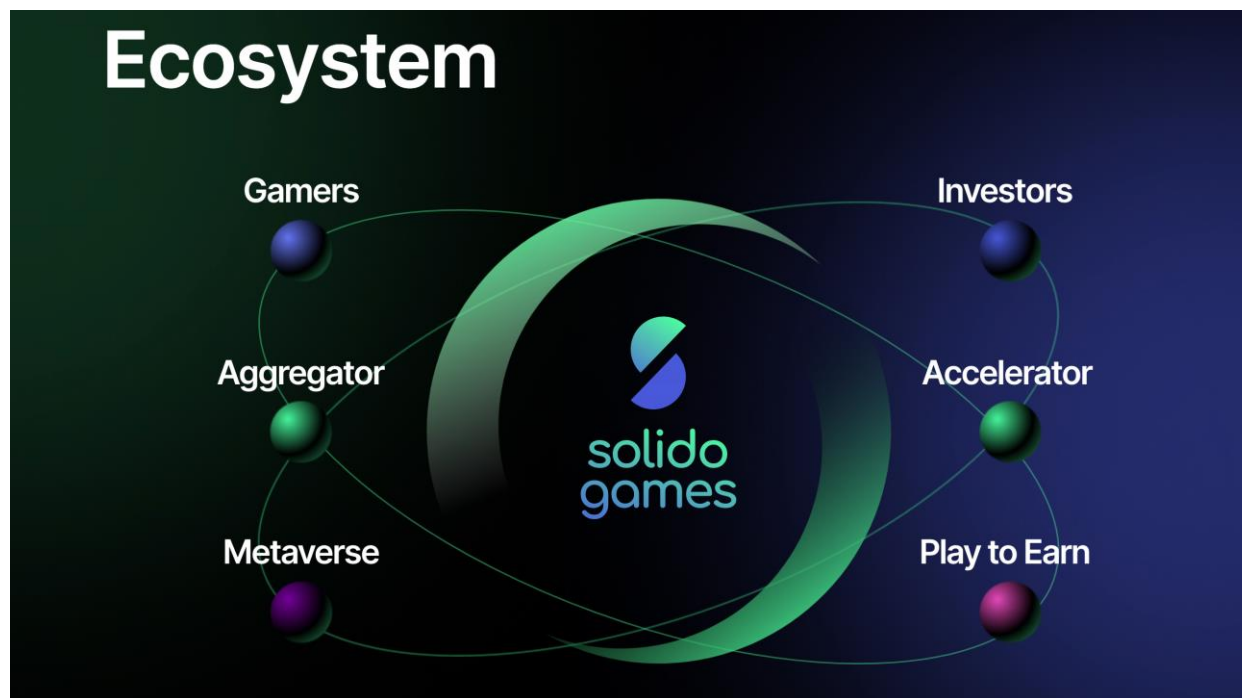
Solido's innovative Metaverse Market provides a cryptoeconomic bridge between the real world and the metaverse enabling gamers to swap or borrow assets to obtain game pieces or NFTs or enable players to monetize their winnings through NFT trading.

Another unique creation in the Solido Games ecosphere is its platform's tokenization model involving Solido Game's (soon to be release) SLG token and the Solido DAO. The SLG token issued by Solido Games is a fungible governance token. Gamers and investors acquire SLG tokens from the market and may either swap the SLG tokens for NFTs in its Metaverse Market or may stake the tokens in the Solido DAO. By staking SLG tokens, gamers gain access to special offerings or higher game tiers, enhancing their P2E earning potential and return rate. Staking SLG tokens naturally reduces the token's circulating supply providing the potential for added price appreciation as the Solido Game ecosphere grows. Moreover, Solido DAO stakers have governance participation rights, able to influence the selection of new offerings and vote on token incentive programs.

A key feature of the Solido Games ecosphere is its unique adaptation of decentralization and blockchain ledgers to metaverse gaming including immutably accurate record keeping of P2E game winnings, account and identity validation (AAA), and uncorrupted software distribution. Collectively, the Solido Games platform (including is P2E GameFi Aggregator, MVP GameFi Launchpad, and Metaverse Market), the Solido DAO, and the SLG token facilitate and enable a new era in online P2E blockchain gaming and commerce therefrom including GameFi and MetaFi.
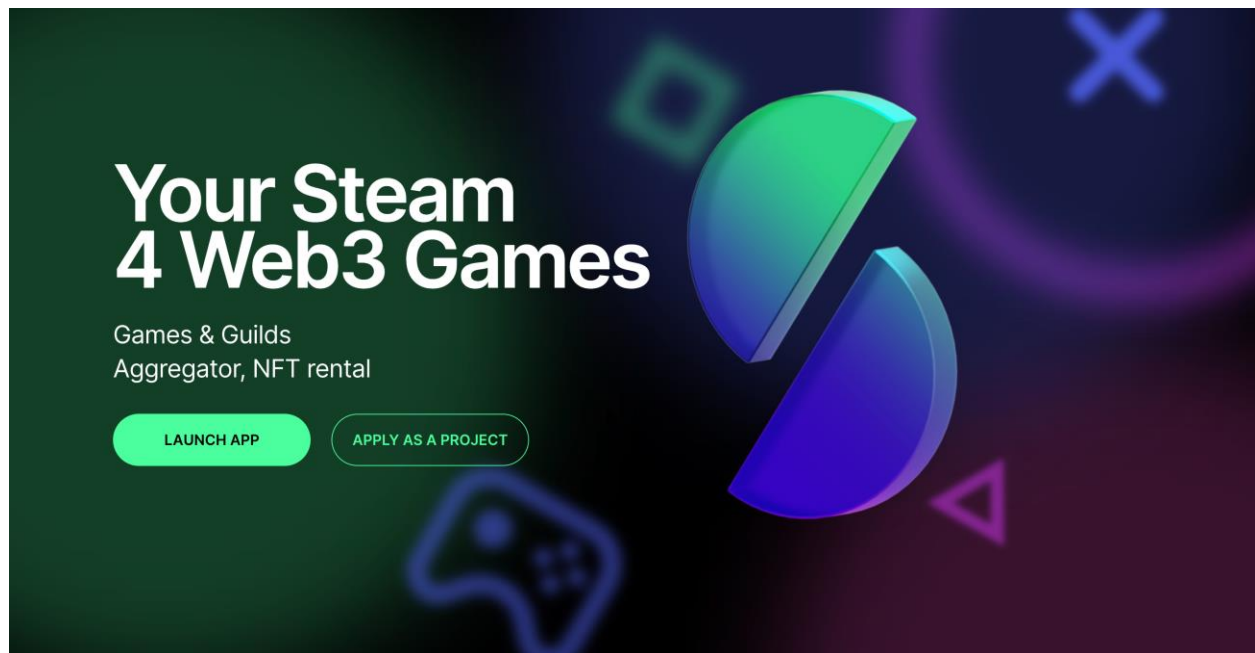
Gaming Industry Dynamics

Gaming as a Technology Driver: Gaming has always been one of the most dynamic businesses in consumer electronics, acting as catalyst and early adopter in the development of semiconductors, microprocessors, electronic data storage, display technology, communications, virtual reality, and more. Any visit to the annual Las Vegas Consumer Electronics Show (CES) immediately reveals the preeminence of the gaming sector – it requires an entire exhibition hall of its own.

Historically, the video game industry has always been a technology driver [1]. In the 1970s (before the mobile phone, personal computer, and the Internet) gaming represented a major end-market for a fledgling tech industry and one of the earliest applications of revolutionary invention – reconfigurable logic, aka the microprocessor. Using ROM cartridges [2] , gaming also pioneered one of the earliest forms of electronic content distribution.

As a market however, entertainment and gaming at that time simply wasn't big enough to economically support the entirety of the tech sector. The financial contraction of game flagship company Atari [3] followed by the video game crash [4] of 1983, a global economic recession [5], stagflation, massive layoffs, and an energy crisis nearly bankrupted the nascent semiconductor and computer industries.

Yet despite the economic crisis, technological innovation in the 1980's actually accelerated. In the boom or bust mentality of Silicon Valley, engineering instantly refocused its attentions away from gaming and onto personal computing, the graphical user interface [6] (Xerox PARC, Apple

Macintosh, Microsoft Windows), high-capacity optical storage (the Laserdisc and the CD), and the Internet. Meanwhile, the epicenter of game development relocated to Japan led by Nintendo and Sega who vied for ownership of the struggling American gaming survivors. By 1994, however, integration of 3D graphics and the CD ROM into a new gaming console, the PlayStation [7], propelled Sony Entertainment into a dominant position in the video game industry. CD ROM game distribution also drove CD media [8] manufacturing capacity increases, further accelerating widespread adoption of optical storage media.

By decades end, game consoles also added Internet connectivity. Although the capacity and speed of the Internet itself grew rapidly, the last-mile local connection to the home prevented widespread adoption of online gaming and content distribution. With high definition video files exceeding the capacity of the CD, a new physical medium was required. Following extensive delays and bickering over data storage formats, the digital video disc or DVD was finally release. Samsung beginning mass production of DVDs in 1996 followed by Sony launching PlayStation 2, the first gaming console with a built-in DVD player [9] useful for both viewing video content and for game distribution and installation.

Meanwhile, cable companies were working feverishly to increase network bandwidth culminating with the industry wide adoption of broadband standard for cable and fiber called DOCSIS [10], an acronym for "data over cable internet specification" able to support multicast video, data, and VoIP concurrently supporting set top boxes and cable modems. By 2006, cable download capacities had surged from 40 Mb/s to 1 Gb/s able to support both gigabit Ethernet and 802.11 b/g WiFi local area networks. Soon thereafter, the launch of seventh-generation game consoles described as high-bandwidth *entertainment centers* brought greater focus to connectivity and content access. To compete with notebooks and PCs advances, these new consoles included HD Blu-ray players, Bluetooth wireless input devices, wireless connectivity via 802.11b/g/ac WiFi, and gigabit Ethernet. Contemporaneously, LED backlit flat-panel LCDs (and eventually HDTVs and AMOLED displays) displaced the CRT "TV-tube" as the dominant display for gamers.

| ROM cartridge game console | CD/DVD game console | Web 2 gaming & entertainment | Decentralized (Web 3) mobile metaverse gaming |

While performance gaming continued to concentrate on regular releases of consoles offering superior graphics speed and gigabit communication data rates, a parallel market opportunity in gaming emerged focused on *mobility*. Unlike the poor image quality low-cost handheld games of yesteryear, the newest smartphones and tablet integrated high-resolution color LCD and AMOLED touchscreens, high-speed parallel processors, with WiFi and 5G connectivity rivaling the performance of home units. After the long wait, the gaming industry finally had what it wanted all along – high speed telecommunication networks able to provide digital distribution of games over broadband Internet. Numerous online distribution services [11] emerged including the Sony PlayStation store, Xbox game store, Electronic Arts Origin, GameStop, Amazon.com and more.

Further increases in broadband download data rates made possible by new technologies, including Gigabit Ethernet (802.3, 1000Base) at 1 Gb/s, WiFi (802.11ax) at 2.4 Gb/s, 5G telephony at 1 to 10 Gb/s, and DOCSIS 4.0 cable and fiber at 10 Gb/s not only reduce download times and latency but open entirely new game markets referred to as *game streaming* [12][13]. In game streaming, also referred to as cloud gaming [14][15][16] or game-as-a-service (GaaS), players access game software on network based servers translated into gaming commands, with the real time results streamed back to the player. In this manner the gamer avoids the cost of purchasing the game and the cost of owning game specific hardware on which to perform the commands. Players may access the streaming service either through an dedicated application (e.g. GeForce Now, PlayStation Now, Shadow) or via any popular web browser. Smartphones may be used for game streaming either on Android or on iOS using Safari browser and Xbox Game Pass. In addition to a streaming service, competitive cloud gaming requires a game controller, typically using a gamepad or any Bluetooth system compatible controller.

Given gaming's unique role as an early adopter, the time has come for the next leap in game tech – the blockchain, Web 3 application decentralization, tokenization, and the metaverse.

Market Gaming Trends: The reported worldwide gaming market [17] for 2021 was approximately $180 billion USD up 1.4% from 2020. Today's gaming market is segmented into three categories comprising (i) game consoles, (2) personal computers, and (iii) mobile devices. Of these, the mobile market (dominated by smartphones) represents $93.2 billion USD or 52%, followed by gaming consoles at $50.4 billion USD or 28%. At $36.7 billion USD, gaming on PCs makes up the remaining 20%.
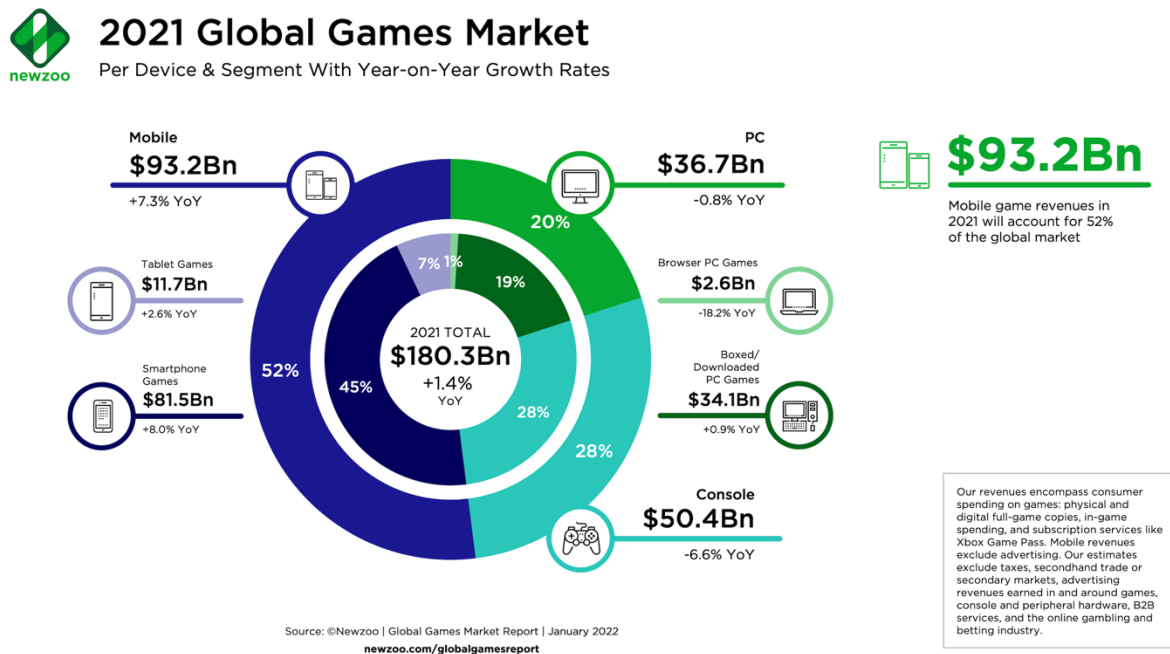
While game market researchers agree historically, there is no consensus on projected market growth rates. Estimates vary widely [18][19] with cumulative average growth rates (CAGR) ranging from a pessimistic 1.4% near term to an explosive 13.2% YoY over five years, with estimated markets of $314 billion in 2027 to as high as $546 billion in 2028.. How can market growth forecasting be so difficult to gauge? Frankly, there is a lot going on in the world right now. Factors impacting the global market include macro and microeconomics as well as evolving population demographics. Events and trends affecting the gaming market include the following dynamics:

- One major macroeconomic factor affecting personal spending globally was the COVID-19 pandemic, which with busines shutdowns, bankruptcies, and shelter-in-place orders reduced disposable cash and overall personal spending. While purchases of luxury items declined, spending on staples and necessities increased. Required for at-home learning and for contactless delivery during home quarantines, Internet connectivity became a living necessity, not a luxury.

- Overall, the market for smartphone gaming demonstrated robust growth of 7.3% YoY while PC gaming remained flat and console sales declined (see figure). In other words, negative growth factors in the overall gaming market represent an adjustment in market segmentation within the sector, largely driven by macroeconomic conditions unrelated to gaming, not a slowing of growth. In particular, delays of new game consoles and slower PC sales are at least in part due to supply chain shortages stemming from the pandemic.

- According to one survey [20], 4.95 billion people used the Internet in October 2021, constituting 62.5% of the world's population. Nearly a quarter billion new Internet users were added in the 2021, with 91% of cell phone subscribers using their phone as a means for Internet access.

- A growing number of Internet users now subscribe to online content, including 3 billion Internet users who reportedly watched streaming or downloaded video at least once per month. Paid video streaming subscriptions globally hit 1 billion viewers, up 26% YoY [21].

- In 2021, consumers purchased 1.4 billion new smartphones [22] and 341 million personal computers [23] (including desktops, notebooks and workstations).

- The number of gamers worldwide [17] exceeded 3.2 billion in 2021, roughly 65% of all Internet users (40% of the earth's population) with 55% of gamers in Asia-Pacific.

- As a distraction from personal isolation of social distancing and lockdowns caused by the pandemic, engagement in the digital and virtual world increased dramatically. Reports suggest online gaming in India increased in duration by 53% to 7 to 8 hours per week [24]

- Online gaming is estimated at 1 billion players worldwide [25], with China, South Korea, and Japan having the largest social gaming communities, and with Africa showing the highest new player adoption rate.

- Game streaming and cloud gaming grew to 24 million paying users in 2021 comprising a $1.6 billion USD market [26]. Major game servers include [27] NVIDIA GeForce Now, Sony PlayStation Now, Google Stadia, Amazon Luna, and game dedicated vendors such as Shadow, Vortex, and more. Many video streaming services such as Netflix are also considering moving into game streaming services [28]

- As post WWII baby boomers retire declining as a percentage of the active consumer market, the gaming market for millennials and especially gen X, Y, and Z players continues to expand. Unlike the boomers connecting to the Internet through PCs and cable services, younger consumers demand mobility. Gaming is therefore expected to continue to migrate to smartphones and tablets.

- In 2021, online social community gaming such as MOBA [29] (multiplayer online battle arena) and MMORPG [30] (massively multiplayer online role-playing games) expanded their reach, hitting share-of-markets (SOMs) of 68% and 74% respectively.

- Aside from game streaming, the gaming industry also includes 1.2 billion gaming video content (GVC) streaming subscribers for Twitch and others [31].

Centralization & Cloud Gaming: Despite all the technology advances in consumer electronic devices and improvements in network speed, with a steady migration to game streaming and cloud services, the administration of present day online gaming and software distribution still remains *centralized*. In centralized services, also referred to as Web 2 services, a limited number of centralized server farms controlled by a resource owner or central authority decide what and how distribution and access is granted.

Like in banking and finance, centralization in gaming is both good and bad. Centralization is advantageous as a convenient means to manage the distribution of software updates. It also renders it easier to confirm account identity. But it also means the gaming ecosphere is controlled by its host who sets the rules and defines its performance. The result is not so favorable. Online gamers have numerous complaints regarding a poor *user experience* in their online gaming. Common UX complaints [32] regarding game streaming include

- Slow response time
- Poor interoperability across devices
- Customized hardware requirements
- Host purchase locking
- Game availability
- Privacy

Response time. Slow response time in centralized systems is not simply a matter of network latency and propagation delay in the communications network [33][34], it is a manifestation of the limited allocation of computing resources and poor data routing. In a game streaming service with a limited number of nodes data traffic density naturally rises as streams approach the centralized nodes, compressing packets flowing into the datacenter but even more so, affecting the fluidity of visual images flowing outward from the datacenter to the player.

Funneling content through a limited number of nodes into a datacenter creates artificial network congestion manifested as slower communication data rates and increase latency [35], even when there is nothing wrong with the network itself. Moreover when a GaaS ecosphere is centralized, response time depends on the availability and the allocation of compute resources for the service's gaming clients, and is especially sensitive to localized network congestion [36]. The total resources made available becomes a matter of budgeting, how much funding (and bandwidth) the streaming provider allocates to the community. In other words, the host platform doing the streaming decides what performance a player gets. Less scrupulous game service providers even have the ability to "throttle" a player's response speed based on how much they pay in fees to the service, i.e. whatever tier they are in or whether they are a VIP client.

The technology exists to overcome many of the forgoing speed issues. Decentralization by moving computing nodes onto multiple edge devices [37], locating servers closer to clients (with distance measure by propagation delay), and utilizing IaaS (infrastructure-as-a-service) and P2P routing protocols [38] to relieve congestion and improve responsiveness are a few tools available to improve gaming user experience (assuming, the host platforms have any interest in doing so.)

Interoperability. Video streaming services are well regarded for their ability to multicast video content seamlessly to virtually any device, be it computer, tablet or phone; irrespective of the device manufacturer, the operating system or the browser employed. Theoretically by offloading game computing onto a host server, the same benefit should be available to gamers. Challenges however exist in iOS with conflicts regarding access rights and privacy provisions. As such, Google Stadia and Nvidia GeForce now require browser work-arounds to run on iOS devices. Only recently did Xbox Game Pass release a iOS version.

Hardware. Historically in gaming, the interchangeability of gamepads and controllers has inspired healthy competition among suppliers leading to new features and lower costs. But in an effort to attract new clients, a number of suppliers of late have been offering controllers customized for specific platforms or games by promising performance benefits (for example reduced latency) but at the risk of fostering incompatibility issues with specific game streaming services.

Host Locking. Common Web 2 marketing strategies by Big Tech lock a consumer's purchases or leases onto their platform to discourage cross platform activities or competitive shopping. A movie purchased on one streaming service cannot be viewed on another even though the purchaser bought the movie, like buying a DVD that can only be viewed on a Samsung disc player.

It comes as no surprise this monopolistic Web 2 marketing practice has migrated into cloud gaming. Purchases or leasing of a game on one host service are locked to that specific service and cannot be transported onto another service. Instead if the player wishes to engage a gaming community on a different network, they are forced to purchase the same game again even though they already own it. Host locking therefore prevents software transportability meaning a gamer is getting a streaming-only version that works on one service. While this practice may be understandable for new game releases, for legacy games (which people are unlikely to repurchase) it is an unnecessary and unreasonable restriction.

If a gamer is unable to synchronize their personal library of games they purchased via their device or PC across multiple streaming services, they may be unable to find players of the legacy game on a specific streaming service still playing it. In essence the streaming service has decided for the gamers that they no longer need to play that particular game.

Game Selection. Today games available for streaming have a limited selection. While poor availability is partly due to the infancy of the game streaming market, game selection may also be affected by intentional efforts of streaming platforms to be the exclusive supplier of certain games and to host-lock games to their streaming platform.

Privacy & Security. Another concern of centralization in cloud gaming is its potential impact on privacy and security, including risks of a concentrated exposure to cyberattacks, malware, and single point failures; and to issues regarding user privacy and data sovereignty (meaning what the steaming platform is allowed to do with the data they collect on their clients' purchases, behavior, daily schedules, etc.). Broadly speaking these issues are the same as those involving centrally securing cloud data storage [39] and cloud computing [40]. But because Web 2 gaming involves playing for points having no financial value, there is no real economic incentive to hack its servers – meaning cyberattacks of Web 2 gaming platforms is motivated by mischief, not theft. But things are changing with play-to-earn GameFi.

GameFi and the Metaverse

Play-to-earn (P2E): Play-to-earn games involve or result in assets having both virtual world and real world value [41][42]. In traditional gaming, a player plays for experience points (XP, EXP) needed to reach higher levels or ultimately win the game using assets with virtual-world value. Assets having only virtual world value [43] include gaming items, drops, tools, weapons, spells, potions, loot, equipment, easter eggs, chests, special powers, extra lives, and other game assets that give a player added capability and increased chances to win. For example, by killing a monster or boss, a player may find loot containing rare or more powerful weapons. Chests may contain a collection of game assets and privileges not available to other players. Easter eggs confer even more special powers or benefits.

Gaming purists don't compete to earn money, instead playing for action, challenge, and sport, for social engagement, or for honing their skills [44]. Through winning, players accumulate points and virtual world assets (ownership) needed to advance to higher game levels. Unfortunately assets with only virtual world value are not really owned by the player (even if they paid money for them). Outside the game, there is no record that they own the item and no means to transfer the asset across platforms. Like "buying" a movie on Comcast, if you switch to DirectTV, the movie does not transfer with you, which means you don't really own the purchase. The need for transportability [45] has led to a new class of gaming called play-to-earn (P2E).

In P2E games, the player earns rewards comprising digital assets conferring ownership to the gamer. Registered ownership is the key to transportability, allowing the player to use or dispose of an asset as they so choose, even outside the confines of a particular game platform, cloud, or game streaming service. Because the asset exists beyond the boundaries of the game, i.e. in the real world, in gamer vernacular it is said to hold *in-real-life* (IRL) value.

Another motivation for P2E gaming is as a source of personal income. Critics of professional gamers often assert that playing video games is a waste of time, that playing is not profitable for the players, and that gamers are not productive members of society [46]. In P2E gaming, however, digital assets earned through winning or completing tasks carry value which can be converted or otherwise hypothecated directly into fiat money. P2E revenue is now part of a country's GDP.

GameFi: P2E games conferring financial value or real-life (IRL) benefits are referred to as *GameFi*, a concatenation of game and finance. Through GameFi, a whole new industry is emerging spanning the field between gambling and gaming [47]. Some prognostications even suggest P2E gaming will overtake gaming. Reddit CEO recently predicted that within the next five years "90% of the gaming market could be P2E." This does not necessarily mean that 90% of gamers will be playing P2E games, but that economically the lion's share of net proceeds will be spent and earned in P2E gaming.

> In the next five years, "90% of the gaming market
> could be P2E" predicts Reddit CEO

As such, GameFi blurs the distinctions between gaming and gambling. In accordance with the gambling regulation of various jurisdictions, gambling involves playing games-of-chance, playing against the house (in P2E gaming playing against the platform hosting the game), or betting on the outcome of the game. On the other hand, similar to poker, playing games against other players is not generally considered playing games-of-chance because a player can win with a losing hand, i.e. based on their strategy and actions (but if betting is involved, it still may be regulated as gambling).

Another form of GameFi is where a player participates passively in competitive gaming [47] through an earning model called "Hold-to-Earn" or H2E. In H2E, the participant stakes assets in a platform or game pool allowing them a share in the pool's income. In a manner similar to DeFi staking income, the platform distributes profit to its participants based on the assets deposited for holding, the holding duration, and the game platform's profit during that interval.

Regardless of the underlying game, GameFi offers the potential to generate income and profit for its players and investors [48][49], and therefore represents a new category of personal income [50] either to supplement regular employment or to replace it altogether.

GameFi Tokenization: In order to irrevocably record the earning and trading of gaming assets in P2E GameFi, a ledger chronicling the transactions must be created and dynamically maintained in perpetuity. The easiest means by which to record digital transactions for game assets is using a blockchain [51][52]. A blockchain is one possible implementation of distributed ledger technology (DLT) where transactions are recorded sequentially in blocks appended on the trailing end of a linear database chain. In order to facilitate inspection and validation of the veracity of any existing block, a cryptographic verification method has been developed using cryptography.

Blocks on a blockchain may employ two types of cryptography used either separately or in conjunction. One such method, *encryption* [53] reversibly converts a data set or file called plaintext into an encrypted format referred to as ciphertext. The process is reversible whereby decryption can convert the ciphertext back into plaintext. Reversible encryption is used to protect content used to confirm asset ownership or identity, like a private cryptographic key used by non-custodial wallets.

The second type of cryptography, referred to as a cryptographic hash function [54] (or simply "hash" for short, is a unidirectional cryptographic process producing a fixed length hash output that cannot be decrypted to recover its original source content. Hashing has a one-to-one correspondence between source content and its hash. Two files can only produce the same hash if the sources match. Any files that don't match even with the slightest difference will not produce the same hash. As such hashing is a simple means to verify if an item is authentic or a fraud. Hashing is similarly used in the process to validate or otherwise detect and reject blocks on the blockchain as authentic or fraudulent transactions.

Blockchains can therefore be used to record all GameFi asset transactions including rewards (earnings), purchases & sales (swaps), spending, and consumption (burning) of digital assets on a blockchain. Although assets can be irrevocably written into the sequential blocks of a blockchain as passive data, a more flexible means to record transactions involves executing a smart contract. Cryptographic assets transacted with a smart contract are referred to as crypto tokens, or simply as tokens. Both cryptocurrency and crypto tokens comprise digital assets. Unlike passive assets native to a blockchain commonly referred to cryptocurrency, crypto tokens follow defined rules specified by the smart contract including supply limitations. The process of integrating tokens into gaming is referred to as game tokenization [55]

Game tokenization is the catalyst making P2E GameFi a viable business model. Many game developers see as a means to grow the market beyond the traditional gamers community. New players will join to earn money, while game purists won't object so long that it doesn't adversely impact the quality of service (QoS) or degrade the gaming experience.

Quoting Splinterlands' CEO and co-founder, Jesse 'Aggroed' Reich [56], "Once players experience asset ownership, they say verbatim 'I'm never going to buy free-to-play games again.' Why would you spend $500 in a game if you could buy $500 of assets in a game, earn with them, build a community, and sell for more later when you're done playing? Crypto is going to eat the world, and gaming will lead the way."

Tokenization of P2E gaming also open entirely new monetization models in GameFi. One new business avenue involves carriers and mobile operators supporting direct carrier billing [57] for joining online P2E gaming, much the way personal messengers sell emojis and stickers.

> ### Crypto is going to eat the world, and gaming will lead the way.
>
> Jesse 'Aggroed' Reich
> CEO, Splinterlands

Tokenization of GameFi is a key component in driving the ubiquitous adoption of cryptocurrency, crypto tokens, and decentralized finance, a revolution that futurists, venture capitalists, and financiers alike unanimously agree has only just begun.

But not everyone appreciates token revenue generation models. During political collapse and hyperinflation in Venezuela, people turned to farming virtual gold [50][58] in popular games. With government issued fiat money rendered worthless, virtual gold farming became a preferred alternative to employment for citizens. It paid better and represented more stable income. Farmed gold tokens could be sold for real money and converted to Bitcoin in intermediary websites. The virtual gold was in turn resold to other gamers who used it to purchase magic potions, weapons, and armor at a discount. Game developers resisted the trend arguing the mercenary tactics of the gold farmers was not really playing the game. Incendiary exchanges on various social media platforms ensued, but the practice of gold farming continues even today.

To recap, P2E GameFi is realized by tokenized gameplay using crypto assets transactionally recorded on blockchains, the performance of which depends on the blockchain used to process the transactions, and how and when transactions are validated. As such, P2E GameFi is referred to as *blockchain gaming*.

Blockchain Gaming: Blockchain gaming is a version of GameFi where assets transactions are recorded on a blockchain rather than in a centralized database. The technology of blockchains can be used for immutably recording anything that a ledger can chronicle for the sake of posterity or provenance. That said, the devils in the detail – how the blockchain is implemented, how the game records its transactions, how transactions are validated, and so on, all matter.

Like in financial applications (FinTech), ledgers for P2E blockchain gaming may comprise either private blockchains or public blockchains. In private blockchains, the platform or streaming services hosts and manages the blockchain, and as a centralized authority has absolute dominion over its governance and any changes thereof. To trust a private blockchain, however, requires trusting its host not to change the rules of blockchain processes at some future date and thereby damaging or destroying the net worth of the assets it contains. Private blockchains lack transparency. Aside from concerns over transparent governance, another issue of a private blockchain is asset liquidity [59]. If a digital asset is only tradable within a small private community it likely suffers from illiquidity, the condition where even a small buying or selling transaction produces significant price changes. In essence the market price of a thinly traded asset is meaningless because its overly sensitive to trading volume.

Rather than relying on custom tokens on private blockchains, the solution to the liquidity challenge is to utilize popular DeFi tokens with significant liquidity in GameFi tokenized gaming, i.e. to use liquidity as a magnet attracting new user adoption [60]. Invariably, popular DeFi tokens are by necessity hosted on public blockchains with widespread access such as Ethereum, BSC, and Polygon [61][62]. GameFi specialized networks such as WAX, Hive, Ronin, Harmony, Vorto, and others are also emerging.

Rather than relying on centralized authority to validate new entries, transactional management of a public blockchain employs a decentralized approach involving consensus [63][64] by a jury-of-peers. In this process, a large number of compute nodes (the peers) comprising the blockchain's network evaluate the veracity of a pending transaction and then vote on the results. How do the nodes validate the authenticity of a block on the ledger without knowing its content? – by the use of a hash chain. A hash chain is nothing more than the sequential application of a cryptographic hash to a block containing the hash of its predecessor block, mathematically as

$$H[B_x] = H[B_x + H[B_{x-1}]]$$

where B_{x-1} is the content of a preceding block and $H[B_{x-1}]$ is a hash of its content. This hash is included in the header of the subsequent block and the aggregate block is hashed to create $H[B_x + H[B_{x-1}]]$ which is included in the next block's header as $H[B_x]$.

Checking this statement is true is relatively easy and not computationally difficult. If the statement is true then the transaction is valid and the new block can be appended onto the chain. If the statement is not true, the transaction is fraudulent and the pending block will be rejected. Validation of blockchain's hash chain is a simple way to identify if a particular instance of the blockchain is incongruent with all the other existing instances of the same blockchain.

Another form of validation can be performed on the content inside a block. This method is known as a binary hash tree or Merkel tree [65]. In a Merkel tree, the root of the tree comprises the hash of two blocks of data which each contain the hash of two blocks of data, and so on. The resulting tree structure thereby comprises a root, branches, and leaves very much like its botanical analog. Should the root hash not agree with its binary components, it means the block is corrupted and will be rejected as a valid transaction by the jury-of-peers checking it.

The second question that arises in validating a transaction when there is no central authority is "how do we know we can trust the jurors performing the checks?" Strangely, the answer to this query is we can trust the nodes 'not because we know them, but because we don't'. The evaluation of a new block is performed anonymously by the network's nodes where the transacting parties don't know the jurors and the jurors don't know the parties engaged in the pending transaction (or even what the transaction is). Since they have no vested interest in the outcome of the validation check, the juror nodes have no motive to vote corruptly or insincerely especially since they are financial compensated for checking the transaction by receiving their ratable portion of the gas fees. Nodes that develop a reputation for repeatedly disagreeing with the other jurors are determined to be corrupt and a barred from future votes.

The only other motive for a node participating insincerely is mischief. Since in a permissionless blockchain there is no mechanism to decide what nodes are qualified as jurors and which ones are not, the best way to ensure their integrity is to confirm they have an economic motive to be honest and a disincentive for mischief. This process, known as a consensus mechanism, ensures a node's fidelity to the jury process by making them risk capital to gain the right-to-vote. The consensus mechanisms used, called "proof" varies by blockchain.

The oldest mechanism, Proof of Work (PoW) relies on the consumption of energy where a node must first solve a puzzle or riddle (called a hash-nonce puzzle) to join the network as a validation node. An alternative mechanism Proof-of-Stake (PoS) uses an algorithm-based low-cost, low-energy consuming alternative to PoW where nodes must hold significant interest, a stake, in the blockchain and thereby risk losing money by engaging disreputable behavior that may erode investor confidence. With PoS, a juror node is allocated responsibility in maintaining the blockchain ledger in proportion to number of chain native cryptocurrency held.

While PoW is the basis of the two most established blockchains, Bitcoin and Ethereum, it has fallen into disrepute for being unsustainable and environmentally irresponsible, especially among millennials and younger gamers. While gamers use this complaint as a basis for resisting P2E blockchain gaming [66], it is largely a myth in part motivated by deeper resentment against money making infiltrating gaming [67][68].

A closer study reveals the reality that blockchain gaming and tokens are mostly being developed and built on proof-of-stake networks [69][70] such as Solana, Avalanche, Hedera, Polygon and Immutable X. These PoS networks do not take appreciably more energy than any cloud-based or game streaming service. Games built on PoS networks, while greener than PoW, are primarily winning the GameFi space for the pragmatic reasons that they are faster and cheaper, and able to execute sharding [71] (subdividing a database) to process and complete microtransactions more efficiently. In fact, energy utilization in a console's front-end GPUs consumes six orders-of-magnitude more Joules than the miniscule consumption of a PoS blockchain back-end [66].

Numerous other consensus mechanism are also under development or in their early stages of deployment with the goal to (i) provide robust validation of transactions resilient to consensus attacks, (ii) reduce validation time to support higher throughput, (iii) reduce energy consumption, (iv) maintain the benefit of a decentralized jury, and (v) provide anonymity to jurors (for identity protection). The table below summarizes various network and consensus mechanisms used in blockchain gaming along with its throughput measured in TPS (transactions per second).

Symbol	Network	Consensus	Perf TPS	Game Examples	Marketplaces
	Binance Smartchain (pvt)	PoSA	>17	Bottle Pets	Juggerworld
	Ethereum Virtual Machine (EVM)	PoW	25	Cryptokitties, Infuenceth	OpenSea, Rarible
	Flow	POS *prop.*	100	Cryptokitties-on-Flow	Versus, OpenSea
	Efinity, EVM, Jumpnet L2, Polkadot	PoA	700	Lost Relics, Age of Rust	Enjin Marketplace
	Theta	PoS (BFT)	1,000	eSports, NFT minting	Theta Marketplace
	Avalanche	PoS	4,500	Blockchain Game Alliance	Polyient
	WAX	PoS *prop.*	5,000	Alien Worlds	Atomic Hub
	Polygon	PoS	7,200	Battle Racers, Ox Racers, Decentraland	OpenSea, any ETH mrkt
	Immutable	PoS	9,000	Gods Unchained	Immutable X, any ETH mrkt
	Algorand	*pure* PoS	46,000	Blockchain Game Alliance	TBA
	Solana	PoS	50,000	Star Atlas, Kaiju Cards	Solible, FTX
	Ethereum Virtual Machine (EVM) v2	PoS	100,000	None	TBA

Although numerous improvements have been made over energy-wasting PoW methods using proof-of-stake methods, many of these goals involve unavoidable tradeoffs. For example in delegated-proof-of-stake (DPoS), stake holders elect a delegate to act as a proxy, voting on their behalf of the stake holders [72], thereby speeding transactions and reducing energy consumption. In DPoS the delegates are chosen algorithmically based on the stake holdings in the network. Because the delegates and the general stakeholders have aligned interests voting integrity is assumed.

The cost of delegating one's stakeholding rights, however, is reduced network decentralization as now fewer nodes are involved in the validation process, increasing the risk to delegate cartels and exposure to voting attacks. Furthermore if the stakeholders do not actively participate in the chain's democratic process, a few nodes will be making all the decisions for many. Another disadvantage of DPoS is that since the delegate is anonymous, they could be part of a crypto cartel and a criminal felon and no one would know.

In Proof of Authority (PoA) [73][74] validators must surrender their identity become a validator. PoA therefore involves a KYC/AML checking process to certify a validator has a high integrity. With fewer more trustworthy validators, validation energy consumption is reduced and throughput is increased. One disadvantage of PoA is the authority nodes may not be a significant stakeholder in the network and may therefore not act in the best interest of its stake holders or the platform. As a compromise between the democratic value of proof-of-stake and the certified identity of proof-of authority, Binance elected to employ a hybrid Proof of Staked Authority (PoSA) [75][76] for its smart chain. Numerous other blockchain consensus proofs exist, some based on proof of stake variants [77], and other consensus mechanisms such as Proof of History [78]. The HyperSphere also offers a zero energy validation technology (patent pending) called Proof-of-Performance where the movement of data through nodes in executing a task concurrently produces a dynamic cryptographic hop code used for validation with no additional energy consumption [79].

Moreover since all the described networks execute game related transactions using tokens rather than the network's native cryptocurrency, blockchain gaming relies not on cryptocurrency mining but on the execution of *smart contract* decentralized applications (dApps). During gaming, blockchain games utilize the network's nodes as decentralized compute engines performing logical and arithmetic calculations required by the smart contract. Changes in state variables including tokens issued, swapped, or burned are stored on the blockchain, operating as a distributed ledger and linear database for file management and cross application transfers or teleports.

Types of Digital Assets: Aside from a blockchain network's operation, i.e. blockchain processing for smart contract execution, various digital assets are used in blockchain gaming for P2E GameFi. Digital assets used in P2E blockchain gaming include gaming items, non-fungible and fungible tokens, and chain native cryptocurrency. The utility of these assets differ as does their market value. A brief explanation of each asset's characteristics is provided below:

Digital Asset	Processor	Use	Protocol
Game item	Game software	In game benefits, player swapping	Proprietary
NFT (non-fungible tokens)	Smart contract	In game benefits, value transfer	ERC-721
Crypto tokens (fungible)	Smart contract	Value transfer, staking, swapping	ERC-20
Cryptocurrency	Miners (nodes)	Gas fees, metaverse swaps	BC specific

Game items. Game items are tools, weapons, powers, and features unique to a specific game. The items are earned or consumed during the course of the game stored within a player's device or in game streaming, in the host platform's servers. Although they have no commercial economic value except within the game, player swapping may allow a gamer to hypothecate a game item for another of similar value. In rare instances assets may be farmed by non-players and sold in private marketplaces for cryptocurrencies. Unless game items are saved on a server or on the player's device, exiting a game results in their permanent loss. Because they follow a game's proprietary protocol and not a standardized token format, game items cannot be saved directly on a blockchain. Without specific header and cryptographic elements required to validate a block when writing it onto the blockchain, or confirming ownership (via a private key) when downloading it, game items cannot interact with permissionless public blockchains.

NFTs. Non-fungible tokens represent unique or limited availability items having value because of their utility or by their scarcity. Unlike game items, NFTs follow token standardized protocol for publicly available permissionless blockchains like Solana, Polygon, etc. where the tokens can be recorded, i.e. stored on the blockchain for later use or recovery. In contrast to fungible tokens which are indistinguishable and interchangeable (like dollar bill)s, NFTs are uniquely identifiable from one another by their own cryptographic identity.

The uploading of a NFT onto a blockchain requires recording the transaction through execution of a smart contract, the same contract used to create the NFT at its inception. Once the contract's instructions specifying the pending disposition of the token are executed by the network's virtual machine (the nodes of the network), the transaction is authenticated, recorded, and appended onto the blockchain by a jury-of-peers in accordance with one of the aforementioned consensus mechanisms.

Unlike other digital assets (namely game items, fungible crypto tokens, and cryptocurrency), NFTs indelibly record digital *ownership* into the blockchain. As such, NFTs cannot be transferred, commandeered, or usurped, without cryptographic confirmation of the rightful owner. Once a NFT is recorded on the blockchain the record of the transaction is permanently added to the blockchain's record of provenance through its hash chain and Merkel tree. Fraudulent transactions and thefts are easily detected and prevented. In other words, the blockchain protects the integrity of a NFT earned in a P2E blockchain game, even after the game has ended. In this manner, the blockchain extends the influence of gaming beyond its own platform or code.

NFTs used in games [79][80] can contain any number of assets as content which may or may not have relevance in the game. The content, separate from the token's header data, may include a digital representation of a wide variety of assets [81] including:

- Strategic game items such as secret messages, encoded messages, clues to an easter egg, map to a treasure chest;
- Tactical game items like swords, shields, armor, potions, magic spells, incantations, transporters, or virtual incendiaries;
- Virtual collectibles including digital art, music, video clips, autographs, tweets, digital goods (games, sports, fashion, charity), trading cards, comic books, photographs
- Real world assets comprising copyrighted material
- Real world assets including ownership of fine art (paintings, sculpture, lithographs), luxury watches, sports cars, diamonds, precious metals, jewelry
- Real world assets including deeds of trust, land, homes, commercial property, REITs, apartment rentals
- Real world assets involving licenses, royalties, contracts, and logistics [82]

The initial process to create the NFT is commonly referred to as *minting* the NFT. This process involves encoding data into the content field, including a header block in accordance with an accepted NFT standard such as ERC-721 then registering the NFT on the blockchain. If the item is a real world physical asset or legally binding contract or deed, a separate process involving a third party authentication or appraiser mut confirm the authenticity of a valuable or collectible before it is recorded. Thereafter, the NFT can be transferred from the blockchain into the game platform as a trophy for winning a competition. NFTs once won, may be hypothecated in a marketplace or in direct peer-to-peer trading for game assets, for fungible crypto tokens, or for cryptocurrency. Another unique feature of an NFT is its ability to embed royalty-bearing licensing features beneficial for content creators (or their investors). Each time the NFT is bought and sold, a contractual portion of the NFT value is paid to its licensor [83].

Fungible Tokens: The role of fungible crypto tokens in P2E GameFi and blockchain gaming is to function as an asset with a defined commercial value useful as rewards or for buying and selling game NFTs or game items. These fungible tokens, made in accordance with ERC-20 or similar standards, comprise digital assets indistinguishable from one another and without any identification of its ownership (except by the crypto wallet that contains them). Like fiat money of the same denomination, tokens of the same name (and same symbol) all carry the same value with no difference among them. For example, at any given moment 500 USDŦ is worth the same value no matter where it is used. The tokens are therefore interchangeable and indistinguishable, the very definition of fungibility. Because they can be stolen without trace, a secure wallet is key.

Unlike NFTs whose value is indeterminate because of a limited frequency of trades, varying demand, and uncertain liquidity, a fungible crypto token once listed and publicly traded has a known value determined by regular trading on decentralized and public exchanges. The higher the trading value, the greater the token's liquidity. By contrast buying or selling a NFT requires an auction or marketplace to determine its FMV (fair market value) on a case-by-case basis. Since each NFT is unique there is no one market price for NFTs. In P2E gaming, such tokens are used as a medium of exchange for earned NFTs or as a form of reward. For example a P2E game may reward a player with a specific NFT which the player redeems (swaps at market prices) in a game marketplace for a tradable fungible token. The tradable fungible token may then be used outside the game to purchase items or to swap for cryptocurrency (and later for fiat money if desired).

Like NFTs, fungible crypto tokens made in accordance with ERC-20 standards (or similar) are created and traded by the execution of smart contracts hosted on one or more blockchains and processed by the network's virtual machine (its nodes). Cross-chain trading involves moving a crypto token asset from one blockchain to another, involving calling and executing a network specific contract. For example USDŦ on the Ethereum network and EVM can be converted into USDŦ on the Binance Smartchain (BSC) offering lower gas costs and transaction fees.

In summary, where NFTs function as earned rewards in P2E GameFi, ERC-20 crypto tokens act as fungible money, i.e. digital cash in the game platform and its associated community marketplaces.

Cryptocurrency. Because chain-native cryptocurrency like BTC or ETH are not tokens they cannot be used to execute smart contracts without first wrapping, i.e. tokenizing the cryptocurrency. So although an NFT reward swapped (sold) directly for WETH (the wrap of Ether), the trader would still have to unwrap the WETH into ETH to convert it to fiat money. Since many crypto tokens including the popular stablecoins USDŦ, USDC, DAI, and BUSD can be exchanged directly for fiat money there is no added benefit of using cryptocurrency in GameFi (except as a store of value). The downside of cryptocurrency is its market value is volatile, depending on currency trading.

As such, cryptocurrency is not generally used as digital cash in P2E gaming. That said, it is still necessary to pay gas fees to transact smart contracts. Gas fees are reqquired in a network to pay nodes to process smart contracts and to pay for consensus validation on a transactions veracity. Distinct from cross-chain compatible tokens like USDŦ tokens, cryptocurrency (like ETH, BNB, BTC) is network specific. The gas for the Ethereum blockchain and the EVM must be paid in ETH, the gas for the Binance Smartchain (BSC) is paid in BNB and so on.

The Metaverse & Gaming: Online gaming is now also evolving into GameFi within the metaverse. The metaverse [84], a portmanteau of *meta* (meaning self referential) and *universe* (meaning everything), comprises a network of 3D virtual worlds intended for social interaction within a virtual reality construct. Still in its infancy, the metaverse is intended to mimic the physical world having communities, cities, homes, transportation, entertainment, and more. But like the prescient film The Matrix [85] as a neuroactive simulation, the rules of the physical world are not a limitation in the metaverse. For example, gravity is optional, dimensionality can violate laws of geometry (the Escherian Stairwell [86]), the multiverse is realty, art museums hold curated virtual auctions, and financial transactions are virtual. In the metaverse, a person's identity is what ever one wishes. Elements of reality of may be imported to create a personal avatar (personalization) or may be entirely synthetic. Blurring the distinction between real and imaginary, the metaverse make a perfect sci-fi ecosphere for the evolutionary future of gaming.

Virtual Reality. A key component for experiencing the metaverse is virtual reality and its counterpart augmented reality. VR headsets allow an immersive experience in the metaverse and especially in gaming, where not unlike games in The Oasis (Ontologically Anthropocentric Sensory Immersive Simulation) depicted in the movie Ready Player One [87], virtual world competitions can have real life consequences (and possibly produce real world wealth).

Metaverse Gateways. A metaverse gateway is the means by which real objects are imported into the metaverse. Generally these gateways comprise 3D laser scanning chambers (typically using LIDAR) to digitize (rasterize) 3D images, store them on the blockchain, and then convert them into NFTs for importation into the metaverse [88] for metaverse gaming. Amazingly, the concept of scanning a human and transferring them into the "game grid" was one theme of the visionary 1982 fantasy movie Tron [89], made over forty years ago! Ironically, its other theme was the need for decentralization, to overcome the centralized control of the evil master control unit (MCU).

Metaverse Gaming. The integration of gaming into the metaverse is not simply about virtual reality and 3D images, its about decentralization, a Web 3 world where everyone is equally valued with no hegemony of power or concentration of wealth to corrupt the ecosphere. But to achieve equity requires the metaverse can have no overlord assigning preferred treatment, controlling transactions, deciding game results, limiting access, or setting costs. Metaverse gaming represents a free-market mentality to gaming, one where players can make themselves heroes (or villains) of their own customized games, and control their own destinies. As such, bankers cannot be trusted with authority to hold dominion over others. But with no central authority, the only means to prevent fraud and theft is by adopting the principles of decentralized finance (DeFi). According to Sam "Captain" Peurifoy [90], the head of development group "the Guild" at Meta corporation, the metaverse is "an online arena where 'decentralized finance,' or DeFi, reigns — fusing together cryptocurrencies, blockchain technology, non-fungible tokens, and video gaming."

In other words, the future of gaming is an open-source free-market economy where players and developers compete based on performance, not by enforcement of arbitrary and self-serving rules and regulations favoring only media magnates or powerful mega-corporations. In addition to decentralization, metaverse gaming bridges the real world with the virtual, including games customized for virtual reality (VR) and augmented reality (AR) displays.

> The metaverse is "an online arena where 'decentralized finance,' or DeFi, reigns — fusing together cryptocurrencies, blockchain technology, non-fungible tokens, and video gaming."
>
> Sam "Captain" Peurifoy
> Meta Corporation

MetaFi – Metaverse Marketplaces. In DeFi and GameFi, decentralized exchanges are used to trade, barter, and sell (swap) digital assets within their own financial and gaming communities respectively. In the metaverse, however these boundaries are non-existent. NFT awards earned in P2E games can be converted into fungible tokens, then used to buy art, to invest in DeFi projects, or to stake for earning interest.

Interest earned can be used to "buy in" to new P2E games or to invest in apartment buildings (virtual and/or real-world), earning interest paid in crypto tokens. The earned token profits are also convertible into cryptocurrency or fiat money. In a metaverse financial or commercial market (aka MetaFi), transactions may involve any mix of P2E game and business income and expense. To fully appreciate the rapid rise in consumer interest in P2E gaming and the metaverse, a simple review of Google trends shows a marked increase in searches of the topics.
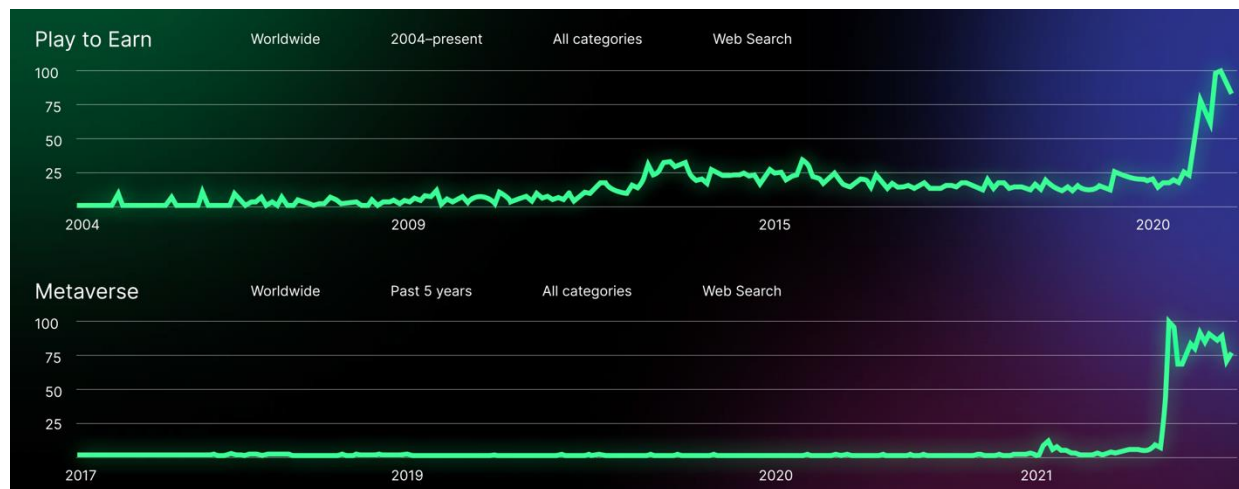
Challenges in P2E GameFi: Given the rapid changes transpiring in P2E GameFi, blockchain gaming, NFTs, and the metaverse, numerous challenges also persist in every phase of product and market development, the greatest challenge of which is market fragmentation. How do developers of new games and gamers looking for new challenges find one another? What platform are the games available on? Is game streaming available? Can I try a new game out before paying? Which games have a pay-to-earn option? In short, how do gamers find the best possible user experience?

Phase	Developer	Gamer
Development	• Limited access to funding • Unable to solicit opinions of gamer communities	• Unable to directly engage game developers • Inhumane bot interfaces
Client Acquisition	• Unable to attract gamers (fragmented market) • Unable to effectively target advertising	• Unable to identify open platforms • Confused by competing messaging
Client Engagement	• Need attractive intuitive user interface • Need to offer a compelling selection of games	• Seeking enjoyable user experience • Looking for wide selection of choices, ratings
Retention	• Promote incentives & rewards • Regular release of updates and new games	• Satisfied with P2E earnings & incentive • Convenient NFT trading, flexible cash-outs
Trust (all phases)	• Ensure error free smart contract execution • Prevent fraud and theft of assets (blockchain)	• Protection of personal identity (security) • No economic loss from fraud and theft

Aside from ensuring a good user experience, another major concern regarding the metaverse and GameFi is the need for privacy and security. With the advent of play-to-earn gaming and game tokenization, the economic benefits and collateral risks posed by cloud gaming are changing dramatically and rapidly. Play-to-earn (P2E) GameFi reward based games involving fungible or non-fungible tokens having real economic value and financial returns. In such cases, a successful hack of a P2E game can lead to asset theft and personal economic loss for the player and liability for the platform.

The best solution to successfully repel cyber attacks is *decentralization*, providing services without a central authority. Also referred to Web 3, decentralized services defy cybercrime and enhance network performance by storing and distributing data via a decentralized digital ledger, i.e. a blockchain. Play-to-earn Web 3 GameFi returns may be earned in NFTs recorded on the blockchain and later swapped for fungible tokens, either as stable coins or as customized tokens. But the smart contracts must be executed properly or all the earnings can be put at risk.

While the challenges are known, individual game developers are not in a position to solve these problems particularly as they involve cross platform and cross blockchain challenges. Instead the solution is best implemented by a game aggregator. The need for such a service will only grow in the future.

Solido Games *Raison d'être*

Solido Games is a pioneering multichain Play-to-Earn (P2E) game aggregator platform developing an interconnected ecosystem of games, NFTs, and metaverse communities designed to maximize player's benefits, enhance user experience for gamers, and mitigate risks of theft and fraud risks through decentralized smart contract execution and immutable blockchain transactions validated through consensus by an anonymous jury of peers.

Features of the Solido Games platform include

- Multichain game support
- Play-to-Earn gaming
- Single and multiplayer game enabled
- Integrated GameFi and MetaFi launchpad
- Game developer funding platform for IGOs
- Metaverse Market – a marketplace for game NFT and SLG tokens
- Solido DAO, a decentralized GameFi community with governance privileges
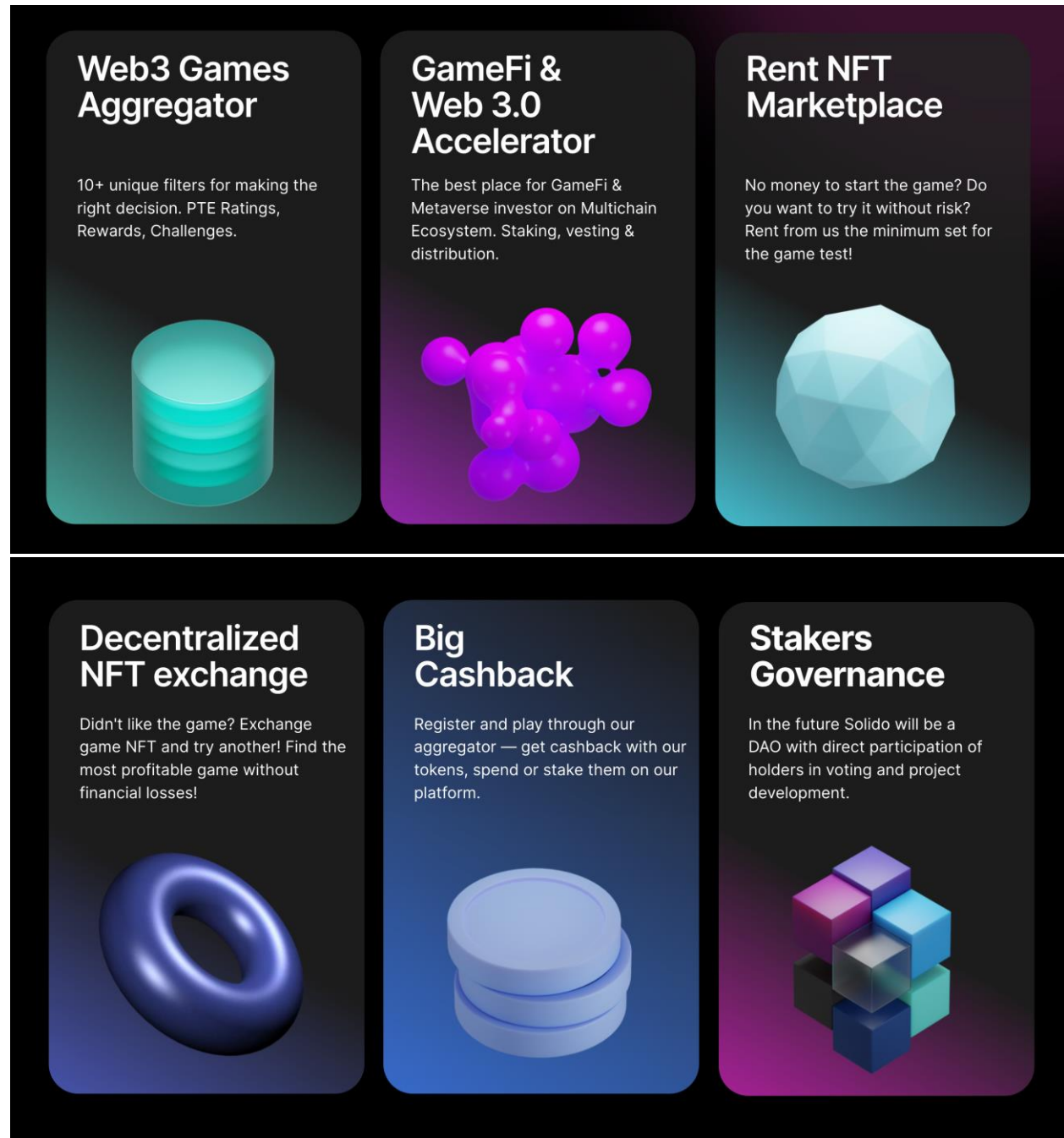- SGT, a fungible token of the Solido ecosphere

Solido Game's enterprise contain three commercial businesses

- GameFi Aggregator
- GameFi Launchpad
- Metaverse Market

Each element of the Solido ecosphere supports a different aspect of the gaming market. Solido's GameFi Aggregator targets both gamers seeking a broad selection in online games and P2E GameFi entertainment; and game companies seeking to reach new and larger game communities. The GameFi Launchpad targets game developers looking for economic and go-to-market support for successful initial game offerings (IGOs). The Metaverse Market is a new concept in tokenized gaming and blockchain token transactions for trading NFTs and for monetization through Solido's own uniquely game-centric fungible token – the SLG token.

All three businesses are affiliated Solido DAO, a decentralized autonomous organization providing governance and directing developments in Solido's ecosphere. Developers and gamers who stake their SLG tokens in the DAO earn the right to vote on key issues concerning the operation and direction of the Solido Games ecosphere.

Another development of Solido is its pioneering adoption of Web-3 based decentralization entails blockchain data storage and trustworthy software distribution, autonomous transactional processing of smart contracts for NFTs and fungible assets, and multichain network support.


Web3 Games Aggregator

10+ unique filters for making the right decision. PTE Ratings, Rewards, Challenges.

GameFi & Web 3.0 Accelerator

The best place for GameFi & Metaverse investor on Multichain Ecosystem. Staking, vesting & distribution.

Rent NFT Marketplace

No money to start the game? Do you want to try it without risk? Rent from us the minimum set for the game test!

Decentralized NFT exchange

Didn't like the game? Exchange game NFT and try another! Find the most profitable game without financial losses!

Big Cashback

Register and play through our aggregator — get cashback with our tokens, spend or stake them on our platform.

Stakers Governance

In the future Solido will be a DAO with direct participation of holders in voting and project development.

Solido Technology Platforms

Access to the Solido Games ecosphere is made through its dashboard, allowing users to choose among Web3 Games Aggregator, Launchpad (Accelerator), or Marketplace.

Through its interconnected decentralized ecosystem of Web-3 games, NFTs, and metaverse communities, Solido is systematically eliminating players reticence to join the GameFi revolution of Blockchain gaming. Gamers earning healthy returns paid in xSLG points through the Solido GameFi Aggregator platform can in turn multiply their winnings by opening Mystery Boxes and participating in new game launches (IGOs) on the Solido GameFi Launchpad.

Solido GameFi Aggregator: The first Solido interface to go live, the GameFi Aggregator allows users to sort and select available games by a variety of parameters including their blockchain host network, the device, the game genre, free-to-play offers, and play-to-earn terms.
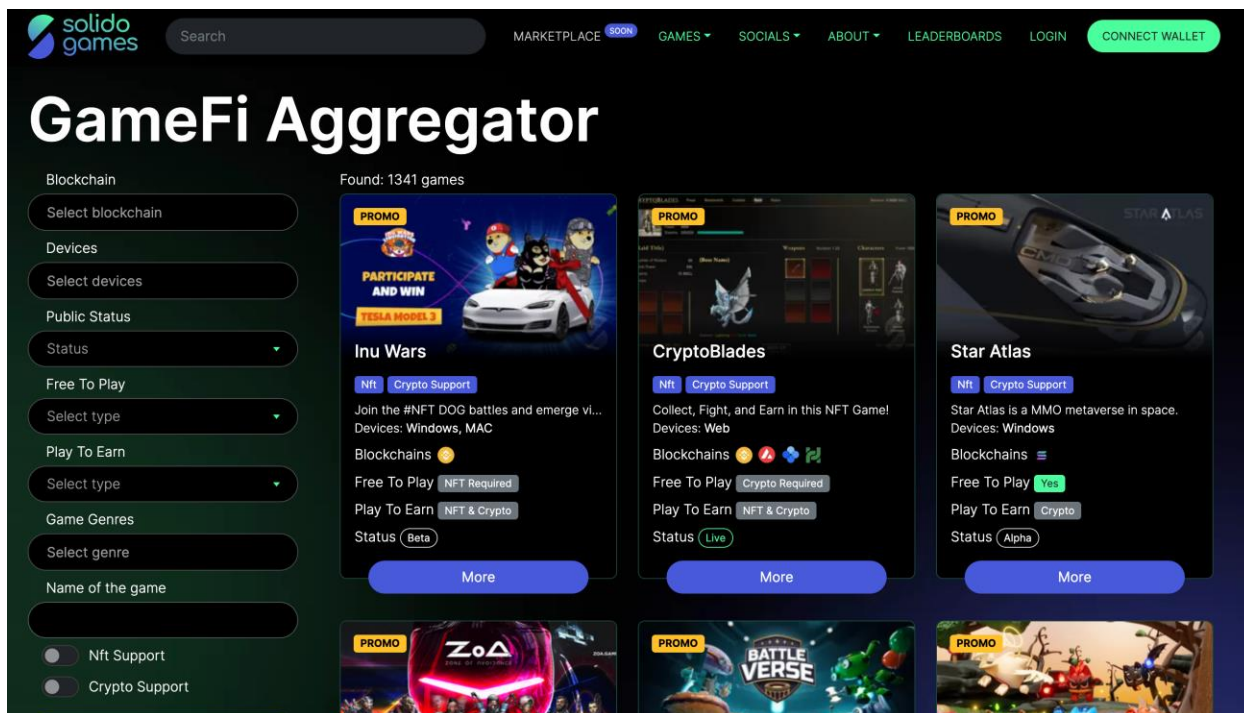
Filters include ratings, rewards, challenges, tournaments, and airdrops. Other tools approximate a player's earnings potential per day, week, or month; and provide information on the costs of obtaining a minimum package of NFTs. Tokens costs estimates are dynamically updated via exchange APIs and CoinGecko. Blogger video reviews are also available.
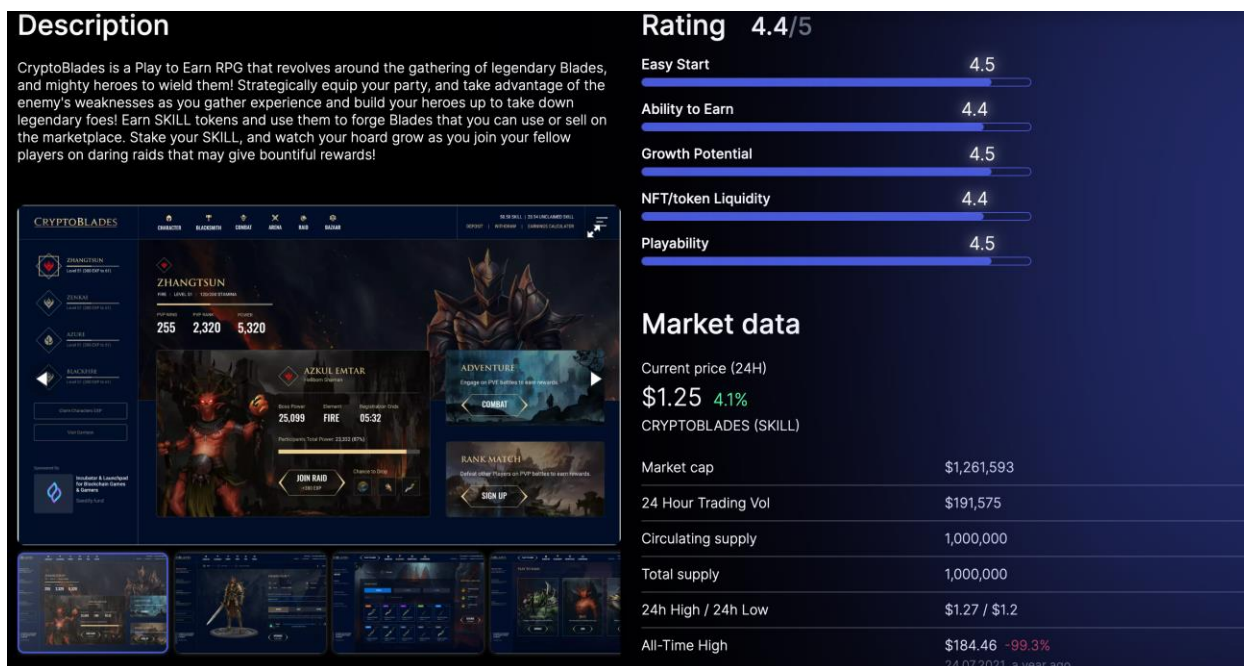
Players wishing to explore a new game but unsure whether they want to purchase NFTs until they have tried it are able to *rent* a minimum NFT package simply by securing the rental for a refundable deposit. In tis way Solido's GameFi Aggregator makes it easy for players to identify and try out new games for a hassle free and convenient user experience, with nothing to lose for trying. Additionally Solido not only aggregates games but also is able to aggregates *guilds* making it easier for gamers to join a group of like-minded players. A guild (aka clan) is a group of gamers who team up to improve their chances to win.

Solido Tasks and Rewards:

Solido GameFi Accelerator: Key elements to attract and retain new clients to a game platform is to offer a wide selection of choices and to constantly add new games to the list. Synergistically, the role of a game launchpad is to create and release new and innovative games to the market.

Like other digital asset market releases such as the initial coin offering (ICO) and an initial decentralized exchange offering (IDO), an initial game offering (IGO) offers economic value and capital growth to its initial investors and benefactors. Realizing the synergies between launching and hosting games, Solido developed and offers a first-of-its-kind one-stop solution to game developers through its Solido P2E GameFi Aggregator and Solido GameFi Launchpad.

As a game incubator and accelerator, the Solido GameFi Launchpad is able to attract project investment through its network of partners and respected affiliates, and to provide funding through its own gaming community and Solido DAO. Aside from funding, Solido's GameFi Launchpad is able to attract interest through its established social networks and create timely advertising opportunities including banner ads or top slots in catalogs.

Moreover, Solido's unique integration the Solido GameFi Launchpad with its GameFi Aggregator means an IGO has a ready-made market of players waiting for it. In short, Solido solves the two biggest problems for an ambitious game developer – no money and no customers.
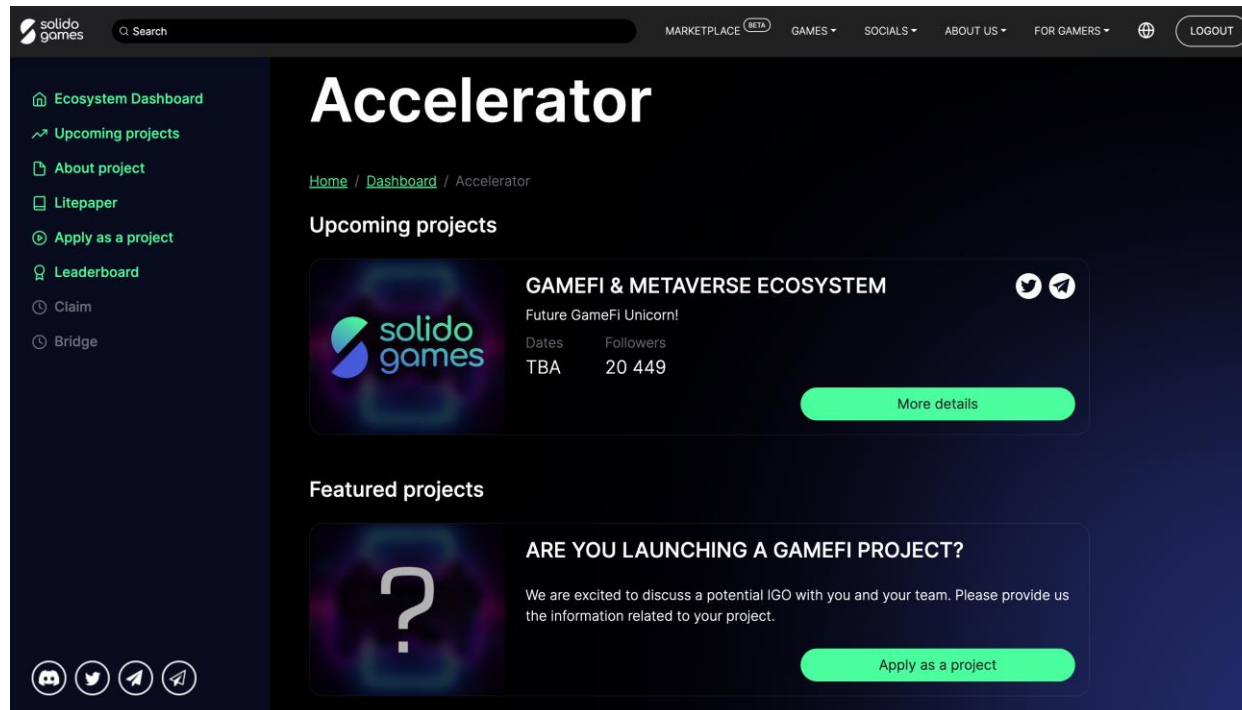
Gamers or investors are able to participate in game launches by investing their SLG tokens in the Launchpad. Investment *tickets* are available based on how many SLG tokens are purchased and what gaming platform the game is to be released on. Examples of minimum investment requirements and exchange rates are shown below. Earnings from project launches are repaid on a ratable basis for the number of tickets held.
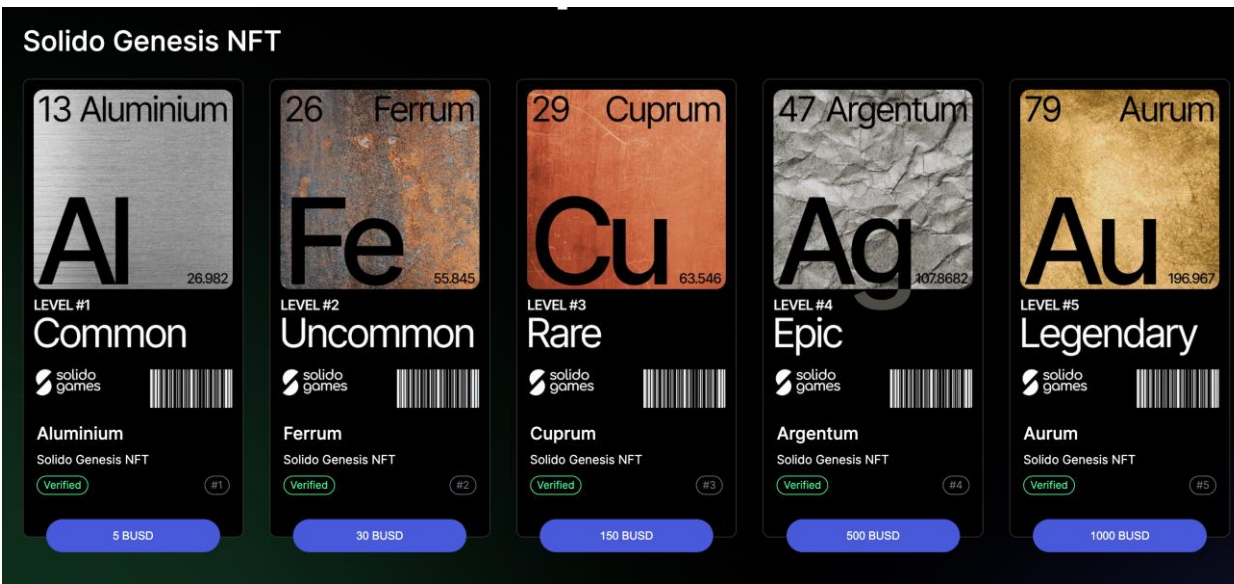
Solido Games Marketplace: As gamers play web3 games, they earn both game specific NFTs and rewards of xSLG points. The Solido Metaverse Market (under development) represents a decentralized marketplace where NFTs can be swapped, borrowed, or loaned in a manner similar to a DeFi pool or decentralized exchange (DEX).

The only fungible token in Solido Metaverse Market is its own SLG token. Gamers wishing to monetize their earnings (i.e. to cash out) can swap NFTs to SLG tokens at market prices aggregating them with SLG reward tokens they earned. The gamer is then free to convert and or all of their cache of SLG tokens to stablecoins (such as USD₮), cryptocurrency (e.g. SOL) or into fiat money (such as US$, Euro, etc.) depending on the exchange's trading pairs.

Gaming companies will host exclusive NFT collections in the Solido Metaverse Market. Staking holders in the Solido DAO will be given priority in these first-come first serve opportunities.

Solido DAO: The Solido DAO represents the heart of the Solido ecosphere. Investors staking SLGs into the Solido DAO earn governance voting rights (ratably as one vote per SLG token staked) as well as receiving preferred offers and VIP specials exclusively available for Solido DAO stakers.

Solido Games members who stake their SLG tokens will receive a *benefit boost* in the Solido Game ecosystem, such as extra experience points (XSLG), access to tools, guaranteed Launchpad allocations, and up to 15% reward from every registration in any P2E game for every dollar spent! Other benefits may include access to special gaming items.

Solido Monetization Model

Solido monetization is based on fees and promotional costs as described here below (subject to change) benefiting all Solido participants including gamers, developers, and financiers.

- Launchpad fees
- Aggregator fees (listing, promo positions, tournametns, airdrops, emailing to database)
- The game company (developer) rewards each new game registrant in accordance with a cost-per-action (CPA) performance pricing model
- Gaming companies pay for advertising and banners in accordance to ad positioning (using the. same mechanics as in Google ads).
- Projects receive remuneration for NFT rental as well as for sales.
- NFT lenders in the Metaverse Market earn interest (paid in SLG tokens).
- Investor returns are paid in SLG tokens (not in fiat money) at a payout rate of 90% of proceeds.

Solido Benefits

Solido's gaming ecosphere provides benefits among its gamers, game developers, retail and commercial investors. Through its GameFi Aggregator players evaluate, lease and buy games in accordance with their needs and interests earning NFTs, then in the Metaverse Market trading or selling their winnings. Gamers can also leverage their assets for added profit by staking them in the Solido DAO. Stakers enjoy preferred gaming pricing and first rights to participate in new IGO investment opportunities. Game companies benefit from reaching new clients and increasing their sales and streaming revenues. Investors profit from Solido's growth and success.

For	Solido	Benefit
Players	Aggregator	Play-to-earn NFTs and SLG rewards, lease or buy games
	Metaverse Market	Swap NFTs, swap NFTs & SLG tokens, borrow NFTs for collateral
	DAO	Stake SLG tokens for staking income, privileges, special offers
Game Company	Launchpad	Release new games (IGOs), advertise, sales and streaming income
	Metaverse Market	Offer player incentives, earn interest of NFT loans
	DAO	Stake SLG tokens for staking income, Solido special discounts
Retail Investors	DAO	Stake SLG tokens for staking income
Pro Investors (VCs)	Solido Games (SLG)	Invest in SLG tokens, capital appreciation
	DAO	Stake SLG tokens for staking income

Competitive Positioning

A comparative evaluation of Solido Games technology portfolio and ecosphere reveals its unique advantage over all other competitors. Moreover, most game platforms today are centralized-server based Web-2 legacy constructs lacking decentralization, blockchain processing, and autonomously authored smart contracts, the hallmarks of Solido's advanced design.

Features	Solido Games	Playtoearn.net	Formless	GameStarter
GameFi Aggregator	✓	✓	✓	✗
Guild Aggregator	✓	✗	✗	✗
DAO	✓	✗	✗	✓
NFT Marketplace	✓	✗	✓	✗
Social Score	✓	✓	✗	✗
GameFi Launchpad	✓	✗	✗	✓
Exclusive NFT Launchpad	✓	✗	✗	✗
Rent NFT	✓	✗	✗	✗

Solido Tokenization Models

Solido is an industry pioneer of tokenized blockchain gaming for play-to-earn GameFi and MetaFi. Decentralized Web 3 processes are at the core everything Solido offers including tokenized blockchain gaming, DAO staking, and Metaverse Market autonomous token transactional trading.

Solido Tokenized Blockchain Gaming: As shown, Solido has integrated blockchain transactional processing capability into its gaming aggregator platform mitigating central server risks in P2E gaming and GameFi. Solido also supports Web 2 legacy games and cloud based game streaming.
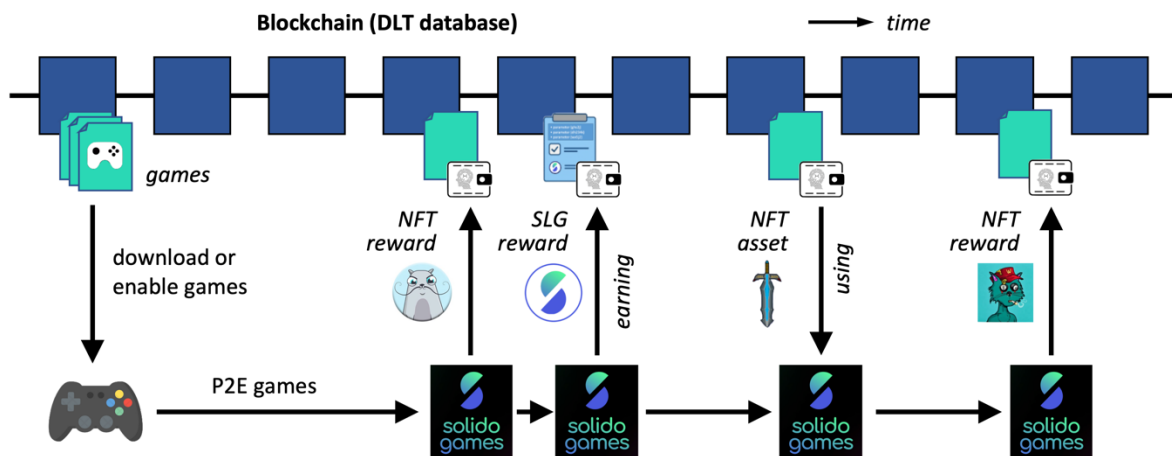
Using Web 3 transactional architectures, permissionless blockchains serve several purposes in Solido's gaming aggregator including:

- Store and distribute platform-specific application software such games (not dApps).
- Store account login and identity profiles to prevent fraud (multifactor security).
- Store and distribute decentralized applications (dApps) updating global parameters recorded in the newest instance linked to smart contract source code by hash chains.
- Record & store changes in NFT assets purchased, earned, or expended during gaming.
- Record and store SLG fungible token awards earned during gaming.

In the illustration above, a gamer is able to download game software stored on the blockchain to a personal device (such as a smartphone, tablet, PC or gaming console) then launch and play games on the Solido GameFi Aggregator platform. During competition NFTs earned are uploaded onto the blockchain and registered in the gamer's secure private wallet (such as CyberWallet). The earned NFTs may have functional value in the game (like a shield or a magic spell) or they may hold some artistic or economic value (such as Cryptokitties). During the contest a player may also need to download an NFT asset from their personal inventory stored to improve their chances. NFT access is granted by private key (stored in wallet) but recorded on the blockchain.

In addition to NFTs, a player may earn SLG token awards during gaming. Unlike NFTs, these fungible tokens are recorded on the most current instance of the SLG smart contract used to create the entirety of SLG tokens at its token generation event (TGE).

Solido DAO Staking: A second use of tokenization in the Solido Games ecosphere is the role of tokens in the Solido DAO. The process of depositing, i.e. locking an issued token into the DAO is referred to as "staking" for which the investor receives interest, profit shares, or other benefits.
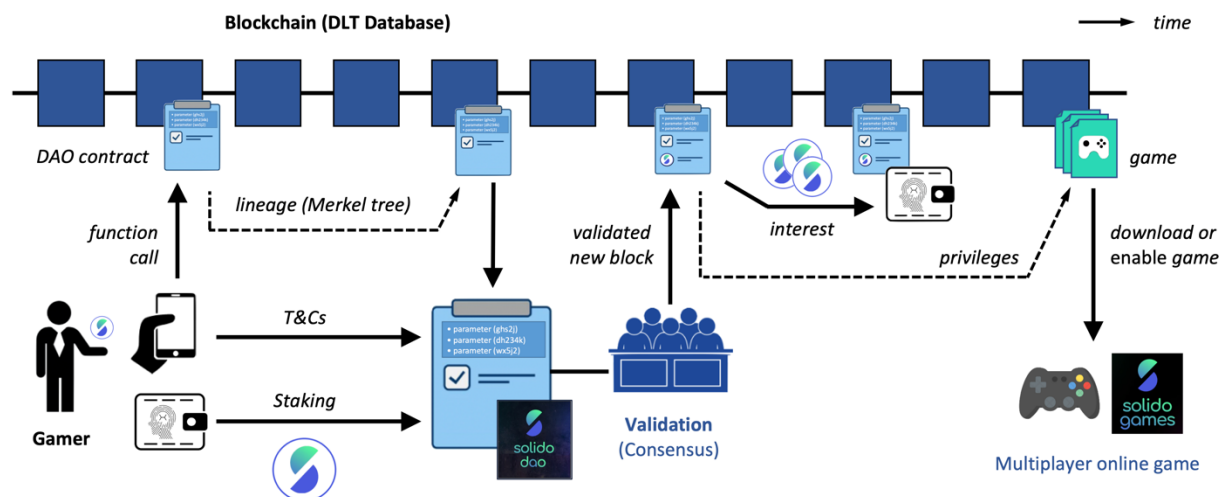
Investor returns may be defined for fixed durations or renewed at defined intervals. In the staking process the investor (or gamer) makes a function call to the DAO smart contract. The Merkel tree (hash chain) in turn identifies and downloads the most recent (up-to-date) instance of the smart contract. The investor then specifies the terms and conditions (T&Cs) of the trade and stakes, i.e. locks, a specific number of SLG tokens into the smart contract. The smart contract comprises a shared investor pool representing the DAO and all minted SLG tokens, issued or locked.

Before the contract can be confirmed and executed, a jury-of-peers must agree to its veracity. In the case of the Solana network used by the Solido DAO, this process involves consensus confirmed by proof of stake (PoS). Once the new block is validated, it is uploaded and recorded on the blockchain and commences paying interest (in SLG tokens) to the investor's wallet in accordance to the contract's defined terms. Concurrently it enable privileges assigned to the investor enabling gaming access, downloads, or special powers.

Metaverse Market Transactions: The blockchain is also used to record and process all transfers in the Metaverse Market. For example, NFTs earned in Solido gaming can be can be swapped (sold) for SLG fungible tokens on the Solana network at their current exchange rate. The SLG tokens can then be exchanged in a DEX (or CEX) for a tradable token (such as Tether), in this case on another blockchain (e.g. BSC). All transactions are recorded on their blockchains with the corresponding private keys stored in the gamer's private wallet.
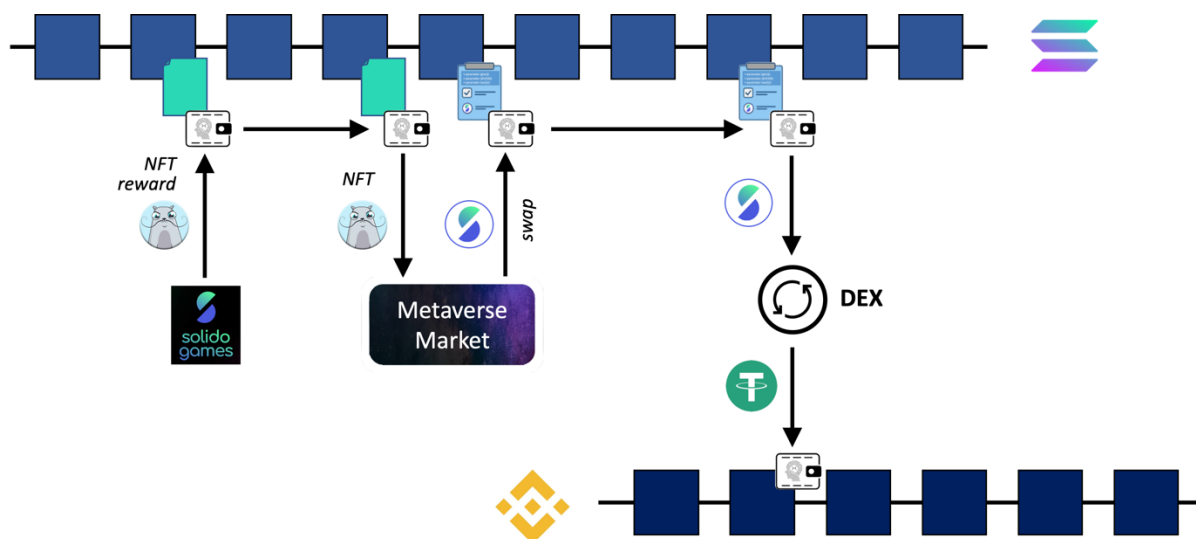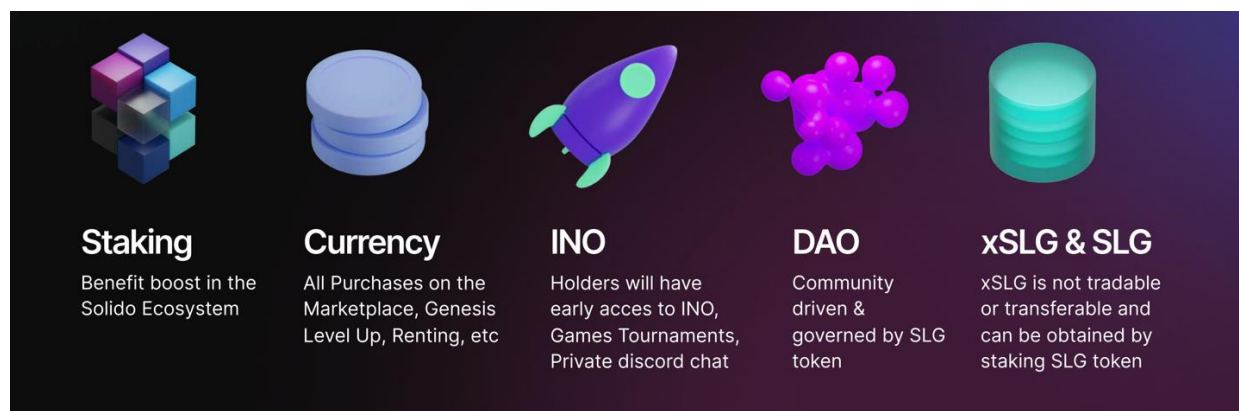

Solido's SLG Token

SLG Description: The SLG token is a multifunctional (utility, governance) crypto token minted via smart contract by and for Solido Games. The SLG token is a fungible digital asset of fixed quantity issued on the BSC network using the SPL (ERC-20 equivalent) standard.

SLG Tokenomics: The total number of SLG tokens minted at TGE is 100,000,000,000 crypto tokens. A complete description of Solido Games offering tokenomics is available upon request from the company.

SLG Token Utility: SLG tokens are issued by Solido to procure private and public investor funding, and for liquidity providing (exchange trading), gaming transactions (Metaverse Market), market development, engineering, player incentives, and as strategic reserves. In gaming operations, SLG tokens are used by players and investors for DAO staking, as interest payments, and as gaming rewards. Staked tokens are locked by the DAO smart contract and removed from the circulating supply during the specified staking duration thereby supporting token price appreciation as Solido's business grows. As a tradable fungible digital asset, SLG tokens carry economic value acting as an instrument of payment (gaming rewards), for trade (exchanged for NFTs), and for currency exchange into cryptocurrency, which in turn can be exchanged for fiat money as desired.

Except for a small portion allocated for public sale and incentive airdrops at its token generation event (TGE), SLG tokens procured by investors in private presales; through SAFTs (Simple Agreement for Future Tokens); and by IDOs (initial decentralized exchange) offerings, are minted as *locked* tokens. Locked tokens comprise crypto tokens issued at TGE that cannot be traded, swapped, or hypothecated for some period of time until when the tokens become vested. Since fungible SLG tokens are (by the definition of fungibility) identical and indistinguishable, there is nothing in SPL or ERC-20 standards to record embedded ownership or pre-define vesting. Instead, to facilitate locking of fungible tokens, locked SLG tokens minted are not distributed at TGE but held in escrow in a digital vault, a software construct of the SLG smart contract. Locked SLG tokens are subsequently released from the contract's token vault in accordance with a defined vesting schedule, and distributed either by *pushing* the tokens to investor's predefined wallets (non-incentive airdrops).

Staking
Benefit boost in the Solido Ecosystem

Currency
All Purchases on the Marketplace, Genesis Level Up, Renting, etc

INO
Holders will have early acces to INO, Games Tournaments, Private discord chat

DAO
Community driven & governed by SLG token

xSLG & SLG
xSLG is not tradable or transferable and can be obtained by staking SLG token

Security & Privacy: All token transactions involving SLG token minting, distribution, are executed by the Solido protocol [94], a cybersecure autonomous dApp for smart contract authoring and blockchain execution. Investor identity and privacy is ensured through KYC/AML, a blockchain identification validation dApp.

Solido Games Roadmap

A roadmap of ongoing developments and feature launches is described in the following table:

2022 Q1-2	2022 Q3-4	2023	2024	2025
Project Start	Tasks & Rewards	DEX Listing	CEX Tier1 Listing	Own Game - Apha
Tiers System	Leaderboards	First INO Launch	Esport Collaborations	Own Tournament
Tokenomics	NFT Marketplace	Staking	NFT P2P Exchange	Games Development
GameFi Aggregator — MVP	GameFi Aggregator — Beta	Aggregator — Live	Own Wallet	Global Marketing
GameFi Ranking	Mystery Box	Web3 Tournaments	First IGO Launch	
Referal Program	Marketing Start	CEX Tier2 Listing	Own Blockchain	
		DAO Governance	First Own Game - Beta	
		Guilds Aggregator		

solido games

Resources

Starting with a respected management team and proven track record, Solido Games has built a respected team of seasoned veterans in game-tech including programmers and technology developers, advertising and customer acquisition specialists, traffic analytics and SEO specialists, and gaming experts (including a five-time champion Warface shooter). After only one year, our aggregator took second place in the highly competitive escapes rooms market. Today Solido traffic exceeds 100,000 visits per month, 15+ cities, with over 600 partners!
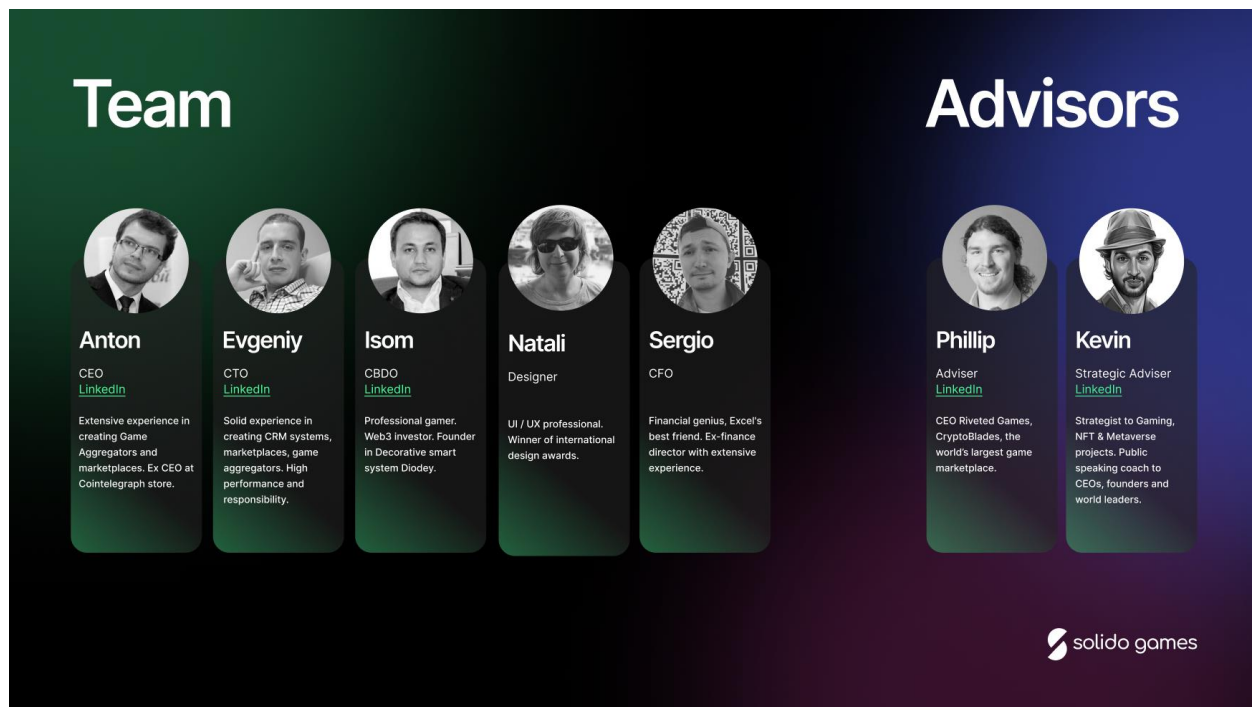
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