

ZERO Research

ZERO Network Rainbow Paper

This document is a compilation of a variety of documents and is considered to be evolving over time. We may create derivatives out of it for public release. Feel free to give critical comments, we need them. Thank you in advance!



Over the last decade the global video game market has seen tremendous growth. and will reach a revenue of about \$160 billion in 2020, an increase of around 9% compared to the previous year. China retains its position as the world's largest gaming market in 2020 with 55% of the total global players (1.5 bn).

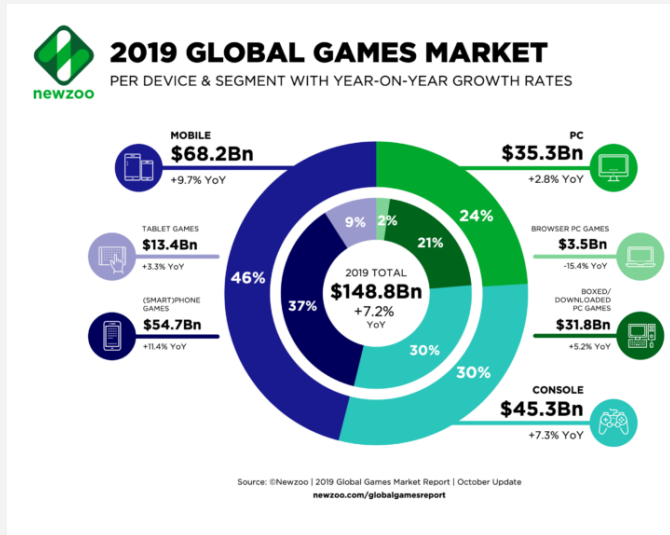
The video game market is an ever changing market with significant growth rates that stem from continuous technological evolution.

Today, gamers not only play on PCs and traditional consoles, like Sony PlayStation, Microsoft Xbox and Nintendo Switch, but increasingly on mobile devices, and through web2 based social networks.

Through the shift to online distribution, traditional business models migrated from boxed pay to play titles to multi million dollar sales pipelines powered by microtransactions and free to play / pay to win schemes.

The unparalleled evolution of decentralised finance, autonomous organisations and the emerging NFT space not only created a massive upside for the early stage blockchain avant garde, it also initiated a massive movement towards community ownership and curation.

These developments currently manifest as a colourful world of NFTs, which influence digital



arts, collectables and the way people think about value chains and participation in digital economies: Video Games and the Metaverse.

Advancements in technology and the use of algorithms generate intelligent, responsive behavior in games. This enables immersive gaming experiences which adapt to the player's choices, changing narrative, character and environment of the game in real time.

But still, behavioural analytics are used to maximize daily active users and revenues at the cost of sustainability and quality of narrative.

ZERO Network is an open and decentralised blockchain network videogames, creators and esports. It provides protocols for identity, digital assets, payment and governance as well as computation and algorithmic creation of game environments and economies.

The Network is run in a decentralised fashion, rewarding operators of validation and computation nodes.

GameDAO is the first product running on ZERO Network. It provides community driven coordination, ownership, and crowdfunding protocols. These connect gamers, creators, publishers and investors to enable community curation, early stage participation and fundraising.

ZERO and GameDAO are governed by crowd based coordination protocols, continuously optimising problem-solution fit for their respective target audiences.

ZERO Network

ZERO Network is a multiverse blockchain network for the videogame industry providing end to end solutions for typical problem domains, like identity, payment, assets, computation.

It was initiated by COUNT ZERO , and built with Parity Substrate, a blockchain framework initiated by one of Ethereum creators, Dr. Gavin Wood, which features cutting edge modularity and interoperability.

As part of the multiverse, different chains, operated by individual parties, work independently but interact where designed through standardized protocols.

Traditionally there are problems, individual development teams or contributors in such network systems perceive as hard problems, and therefore try to avoid due to complexity or financial barriers.

ZERO takes away a variety of economic, regulative and technological pain points, to empower development teams to create truly community owned, blockchain native economies at scale.

WEB3 SDK	Unity SDK	Unreal SDK	Mobile SDK	Own Platforms	
Hypergraph Substrate Graph					
\$PLAY Token Stable Payment MiCa ART EUR / DAI backed	Asset Protocols NFT FT	Finance Protocols Collateral Pool Staking Pool Fundraising	Governance Legal Entities Projects Teams (esports)	Org Governance Council	GameState Matchmaking Game State Finalization Dynamic Blocktimes
Identity DID KYC AML	Payment Multiple PSP	Network Operation • Validator Nodes • Collator Nodes	Network Operation • Graph / Indexer Nodes • Oracles		Game Operation Computation Nodes Hardware / TEE
Substrate	Relay / Parachains		Polkadot Relaychain		Hardware
Legal Bodies					

The network design enables entirely new types of business designs shifting value generation from ancient user exploitation into integrated, mutual economic incentive for all participants.

ZERO as a network is initially rolled by its development team, but gradually handed over to the community.

Network Ownership

Upon inception ZERO Research as the service provider and maintainer of ZERO Network will utilise the SUDO keys giving administrative superuser rights to the keeper.

By the end of 2022, the network should provide enough nodes, validators and active voters participating in the network governance, to hand over the network to the community by destroying the SUDO key from the network. Polkadot already demonstrated how this can be scheduled and implemented in a reasonable way, a positive example we would like to follow.

Products + Revenue Streams

Complex systems like the ZERO Network and its built in asset protocols require not only plain operational but also development effort to continuously innovate on technological and economic groundwork allowing for outstanding developer and user experience (DX/UX).

Products like GameDAO are simple on their surface but still tailor made solutions for a dedicated market, potentially solving real world problems of users.

Creating and maintaining both worlds results in continuous revenue streams from a variety of transaction types:

Storefront

The ZERO Storefront utilises licensing protocols and provides a commercial interface to products and services living on the network.

These will be games as well as media content and game assets. Community curation protocols ensure continuous monitoring and scoring of offered content.

Core Services

One of the building blocks of ZERO is providing the right tools to enable users to participate in tokenized economies. Therefore barriers like onboarding, key storage, content delivery or payment processes need to be addressed.

Network Protocols

Operating networks in a decentralised fashion is always hard, even if you run with existing frameworks, like Substrate or Ethereum, where most nodes run on infura or amazon.

We incentivise strengthening the network and its capabilities in three areas:

Liquidity

Running a transactional system using a base currency which is either stable or asset referenced like PLAY would not make much sense if there was no liquidity. And especially for the wide range of core functionality, we will need some stash to be filled up.

Therefore we are working on a program rewarding liquidity providers who are staking amounts of EUR/PLAY (through custodial payment service) or DAI/PLAY (through an

Ethereum bridge vault) with ZERO, the Network governance token.

Validation Nodes

As ZERO Network is a nominated proof of stake (NPoS) network, it requires transaction validation by nominated and elected validators. This requires staking of the platform currency ZERO and is rewarded in ZERO.

Computation Nodes

Certain functionality inside a decentralised network still requires enormous amounts of computation in a short amount of time.

Especially when it comes to computer games, certain game models have complex state transition functionality which requires off chain computation through dedicated workers which provide trusted execution environments.

- Realtime Game State
- Generator Functionality
- Autonomous / Agents

Another scenario is prediction functionality or autonomous agents (think enemy or player support AI, NPC logic) which require computation at scale and continuously contribute information to the graph.

Functionalities like these will therefore act in a way like oracles for simple and complex computational and attestation tasks.

Computational tasks will require transaction fees, e.g. covered by the requesting party and shared with the network and operators. This incentivises the operation of such computation nodes.

To enable computation in an early stage, a full decentralisation of this will take place over time, starting with e.g. single nodes per game session and later on in a distributed and/or more decentralised fashion. This should enable existing providers of e.g. multiplayer architectures to initially integrate into the landscape through an oracle and later on with full compute node architectures.

Graph Nodes

ZERO Network operates Graph Nodes into the multiverse. To keep up with the requirements of operating such Graph, it is necessary to operate dedicated nodes providing indexing of network data and exposure of this data in a graph like structure.

This will reduce the onboarding barriers for product teams manifold, as the integration into software products is much simpler and less error prone.

Furthermore indexing and caching of fragments not only reduce network load but also compute load from full nodes.

Thanks to recent developments, the integration of substrate nodes can be even automated now, as relevant metadata exposing types and interfaces can be transformed into specs for the graph, removing tedious extra work.

Asset Protocols

Like primary and secondary markets in traditional and tokenized finance, asset management is a necessary fundamental of ZERO Network.

While the simple generation of fungible or non fungible assets is a no-brainer nowadays, because they seamlessly integrate into traditional business models in video games and content distribution, ZERO aims at a deeper integration of asset protocols into game mechanics and economics, starting at the genesis moment of a game, its properties and items can be fully generated environment.

This enables reproducible and randomised creation of game environments, simulations, individualised gameplay based on player insights and much more.

Like in core services, depending on the transaction type, certain cost of creation, customisation, transfer, trading may apply, leaving enough room for solid revenue for the creator, whether they create a game or content for it.

Finance Protocols

Products like GameDAO focus mainly on providing robust coordination and finance protocols, enabling disruptive product ideas based on community collaboration.

Creators are not forced anymore to stick to traditional fundraising, there is a lot of innovation happening in tokenized and decentralized finance (DeFi) with growing availability of automated market makers (AMM) and decentralised exchanges (DEX).

ZERO's low level primitives enable a low barrier entry into this with some guarantees from traditional regulated finance and merging these with innovative concepts of DAO, DeFi, NFT and DEX.

Therefore GameDAO can provide unique integration and incentive to not only support teams in raising funds, but to accompany and influence projects along their way, through the

respective DAO mechanisms: This is Next Gen Cooperatives or Democratic Smart Money.

A variety of revenue streams opens up out of protocol usage, and can be dynamically adapted through dynamic bonding curves. These help to balance transaction fee based systems to become fair.

Computation Hardware

ZERO Research is actively working on dedicated hardware for validators and computation nodes. These can be purchased as lightweight devices, heavily contributing to decentralisation and network stabilisation. This also opens up a gateway into open hardware and additional revenue streams over time.

PLAY

PLAY Token is a Euro/DAI based Asset Referenced Token (ART re. MiCA) and the payment means on ZERO Network and its connected Parachains.

It can be purchased through connected payment service providers enabling traditional FIAT but also crypto currency based payment.

All PLAY liquidity will be minted on cash-in of the input currencies as a collateral, independently

from the used currency (FIAT/Token) by the buying entity.

On cash out, the respective amount of PLAY Token will be burned and the equivalent of FIAT currency released to the cashing out party.

In order to conduct any kind of transaction on the network, consumers will need to purchase PLAY.

- Game or Content licenses
- Service fees and subscriptions
- Revenues

As a consequence, there will be a reward programme incentivising Liquidity Providers and respective collaterals will be stored fully compliant to regulatory requirements.

\$ZERO, \$PLAY, \$GAME

\$PLAY tokens are used as the universal payment means across the multiverse. Products and Services consume PLAY.

\$ZERO is used for staking, nomination and for network governance of ZERO Network while GameDAO, being a fully autonomous DAO, features its own governance Token \$GAME.

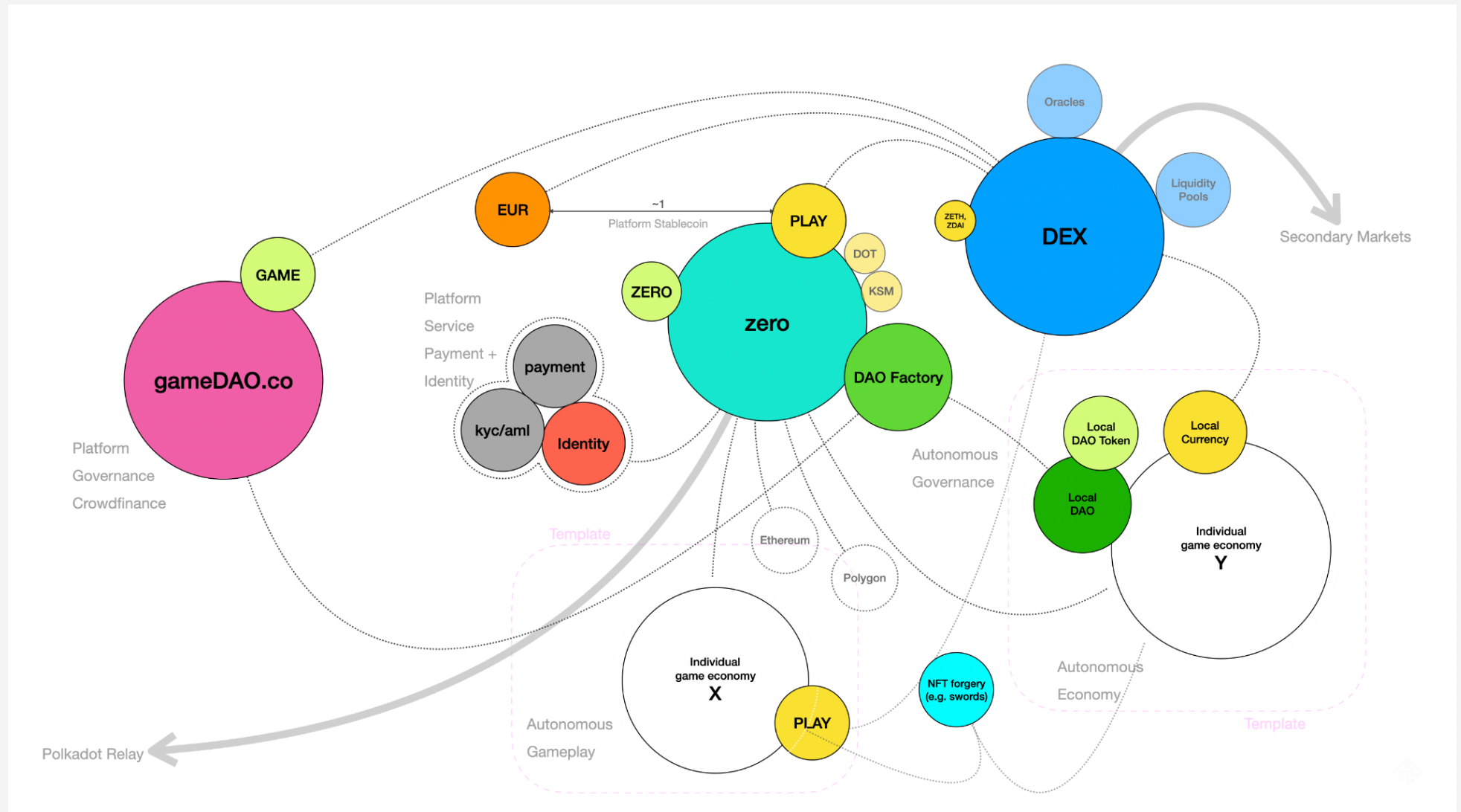
Members/Users of GameDAO need \$GAME tokens to take part in GameDAO Governance

and \$PLAY Token to use services offered on the marketplace.

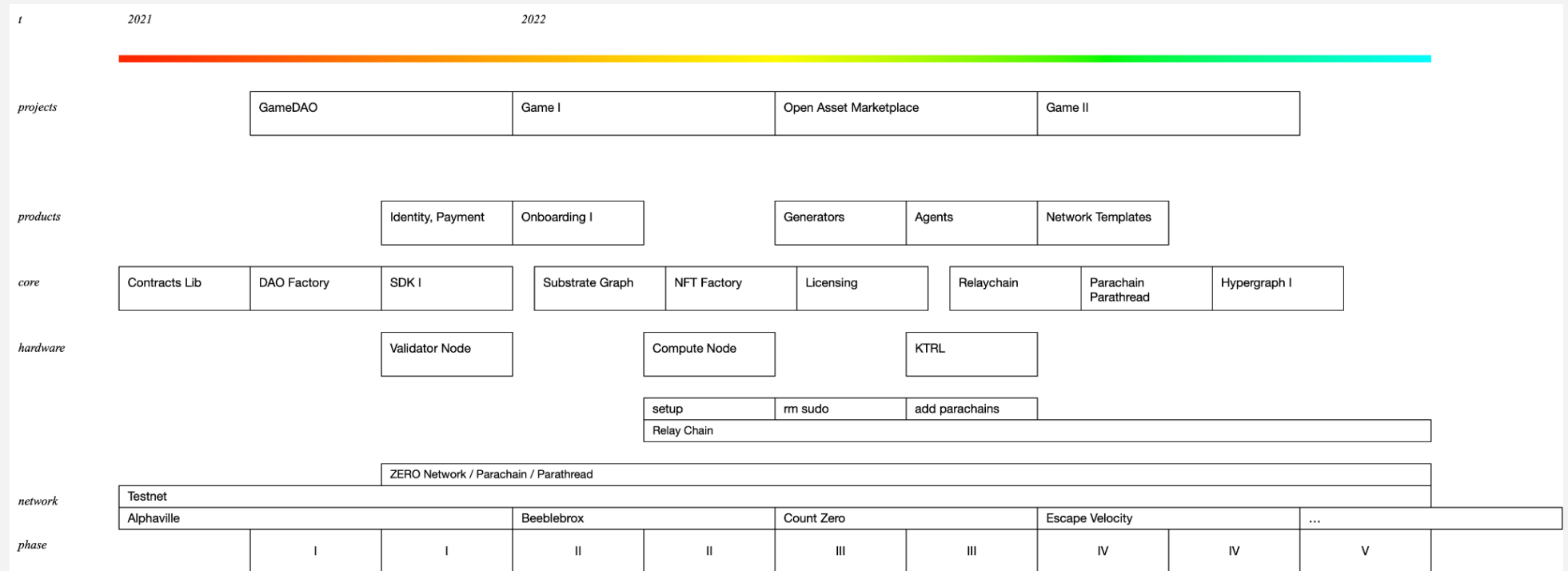
\$GAME and \$ZERO Token incorporate voting rights. and have to be locked through the Staking Dashboard (*fig. 8*) to actively take part in governance.

As the platform is operated as a Nominated Proof Of Stake network based on Parity Substrate, there will be validators evaluating every transaction. Validators will be chosen based on factors like nominations, staked assets, transaction history and a random base among qualified nodes.

Ecosystem



Roadmap



Appendix I —

Terminology

ZERO Research	The Research and Development Company building ZERO Network and more.
ZERO	The whole ZERO Ecosystem
ZERO Protocol	Native protocols running on the network
ZERO Network	Zero Network in its various stages, connected to Polkadot, Kusama and others
ZERO Relay	A Parity Substrate based Relay Chain
GameDAO	A separate organization, creating DAO + DeFi protocols and other products, using ZERO protocols

Appendix II — Blockchain Opportunity

“Blockchain offers solutions to many problems of the global gaming industry. Game currencies, items, avatars, gameplay input and even entire games and environments can be created, distributed and secured via Blockchain.

The proper integration of Blockchain in online games suggests that players can interact with each other and the games they play in ways never before possible.

It also suggests that developers can create new business models formulating new genres of games by emphasizing gameplay elements unique to blockchain gaming.

Benefits for Gamers

First and foremost, blockchain gaming is exciting because it can empower players and improve their experience. Below are some of the key benefits that players can enjoy through blockchain gaming.

Real-World Ownership

Any or all items and elements in a game can be placed on a blockchain. Whether it be scarce resources in a game, rare items or coveted loot, or the characters and avatars themselves, any entity in a gaming environment can exist as a crypto asset.

Typically, this manifests as fungible tokens (in the form of game currencies) or non-fungible tokens (in the form of items and avatars) upon an existing blockchain network.

A core component of blockchain is the value of sovereign ownership for its users. When game elements are placed on the blockchain, they can be interacted with directly by the player. When avatars or accounts are linked to player wallets, the loot they collect and currency they accumulate can be sent to their wallets as they achieve in-game.

In such a system, players do reap what they sow. Their rare swords, gold, armor, and whatever else is theirs forever. The developer has no permission to take back anything the player has earned, and even if the game shuts down, the items still belong to the player.

They can send it to other wallets and sell for real-world profit. Ownership of their items empowers them to receive a tangible output from their efforts and successes.

Provably Fair Gameplay

Hackers suck. Faulty gameplay does, too. When players are cheating against their competitors or games don't run the way they are anticipated, the experience is completely ruined for everyone.

Blockchain gaming enables a quality of “provably fair gameplay”. When games are placed onto a blockchain, the game logic and gameplay elements are shared as well. The consensus mechanism for securing the network works simultaneously to secure the game.

This means two things for gamers:

One: hackers, cheaters, or anyone else that seeks to infringe upon what is possible for players is inherently unable to do so. If their moves contradict the stated game logic, their activity is rejected.

Two: games are transparent. If, for example, a game has a chest that says it has a 10% chance of revealing a rare item, players can be sure that the possibility of revealing a rare item is, in fact, 10%. If they are unconvinced, they can look at the game logic as it's published on chain.

Play-to-Earn Gaming

Pay-to-Win gaming has plagued the experience of the billions of worldwide gamers. It's no fun to play a game where success above the competition comes with the deepest pockets, independent of whoever carries the highest level of skill.

Blockchain gaming turns pay-to-win on its head with its system coined “play-to-earn”. As mentioned above, blockchain gamers maintain real ownership of their items and virtual assets.

This includes the ability to sell them on open markets to other players. Blockchain games encapsulate a quality of rewarding players with crypto assets that carry an associated real-world value.

In the pay-to-win freemium model, the best or highest ranked players may be required to spend thousands of dollars on the game.

In the play-to-earn model, the best or highest ranked players may instead see earnings of thousands of dollars.

Cross-Game Communication

What does a gamer do when they stop playing their favorite game? Either they grew out of it, or the game died out- the community left or the developers decided to pull the plug.

Unfortunately, there’s not much they can do beyond finding the next game and starting back from scratch. Games exist in suspended, independent universes; there is no continuity between different games in the current scope of the industry.

With blockchain, this component is also radically disrupted. When games and game assets exist upon a blockchain, they can communicate with any other environment on the same blockchain.

If a developer made a sequel to a game, the items from the first could be taken onto the second. Avatars can bounce across multiple games. Quests or events can jump across games. Most importantly, players may never have to start from scratch again.

Ideally, they possess a single, universal avatar that follows them as they hop onto different games. Their virtual currencies and items may carry functionality across games.

The “Kittyverse” represents a synergy across several dozen Ethereum DApps where one’s Crypto Kitty can be used across each individual DApp.

Benefits for Developers

While it’s certainly important to improve the experience of gamers, it’s also necessary to understand the benefit developers have by incorporating blockchain into their game development. After all, if it’s nothing but headaches, developers simply would not bother. When applied intuitively, there are a range of benefits for developers to enjoy while building blockchain games.

Emerging Markets

For every big indie hit, there are tens, hundreds, or thousands of alternative games that just never take off. Perhaps the greatest obstacle to overcome for an independent developer or studio is their ability to stand-out and grab the attention of gamers in order to bring in an audience and forge a community around their game. The experimentation of many traditional game studios in blockchain gaming projects confirms the assumption that there will be a breakthrough blockchain game, and there is an ongoing race to be the one who doesn’t. The first major blockchain games that can captivate the attention of the general gaming population will be massive, and the pioneer developers will be well rewarded.

Cost Reduction

For an industry with as low a payout as game development, the associated costs can be crippling. Even when games do take on an active player base, the burden of publishing, server upkeep, player moderation, and so on can be unaffordable for games that don’t “properly monetize” their players. By building games on blockchain, all of these costs can potentially be outsourced to the miners or validators responsible for propagating the network. Online game publication and propagation can potentially be a zero-cost endeavor

New Development Genres

In the same vein as previously mentioned, developers and studios, particularly in the world of indie, are always seeking for ways to differentiate themselves. There are

unique properties associated with blockchain gaming, and these properties can be leveraged into the formation of entirely new and previously unknown genres of gameplay. There are already examples of “play-to-earn” games, where gameplay is emphasized around the concept of players earning real world profit. Several existing projects also boast their potential to recreate the OASIS universe from Ready Player One, the New York Times bestseller and subsequent Hollywood film.

Value Creation

So many recent game trends have revolved around sucking value from players in “freemium” and “pay-to-win” models that emphasize addiction and spending over actual fun. For good reason, many developers across the board are opposed to this profit model and the parasitic implications it has on the industry as a whole. With blockchain, developers have more creative outlets to earn profit. Blockchain games enable developers to create and forge crypto assets with real, transferable, intrinsic value. Not only does this give players more capacity to profit, but it also gives developers less intrusive profit mechanisms, too. Setting up games to split profit between developer and player is a much better alternative to draining the player’s bank account.

Enhanced Playerbase

The existing and future players that make up blockchain gaming are an interesting subset of the consumer population. These players have an elevated interest in their gameplay and heightened attention in seeking profit through their play. Blockchain gaming connects developers to communities of “super players”, with far more resources and investment in regards to their gaming. A more active, elevated, and beneficial relationship between two parties can be forged than is possible in traditional gaming counterparts.”