



www.Gamearts.org

Game.Arts Chain Whitepaper

Game industry revolution based on blockchain technology

Gamearts Chain Foundation

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Summary

The gaming industry came into being after the Internet was born in 1969. Although the global game market has reached more than 150 billion U.S. dollars, the traditional game industry market has become saturated. Some traditional games are much criticized by players, for being unfriendly to players, closing the network at will, and modify the rules of the game without authorization, and so on. The disadvantages and decline of the centralized game are becoming more and more obvious. In contrast, blockchain games are like a child, thriving under the decentralized sunshine.

The storm in the gaming industry is coming.

GAME.ARTS is a glimpse into the future game business service landscape.

This white paper elaborates on how we have evolved the idea behind Bitcoin to the form of GAME.ARTS AI. Specifically, the system (GAME.ARTS AI) will be used as a service to protect the continuous operation of smart software. This is the part of artificial intelligence trying to keep itself running.

GMAES.ARTS is a kind of LIBERTYDECENTRIC (autonomous decentralization). Imagine it as a notebook, which explains how to define and design interesting concepts under a new ethical system. Needless to say, this is a valuable and advanced concept, enough to allow the current commercial system to accept it.

GMAES.ARTS is a complete value network. It does not depend on any individual. Contracts, AI and anything can frequently interact with each other day and night. Values are circulated among them. Values can go where it should be automatically, all you needed is to type a line of code.

GMAES.ARTS provides new possibilities and ideas for the traditional game industry and solves the fundamental trust problem based on technology and code. The combination of blockchain and games has brought about a change in the thinking mode and business model of the game, as well as the possibility of cultivating new game types and ways of playing. Compared with traditional games, it has the advantage that cannot be copied, gathering a complete game industry chain.

GMAES.ARTS aims to establish a new gaming community ecosystem, making virtual assets extremely close to real assets. In its open and compatible ecosystem, game players, game developers, operators, investors, and promoters from around the world can play the roles that allow them to convert the values of their input into their revenue and circulate in the system in the form of GA (GAMEARTS platform token). As a value carrier, GA can not only circulate in the closed-loop system but also leverage the larger value outside of the ecosystem.

It sounds complicated, don't worry, this is a feast for games and arts.

Background

The global game market
Bottlenecks in the Development of
Traditional Game Industry
Blockchain Reshaping Game
Industry Rules
The status of blockchain games

1.1 The global game market

The global game market shows a continuous growth trend. According to the "Global Game Market Report 2019" released by Newzoo, the global game market is expected to generate US \$ 152.1 billion in revenue in 2019, an increase of 9.6% year-on-year, of which mobile games will still be the largest market segment in 2019, accounting for 45% of the global game market size. It is estimated that the global game market revenue in 2020 and 2021 will be USD 164.6 billion and USD 178.2 billion, respectively.



In the past two years, with the rise of entertainment methods such as short video and live broadcast, the user dividend is attenuating and the game life cycle is short. Except for a few games, there is little room for the improvement of payment rate and ARPU. The reason for this situation is related to the needs of users, but also has a direct relationship with the accumulated disadvantages of traditional games.

1.2 Bottlenecks in the Development of Traditional Game Industry

As the market gradually enters stability and maturity, competition in the gaming industry is gradually intensifying, problems such as technological upgrades and obsolete game ideas have gradually become apparent. To compete for the global game market share, the major game developers' battle has begun.

According to the data, there are three major game industry developed regions in the world, Europe, Asia, and the United States. Overall speaking, Europe is similar to the United States, and Asia is different from them. At the same time, Japan, which has a long history of games, has gone further and further on the road to gamification.

Speaking of Europe, the game industry did not rise in established powerhouses such as Germany, France, and the United Kingdom. Instead, Sweden shouldered the glory of Northern Europe. It used to be the world's number one gaming power, but now it is sinking into the twilight of the gods. The rise of gaming in Europe had a unique foundation. The rise of the Swedish game industry lies in policy support. In the 1970s, Sweden vigorously developed high-tech industries and a high social welfare system. As a developed country, Switzerland has a free and liberal environment. Due to the higher

latitude, the winter nights in Sweden are very long, over 87% of Swedish households have computers and the Internet is popular. Of course, it is necessary to do something happy in the cozy home. The Swedes' game talent is mainly focused on FPS games. In the past, the Nordic gods ruled an era.

The success of the conventional pay-as-you-go model has greatly increased the revenue of the game companies, but at the same time, this model deprives the players of the most direct and simple fun of playing the games. The original pleasure is contaminated by money, manipulating others by the sheer power of money has became the main fun in games. As a result, game playing has been downgraded into the calculation of the cost and profit.

However, under the influence of huge monetary interests, the famous games distribution platform is unwilling to change the current unreasonable situation easily. They continue to promote and strengthen the pay-as-you-go model. They even forced other game companies to follow this unreasonable game design method by abusing their market monopoly.

At the same time, because of this unreasonable game design method, the overall user of the game industry shrinks, and the user acquisition cost continues to rise. These large-scale game platforms continue to increase the percentage of revenue collected from game developers, and even take 90% of their revenue as game share margin. To survive, game developers have to further strengthen this irrational game design method, which has caused the homogeneity of the entire game industry, the difficulty to start innovation, and the vitality and self-evolution ability of the industry have been severely suppressed.

1.3 Blockchain Reshaping Game Industry Rules

How to break the current situation? The advent of blockchain technology has brought a brand new solution to thoroughly solve the pain points of the traditional game industry.

Blockchain's natural decentralization, transparency, and borderless traits have ushered in a brand new business model for our game industry, allowing gamers, game developers, operators, investors, promoters and others to achieve win-win game ecosystem possible:

- (1) The key data such as equipment and items are on the blockchain, which is fair and credible. At the same time, the token will provide incentives to community building, and innovation is no longer simply the responsibility of developers;
- (2) Using the economic system in the blockchain to break the channel monopoly and create a new self-distribution network;
- (3) The user truly owns the in-game assets and can rely on smart contracts to realize trustless circulation;
- (4) The cross-application ledger feature enables the same IP asset to be reused, increasing the interactivity and playability between games;
- (5) Reshape the in-game economic system.

With the slowdown of mobile game growth and the peak of PC games, future growth will mainly come from the game ecosystem market, and the strong promotion of the commercialization of games sports events will further enhance the expansion of the game ecosystem and provide lasting support for industry growth.

After experiencing the previous explosive popularity of League of Legends and Watch, the competitive sports game market is waiting for the emergence of the next hot games to maintain rapid user growth.

Another noteworthy trend is that game users are gradually transforming into game events audience, and a large number of watching needs have not been met, and blockchain games have brought a new wave of digital tokens.

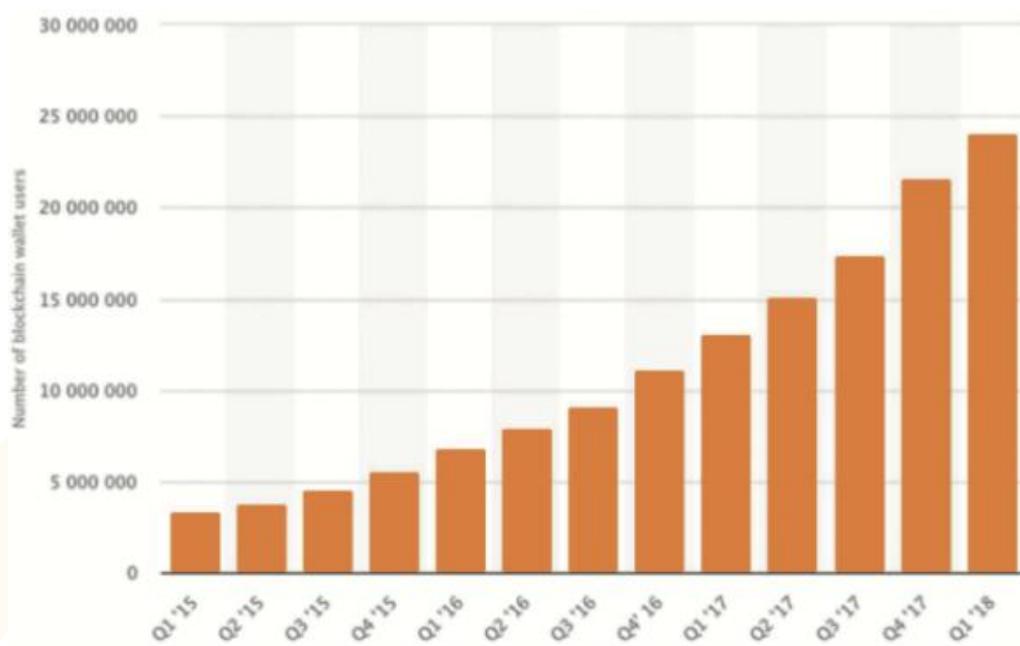
The game commercialization model is moving towards daily life, and the display of deep strategic game commercialization, in addition to brand implantation on the arena, presented itself in-depth strategic cooperation off the arena, living style product cooperation, and derivative content service cooperation that leverages the advantages of digital sports, etc.. It will also be an advantage for future development. The game commercialization model is moving towards life, and it is deeply strategic. The League of Legends Professional League (LPL) has launched long-term and deep cooperation with Nike. The joining of sports brands that have good cooperative relationships with many traditional sports leagues not only confirms the commercial value of game sports is gradually recognized but also indicates the future exploration direction of the commercial value of the entire game industry.

Industry competition has intensified and lead to professionalization. A large number of emerging clubs are joining the industry. The competition in the industry has become increasingly fierce, and it has also prompted the game club industry to move towards professionalization at a high speed. The traditional club started early and has a very strong industry accumulation and brand capital. The technology investment club inherits the corporate management operating model and inherits the resources, technology, and team of the parent company, but how to realizes business value diversification on the premise of guaranteeing performance is still an issue to be addressed by the gaming clubs.

Game short video content has received extensive attention from the game audience, accounting for nearly 76% of the total user proportion. Game users will watch the short video content of the game. The short video content that the game users most like to watch are game teaching content, event highlights, and the anchor daily life.

GMAES.ARTS user group comes from the Southeast Asian market and the new type of market. The GMAES.ARTS chain will also develop a diversified ecosystem in the future online and offline ecosystem, improve the games and create an independent decentralized road of the game. The service will help More players and game developers.

1.4 The status of blockchain games



The blockchain industry has seen explosive growth in the past two years with the average users increasing by hundreds of thousands in 2017 and 2018. By 2018,nearly 22,500 players have created a market worth hundreds of billions of dollars.

Games have a very special place in blockchain. No matter in the field of traditional internet or blockchain, games are one of the most easily monetized industries, and the game industry also features low cost of trial error.

Since the development of blockchain games, numerous teams have successively launched many new game types and gameplay, among which there are some very successful works in the data and business, and gradually formed a mature business model and release strategy. Especially in the past two years, blockchain games have seen explosive growth, forming a global distribution of high-paying users. Moreover, the trend of younger blockchain users obviously have a very strong investment attribute which has been valued by the outside world.



Project Introduction

What is the Game.Arts
Players Autonomous Game Community
Concept and vision

2.1 What is the Game.Arts

Game.Arts is a technologically advanced blockchain game publishing and downloading platform, with the essential characteristics of blockchain economic attributes. An entertainment platform for comprehensive game data and information based on block chain technology. Game.Arts products cover game guessing, game live broadcast, game recommendation, entertainment media, game community, etc.

The purpose of the design of Game.Arts is to improve the disadvantages of the centralized platform. GA is the only trusted Token in the ecosystem that will be used for all services and application exchanges throughout the ecosystem. According to the distribution mechanism of equity pass, professional players, users and anchors will get corresponding GA incentives.

The realization of Game.Arts products adopts the characteristics of decentralized block chain technology, and "participation is benefit" is the core concept of GA. Participating users can get the indispensable props in the entertainment section for free, and then bring in the income for them through the prop transaction. For entertainment content creators, GA will provide a zero-threshold sharing and operation channel for developers and development teams around the world, and provide comprehensive financial and technical support to help them realize value, while continuously enriching the ecological connotation of game.arts.

The Game.Arts game platform has the same functions as the exchange to launch and exchange the stock exchange. Users can use GA to pay the online fees. GA supports other project parties' pass CARDS to play online entertainment as betting chips in the game, and helps other project parties to graft game application scenarios and eliminate the bubble of token market value. Competitive games will be the first to realize the user behavior, entertainment, games, asset monetization and set bidding transaction, based on the transverse extension, will form a variety of traditional entertainment and digital currency financial attributes combination, mutual penetration, the user's consumption and creation will evolution GA for digital assets, not bound by any platform and free cash flow, will be fully dig dug its financial value. Based on the perfect incentive system, game namely, dig, income dividends, rights, fair and reasonable to measure and motivate different types of entertainment ecological users, let them both to have fun, and can create economic value, ecological form two-way encouragement, make whole entertainment entertainment not only stay in a simple game, more into a collection of entertainment competition, value creation and capital circulation, high returns in the integration of innovative value investing.

◆ Disintermediation in the game distribution

Game.Arts is a complete game ecosystem, and the concept itself will attract a large number of players. At the same time, in the Game.Arts, game developers can use the traditional costs for advertising and promotion to directly attract game users through GA airdrops, game distribution, etc., At the same time, the high share fees of traditional distribution channels are eliminated, allowing users and game developers to share profit.

On the internal distribution of platform users, the platform will use new game trial rewards, multi-game active rewards, and other mechanisms to promote more players to participate in the game, thus resolving the winner-take-all problem (the top games will gain more than 90% of platform users) in traditional game distribution platform, and allowing even the lower-ranked games to gain user traffic on the gaming platform.

◆ Unified payment method

A blockchain game public chain developed based on the expertise of multi-blockchain platform technologies such as ETH / Fisco-Bcos / ABA / GFS / DOT /, allowing all game content in the ecosystem to use the platform token GA for payment, Ensure that users in the ecosystem can use GA to achieve free switching between all games and game asset trading.

◆ Cross-border Game Ecosystem

Based on the self-developed blockchain game public chain, all games in the world can be published and downloaded based on a unified platform. Users do not need to worry about complex exchange rate conversions in cross-border transactions, and recharge of currencies of other countries. Users can enjoy the ultimate gaming experience brought to you by global game developers.

◆ Revenue Sharing

In Game.Arts, GA will be obtained through players' action in the games. The official platform will not sell GA with fixed price. Users are both consumers and producers and sellers of GA. The income from GA sales will belong to Users. The official platform and the community only act as the supervisors of the commodity trading market. Through the sophisticated market commodity price stabilization mechanism designed by the team of platform economic experts, the market commodity prices are regulated to achieve the purpose of stabilizing commodity prices.

◆ Game developers have basic income protection

The public chain technology of Game.Arts is a consensus mechanism based on the distributed network system node model for public chain packaging. Therefore, producers that cooperate with us early in the ecosystem will be able to use game servers to become one of the supernodes, so that they can obtain the additional “mining” income for served as supernodes ,therefore the basic interests of the third-party cooperation vendors in the early stage will be protected.

2.2 Players Autonomous Game Community



◆ The community decides the list ranking of new games

Through community voting, players can vote on a game recommended list and decide the ranking order of games. The platform will sign and list games according to the players feedback from the community.

◆ The Community decides profits distributing ratio

Players can evaluate and rate the games on the platform by evaluating games. The Platform will rely on Smart Contract to dynamically adjusting the revenue sharing proportion of all games on the platform, allowing community users to effectively restrict game developers. For some games with high quality, community users have rights vote to give them the extra bonus.

◆ The community decides whether game items should be listed on the exchange

By discussing and voting, players decide whether to put the game items on the Exchange or not. Besides, the platform helps game developers with the technical docking of items with the Exchanges.

◆ The community players participate in game design

In traditional game content design, game developers lead the design. For example, Ghostcrawler, the designer of the famous game World of Warcraft, once adjusted the settings of World of Warcraft and League of Legends despite players' fury, totally ignoring the opposition and protest. In these cases, players have no alternative.

For the games on the shelf, players can influence the design decision of game developers by adjusting the profits distributing ratio, enabling them to design and maintain game with developers.

For the games that need crowdfunding, players can have a full discussion about the content of the games and vote to decide whether the crowdfunding should start.

◆ Community active rewards

The rewards for community activities, including daily login, check-ins, thumbs-ups, replies, etc. The reward for those who participate in community management works, including community voting, community management, community recommendations, community building, etc.

◆ Excellent high-quality contents rewards.

Users will receive a reward from other users after creating high-quality user generated content (UGC) content in the community (such as Posting). Well-known key opinion leaders(KOL) can also create their own subscription content to win consistence income.

◆ Platform sign-up rewards

Users who provide high-quality UCG content will also have the opportunity to enter the Community Council to become members of the council and share the regular awards from the community council.

For all the game industry ecological users to provide a strong interactive community, game games need a strong community to game teams and game players, game guild links together, play the maximum matrix effect. The objects participating in the whole game ecosystem are the users of blockchain system application. The main roles in game ecology are users, professional players, anchors, advertisers, and event organizers. Different roles contribute to the whole ecosystem, for example, when users submit high-quality personal data, they will get GA. Each object will have a corresponding algorithm strategy to ensure the good operation of the entire ecosystem.

Block chain driving force of the core values from the consensus of the community, through the early to the community to guide, medium and long term development projects to be full of community autonomy, through game developers and players, content creators, the host community personnel to vote and the joint construction of the community, the GA will be acting on how much contribution to the targeted incentives.

◆ recommendation and reward mechanism for excellent games

As a comprehensive game portal, GA has many players with more diversified demands for various games. After the game hits the shelves, all player users recommend that more users participate in the game will get GA.

The main games are divided into: console games are recommended to xbox, Ps4, switch and other game console market, more high-quality console players. High-quality console games provide more content for the industrial chain.

PC game recommendation platform mainly includes Steam, wegame, GOG, Itch, etc., covering more paying players. Copyright purchase is the main business model for such players.

Mobile games are recommended mainly for mobile terminal games such as Appstore and Googleplay, with larger scale of game players. In-game purchase and advertisement realization are the main modes.

Universal credits players can gain universal credits by downloading the game and users can flow throughout the game ecosystem. This will make it easy for more Internet communities to adopt GA COINS in their websites and games by including development of other forums such as GA and CMS integration as part of the open source platform API. The open source PHP and NodeJS SDK will enable Web developers to easily access all of the GA coin functionality and provide a comprehensive set of capabilities for customizing websites and apis.

2.3 Concept and vision

"One can study economics in three ways: through theory, through statistics and through history."

-- Joseph schumpeter

There are many investment opportunities in the 11 years since the birth of bitcoin. Of course, the early investment assets are all high yield, high risk and high volatility. Historically, it takes a long time to determine the value of a certain financial product and the recognition of people's ideas.

As one of the investment elements, the token economy that follows the development of blockchain is irreversible. Although blockchain technology has gradually taken root and germinated in various fields with its decentralized concept, its combination with traditional finance and innovation and deep cultivation in investment diversification are still a blue ocean. No matter

How will digital financial assets as part of the portfolio, or how to turn the traditional financial instruments and investment philosophy combined with block chain technology, and how to traditional financial assets under the premise of compliance, risk control in a centralized way chain on the packaging, are worthy of our in-depth analysis and research application.

If innovation, faith and risk are the seeds of business, value is the luxuriant trickle that feeds it. Traditional industries produce value directly, the Internet increases value through the efficiency of connectivity, and modern finance brings capital flows to amplify value. Value is the most basic business logic.

The core of blockchain game should not be the complex program code that is difficult for ordinary investors to understand, nor should it be the Token price that is driven by capital to rise and fall. Instead, it should focus on solving the pain and dilemma of how to combine the application of entertainment industry with the decentralized concept of blockchain. Application is the core of GA ecology, and its fairness, security, openness and traceability should be the embodiment of its decentralized value. At the same time, GA ecology itself also needs to have a real playable entertainment products on the chain, and through its own decentralized integration, packaging, incubation, etc., to integrate resources for the convenience of players to use and create value. This constitutes the value basis of GA game + block chain.

◆GA ecological vision and positioning

GA ecology is not a centralized structure of traditional companies, with no CEO or board of directors. Relying on the block chain technology and the concept of pass economy, it will be the world's first community autonomous comprehensive game platform. GA ecology will become the world's first open and most of the profits of the game ecological platform. By publicizing all kinds of ecological profits such as games on the chain, and selecting the major currencies of large profit-sharing economies and time-proven currencies, community members are encouraged to focus on the medium and long term, with band as the auxiliary, and value investment is advocated. Through the way of encouraging users, form community habits, become a positive energy, powerful community, create a community legend.

GA's vision is to create an autonomous, transparent and high trust for digital currency investors and game users

impartiality, transparency and safety, and meet the requirements of safety, auditing, reporting, analysis and regulatory compliance in the most transparent way.

◆GA community building

Community is an open and transparent certification organization, and GA certification represents the rights and interests of participants of GA ecology. GA pioneered the "construction and mining" model and the upwing-type dividend model. Most of GA's incentives, especially when the community is mature, the GA community will distribute 100% of the profits to GA holders. In the early stage, we will give 80% of the profits to GA holders and actors, and 20% to daily management and operation. We will distribute equal proportion to GA holders according to the profit composition.

Community feedback adopts the model of "promotion is mining" and is gradually released to community members. We will return the income to users through the development of mining (including top-up and withdrawal fee return, login incentive, content creation, game duration incentive and other forms). Each day is a GA return cycle. We will calculate the amount of GA to be returned in the current period according to the average price of GA and timely release it to users.

Technical Resolutions

Platform Architecture

Smart Contract

SDK of the platform

Group Architecture Design

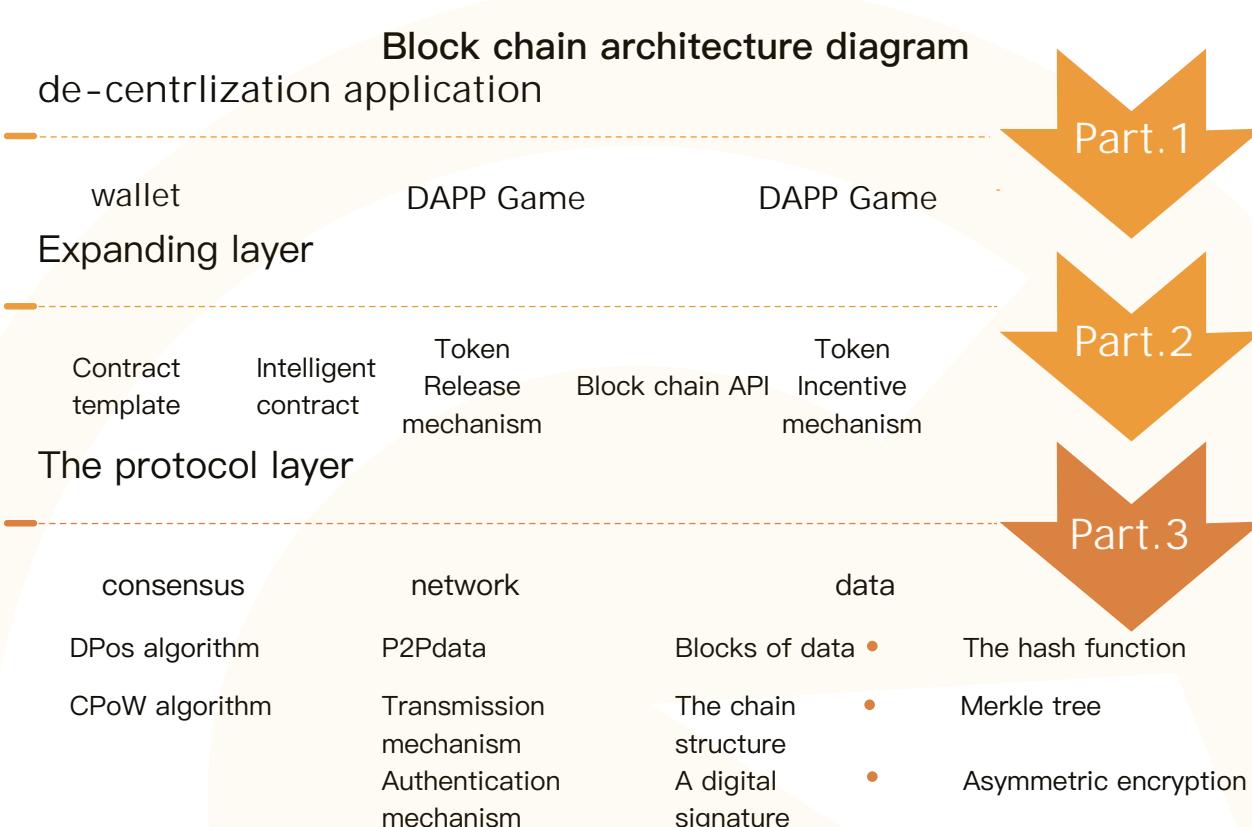
Blockchain File System

Inclusive Consensus Mechanism and
Strategy

3.1 Platform Architecture

The blockchain uses consensus-based specifications and protocols (such as a set of open and transparent algorithms) to enable all nodes in the entire system to exchange data freely and securely in a trustless environment so that the trust in "people" becomes trust in machines . No human intervention will work. In addition to the private information of the parties to the transaction being encrypted, the blockchain data is open to everyone, anyone can query the blockchain data and develop related applications through the open interface, and each node is jointly maintained by all platform participants to ensure the fairness, transparency, and authenticity of the platform to the greatest extent.

Based on the basic mindsets of the blockchain, Game.Arts brings together the research and development results of multi-blockchain platform technologies such as ETH / Fisco-Bcos / ABA / GFS / DOT / etcs. It combines the actual scenes of the game publishing industry and employs the following basic technical architecture and technology systems.



◆ Blockchain underlying technology

Based on ETH / Fisco-Bcos / ABA / GFS / DOT / and other public chains for innovative construction, Game.Arts intends to adopt a multi-consensus algorithm mechanism such as POS / DPOS / CPOW / PBFT, with 10,000-level TPS concurrent processing capacity, which can meet the onboarding needs of many blockchain games.

◆ The interaction layer of the business logic of the platform

The contract template provides an application development template according to different application scenarios (user login verification, game items generation, transactions on the game items mall and so on). The blockchain API layer is encapsulated in the provided platform SDK, and the DAPP Games of the upper layer interact with the chain service through API. The smart contract mainly includes the business logic of the ShareWorld platform.

◆ The De-Centralized Application Layer

Game makers develop DAPP games and access to the platform, game players interact with the platform by logging into DAPP games or by using the wallet.

3.2 Smart Contract

Identity Authentication System	Game Income Distribution System
Game Asset Generation System	Game Voting and Evaluating System
Game Asset Trading System	Community Autonomy System

◆ Identity Authentication System

The identity is uniquely identified by a cryptographic address, i.e., a public key and the assets on each address are managed by the corresponding private key of the address. Game players can hold multiple addresses and the private key of each address can be preserved by the wallet. As with Bitcoin and Ethereum, game players need to ensure the private key is not compromised.

◆ Game Asset Generation System

Game makers can generate new assets (such as valuable items and equipment) through the Game Asset Generation System. The assets will be recorded in the ledger of ShareWorld blockchain. Meanwhile, only those assets which are generated by the smart contract can be traded in the Game Asset Trading System.

◆ Game Income Distribution System

Based on the result of the community voting, the smart contract will be automatically driven to adjust the income distribution ratio of the game.

◆ Game Asset Trading System

Game players can freely trade their game assets in the Game Asset Trading System by using GA (only the game assets generated by the Game Asset Generation System can be traded in the trading system because only assets that are recorded in the ledger of the ShareWorld blockchain can be checked out). A game player can sell his/her assets in Game A to get GA and then use GA to buy assets in Game B. In this way, a player can hold the value of the assets throughout the platform.

◆ Game Voting and Evaluating System

Game players and makers can participate in various voting activities, including voting on all kinds of the game ranking list, voting on community autonomous affairs and so on. Through releasing subscription information, one can drive the execution of the smart contract.

◆ Community Autonomy System

The smart contract portion of the Game.Arts is the most flexible one and directly affects the interests of all participants. The smart contract cannot be modified once it is deployed because of the tamper-proof nature of the blockchain. If the system needs to upgrade, all the smart

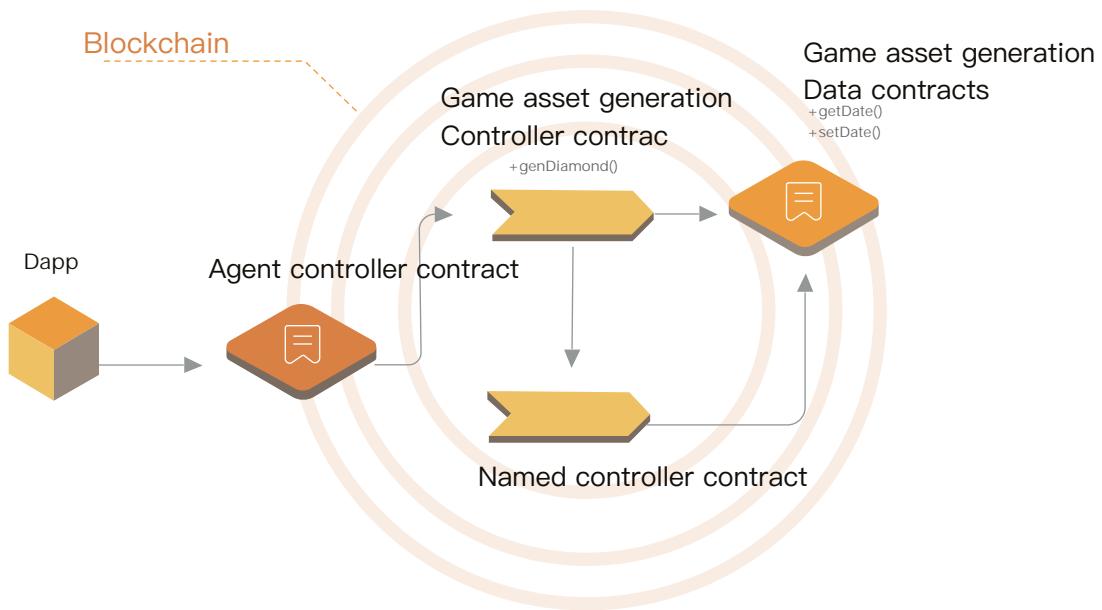
contracts should be re-deployed. This may involve changes of the arbitration rules, the credit scoring algorithms and so on. Participants may have different attitudes toward it since it directly related to the interests of them.

If the developer directly enables all DAPP games to run the latest version of the protocol through specifications, then there come the following two problems. On the one hand, due to lack of discussion, it is possible to cause benefit loss of the participants and affect user experience. On the other hand, it may also bring risks to the system due to lack of consideration.

Therefore, the Game.Arts establishes a decentralized, digital autonomous community based on GA. The protocols of Game.Arts will be deployed to the blockchain. The GA holders have the privilege to vote on whether the system needs to be upgraded. The holding time and the total amount of the GA will affect the voting weight of an owner. It will be a collective vote.

◆ Design and upgrade of Smart Contracts

From a business perspective, smart contracts only need to do two things. One is how to define the structure of the data and how to read and write, and the other is how to process the data and provide external service interfaces. To better do module abstraction and contract structure layering, these two things need to be separated, that is, to separate business control logic and data from the contract code level. This kind of processing is used in complex business logic scenarios. Currently considered the best model. This mode is referred to as the CD (Controller–Data) mode. Contracts are divided into two categories: Controller Contracts and Data Contracts.



The controller contract obtains data by accessing the data contract, performs logical processing on the data, and then writes back the data contract. It focuses on the logical processing of data and external services. Depending on the processing logic, there are namespace controller contracts, proxy controller contracts, business controller contracts, and factory controller contracts. In general, the controller contract does not need to store any data, it completely depends on external inputs to determine access to the data contract. In special cases, the controller contract can store the address or namespace of a fixed data contract (the contract address is obtained at runtime through the namespace).

Data contracts focus on the raw interface for data structure definition and the read and write of stored data. To achieve the purpose of unified data access management and data access permission control, it is best to expose the data read-write interface only to the corresponding controller contract. Other ways of read and write access are prohibited.

Based on this model, following the top-to-bottom analysis method, We design various controller contracts from the service interface provided externally, and then gradually transited to the data model and storage method required by the service interface. The design of the contract structure can be completed relatively quickly.

In the CD mode, when the business logic needs to be upgraded, it can be divided into the following three cases according to the upgraded relationship between the controller contract and the data contract:

The upgrade of the smart contract in CD mode can be divided into the following three situations.

Controller Contract		Data Contract
Upgrade		Not upgrade
Not upgrade		Upgrade
Upgrade		Upgrade

◆ controller contract upgrade, data contract is not upgraded

As shown in the following figure, the Game Asset Generation Controller Contract is upgraded from V1 to V2 (Assume only upgrade the genDiamond interface).

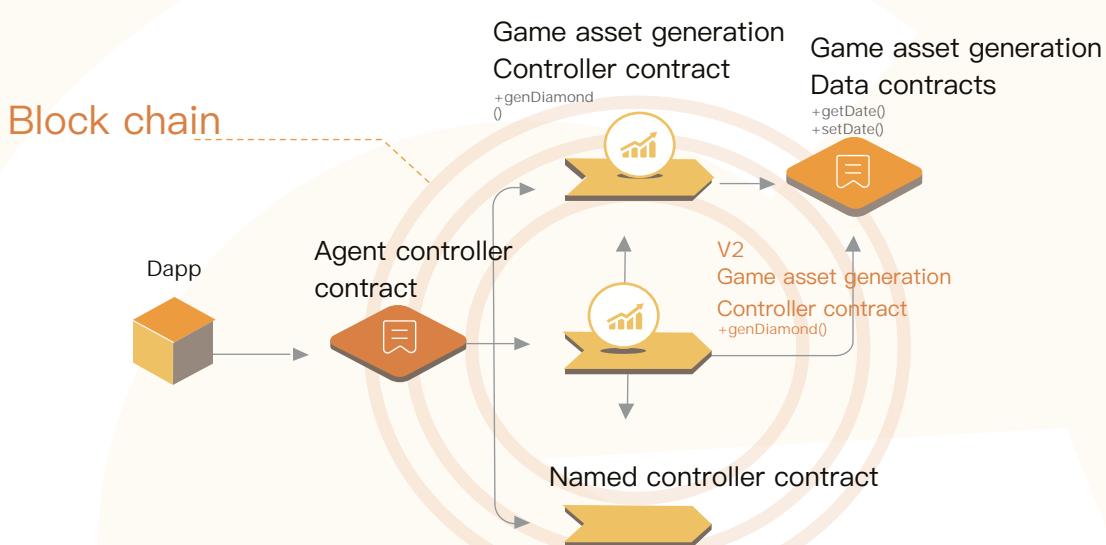
The concrete execution steps of the Game Asset Generation Controller Contract on version V2 are as follows:

- Inherits the Controller Contract on version V1;

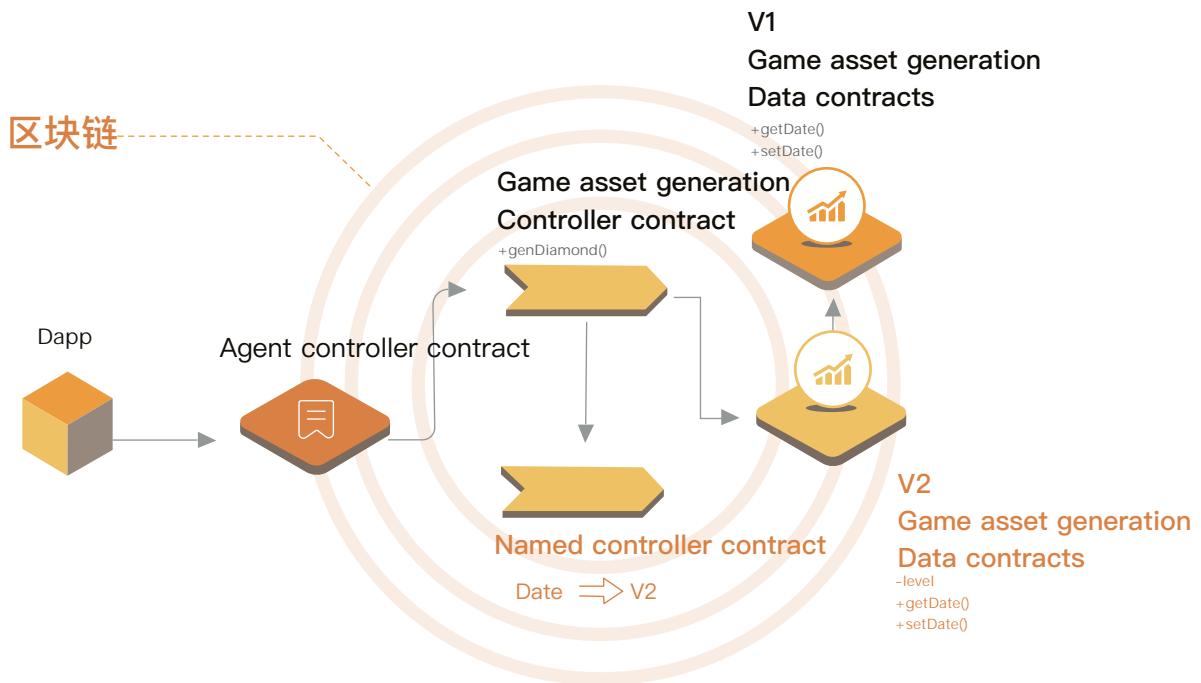
- b) Adds a member variable and point to the contract address on version V1;
- c) Adds the genDiamond interface to implement the start–stop gray strategy, and allows an external account to enable or disable this strategy through a regular transaction.
- d) Overloads the genDiamond interface and implements it. To reduce the online failure of upgrades, it adds a customized gray strategy. In the case of the gray strategy is enabled, the V1 version of the contract is directly called and the genDiamond interface in version V2 remains useless if the request does not hit the gray strategy. After ensuring the contract in version V2 is correct, we can disable the gray strategy, and thus the contract on version V2 will handle all request.

After completing the contract in version V2, it initiates a regular transaction to finish the upgrade operation. The logic of the transaction is as follows: 1) deploy the Game Asset Generation Controller Contract of version V2; 2) add the address of Controller Contract to the Proxy controller contract. In this way, the Controller Contract is upgraded.

If rollback is needed, we can simply initiate a regular transaction to modify the Proxy Controller Contract and map the Controller Contract address to that in version V1



◆ Upgrade the Data Contract only



As shown in the following figure, the Game Asset Generation Data Contract is upgraded from V1 to V2 (Assume only add a data field level).

The concrete execution steps of the Game Asset Generation Data Contract on version V2 are as follows:

- Inherits the Data Contract in version V1;
- Add a field level and implement the related interface.

The concrete execution steps of the Naming Controller Contract are as follows:

- The Naming Controller Contract stores and access data by access Data Contract. The upgrade of the Naming Controller Contract can be referred to as the upgrade of the Game Asset Generation Controller.
- The Naming Controller Contract saves the mapping table, i.e., the mapping of “name” to “currently available version”.
- The Naming Controller Contract provides the interface of traversing the name of Data Contracts (support for calling multiple Data Contracts).

d) The Naming Controller Contract provides an interface for modifying the mapping table of the Data Contract.

After completing the Data Contract in version V2, it initiates a regular transaction to finish the upgrade operation. The logic of the transaction is as follows: 1) deploy the Game Asset Generation Data Contract of version V2; 2) Data migration from Data Contract in version V2 to version V2 if there is the need; 3) Register the address of the Data Contract of version V2 to the Naming Controller Contract and update the current valid version to V2 which is mapped by the Data field. In this way, the Data Contract is upgraded.

If rollback is needed, we can simply initiate a regular transaction to modify the version to V1 which is indicated by the Data field

Through the logic of version controller in the Naming Controller Contract, we can maintain both the old and the new Data Contract and meanwhile makes other Business Controller Contracts still function well. With the development of business and the continuous version upgrade, the storage of the Data Contract will become large, which resulting in a decline of the performance, but this can be well handled by data migration and upgrade.

This version control design by leveraging the Naming Controller Contract can flexibly select gray strategy according to different business requirements, and meanwhile, it will not affect other business contracts and they do not need to stop services.

◆ Upgrade both the Controller Contract and the Data Contract

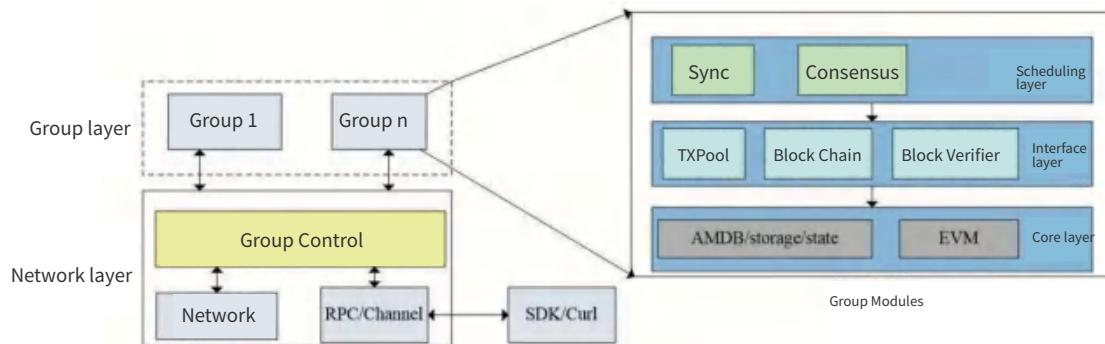
This case is essentially the combination of the above two cases. Therefore, it can be divided into two cases according to the specific situation.

3.3 SDK of the platform

Language support: Golang, Java, C#, C++, Rust; It can provide customized API and web service for WebPHP, NodeJS SDK.

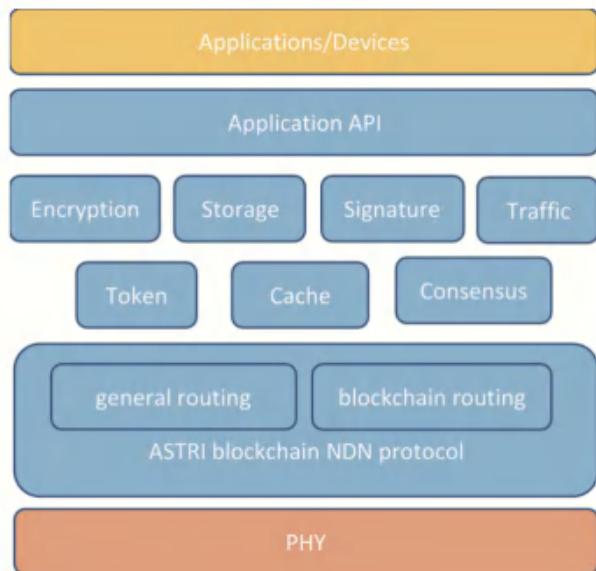
3.4 Group Architecture Design

To ensure flexible service access and expansion, Game.Arts has borrowed and absorbed the group architecture technology in FISCO BCOS.



3.5 Blockchain File System

To realize the distributed network storage of massive data files, the GFS blockchain file system will be introduced in the higher-level iterative product system of Game.Arts.



3.6 Inclusive Consensus Mechanism and Strategy

In order to improve the platform's blockchain performance, Game.Arts draws on and absorbs the Ecoball (ABA) inclusive consensus mechanism and strategy: The EcoBall main chain uses ABABFT, VRF, DKG & TBLS (threshold signature), TPOS (threshold POS) and others. It takes into consideration both the security and efficiency of the platform; EcoBall's cross-chain business main chain and side chain adopt the flexible consensus mechanism strategy, integrating consensus mechanisms including POW, POS, DPOS, PBFT, PAXOS, RAFT, etc. And can support component plug-in mode, users can flexibly choose a consensus mechanism that conforms to specific scenarios and business logic as needed.

GA Issuance

What is GA
The basic information
Allocation Plan

4.1 What is GA

GA is a universal digital asset for the Game.Arts platform and medium for business and financial transfer. Players can use GA to buy game time and items, participating in community voting and rewarding community players on the Game.Arts platform. In the process of trading, a player needs to pay a certain GA as the transaction fee.

4.2 Basic Information

Token name: GA (Game.Arts)

Total amount of issuance: 5,000,000,000 GA

4.3 Allocation Plan

The proportion	allocation	lines	Release plan
15%	Founding team	750 million	10% released in 6 months
10%	Angel Fund	500 million	10% released in 6 months
9%	Global communities	450 million	10% released in 6 months
9%	Technical team	300 million	10% released in 6 months
60%	ecosystem incentive	3 billion	released according to the game ecosystem contribution

GA ecosystem application

Game Publishing

Game payment

Game Asset Trading

Game.Arts inspires to establish a game ecosystem based on blockchain technology. The ecosystem will be managed by a community composed of players and game developers. All the income of the ecosystem will also be shared with players, game developers, and investors using blockchain technology.

As the initiator of the GA game public chain game ecosystem, we will strive to establish a sound infrastructure for the players and game developers, and gradually establish a blockchain technology community, game download platform, game items exchange, and game crowdfunding Infrastructure. We will quickly introduce many interesting games, prepare for the rapid accumulation of users in the ecosystem, and develop compatible open-source software development kits (SDKs), smart wallets, game plug-ins, and payment frameworks. Three-party game companies can more easily access the ecosystem and meet the needs of the players and game developers in the future.

5.1 Game Publishing

In Game.Arts, game developers publish transformed blockchain games for free, which can use the traditional advertising cost to attract the game users through game distribution and other forms, eliminating high cost of traditional distribution fees and allowing users and game developers to share profit.

5.2 Game payment

We believe that the world needs a global digital native currency that can integrate the characteristics of the world's best currencies: stability, low inflation, universal acceptance, and interchangeability worldwide, and a strong payment network and Lightning payment speed.

So far, no digital currency project has realized a real offline payment business scenario. This is because the existing digital currencies, despite their high market value, are too small compared to the global offline consumption scale. As of 2019, the global credit card consumption scale is close to 40 trillion U.S. dollars, and the total market value of Bitcoin is only 141 billion U.S. dollars, a contrast of 283 times, even though Bitcoin's holding addresses are very scattered. Statistics show that among the 887,934 active addresses, the top 200 holdings held more than 4% of the total issued Bitcoin. There is no reason for merchants in any country to support a relatively small, relatively concentrated digital currency as a payment medium. As for the vast majority of consumers, credit card payment is more used for overdraft consumption.

GA's cross-chain technology provides the perfect solution. Through the mutual remittance between digital currencies, the total market value of digital currencies will be increased. GA can increase the scale of the digital currency use and increase the scale of consumption by nearly 20 times. According to the current total market value of the digital currency of 240 billion U.S. dollars, the payment capacity of digital currencies can reach 480 billion U.S. dollars, exceeding 1% of the total daily payment demand. It is enough to be valued in more than 200 countries and regions around the world.

5.3 Game Asset Trading

The Game.Arts platform uploads game equipment, items, points and other element data to the blockchain for trusted transactions within and outside the ecosystem.

◆ The transaction process guarantees safety

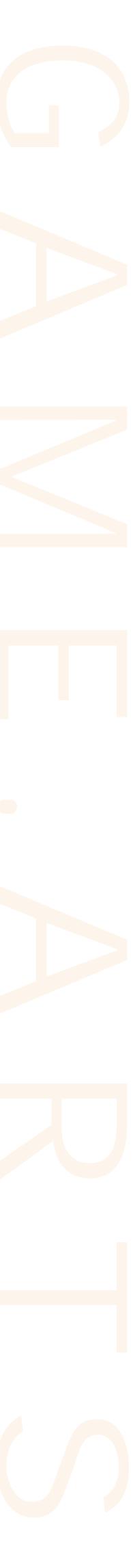
With the use of blockchain technology, any product that can log on to the game trading platform is subject to the blockchain technology's right to ensure that the source of the props is legitimate, and players do not need to worry about illegal transactions.

◆ The total amount of trading items

Through the supervision of the community appraisal council, all the game items that can be listed are in the form of blockchain. The community appraisal determines the total amount of listed items through the technical guarantee of the smart contract of the blockchain.

◆ The simple and convenient transaction process

Players no longer need to enter relevant games to perform complex operations. There will also be a built-in exchange directly in the game, and players can exchange transactions while playing the game.



FOUNDATION

GAMEARTS Foundation

Foundation Overview

Decision-Making Committee

Executive Director

Public Relations Committee

Member of the international team

6.1 Game.Arts Foundation

The Singapore Game.Arts Foundation (hereinafter referred to as the "Foundation") established a foundation in Singapore in January 2020. The foundation is committed to the development and construction and the advocacy and governance of transparency management of Game.Arts, to promote the safe and harmonious development of an open-source ecological society.

6.2 Foundation Overview

Game.Arts ensures the safety and trustworthiness of accounts and assets through blockchain consensus, non-tamperable technology, and security methods such as digital signatures and encrypted wallets. In the early days of the foundation's establishment, the decision-making committee was composed of the chairman of the foundation, the Game.Arts genesis team, super messengers, and cornerstone institutions. The term of each director is two years.

In addition to serving and advancing the Game.Arts project itself, the foundation is also committed to using the value generated by the project to support the growth of ecosystem members. The foundation will provide a certain amount of funds each year to support game developers with potential in the ecosystem with varying amounts of project funding to help developers grow faster. At the same time, the foundation has established a special seed incubation fund for Help start-up teams to get ideas to the ground quickly and the game to be on blockchain for faster growth.

The foundation will continue to vigorously support and invest in the Game.Arts ecosystem. The purpose is to drive the ecosystem upstream and downstream nodes to quickly achieve leapfrog development from technology to applications, and from the single point of prosperity of the Game.Arts game public chain to the prosperity of the entire Game.Arts ecosystem.

6.3 Decision-Making Committee

The foundation establishes a decision-making committee. The decision-making committee must maintain high standards of integrity and ethical business conduct standards; comply with relevant laws and regulations and industry self-discipline principles; provide transparent financial management; the foundation will invite third-party audit institutions to make the Audit and appraisal of fund use, expense, profit distribution, etc. The functions of the decision-making committee include appointing or dismissing executive directors and heads of functional committees, making important decisions, and holding emergency meetings. Its duties are equivalent to the board of directors, and it has the right to appoint and remove personnel.

6.4 Executive Director

The executive director is elected by the decision-making committee and is responsible for the day-to-day operation and management of the foundation, the coordination of the subordinate committees, and chairing the meetings of the decision-making committee. The executive leader reports work to the decision-making committee regularly, and his duties are equivalent to the company's CEO. The appointment of the CEO is made by the decision-making committee.

6.5 Public Relations Committee

The goal of the Public Relations Committee is to serve the foundation and the global community, and is responsible for the law, legal, technical intellectual property, open-source projects, brand promotion, and global strategic alliances of the Game.Arts global market.

6.6 Member of the international team



William Chance

Co-founder, master of business finance, university of Toronto. He used to work for the global financial giant jpmorgan chase, where he was responsible for the analysis of global stock indexes. I got in touch with BTC and ETH in the early stage and participated in the global community construction work of BTC in the early stage. I have unique insights into digital currency and blockchain economy. In 2017, I established game. ARTS in Singapore, which is committed to changing the unfair status quo of the global GAME industry.



Paul Spesrry

From Ukraine, technical consultant and co-founder; Boston university computer application quantitative analysis expert, block chain expert; In his early years, he worked as the head of Microsoft's technology department, and later worked as a data analyst at amazon's data research center. He also participated in the development of ethereum in his early years, and became the chief blockchain expert consultant in silicon valley. With many years of block chain public chain development experience.



Seems Nagender

From Russia, graduated from the university of California, majoring in low-level computer design, more than 6 years of design and development experience, has a unique professional vision and design ability on block chain technology; Proficient in Java, familiar with ORACLE/ MYSQL/MS SQL and other database applications, have a very strong database design and development capabilities, database performance optimization, sub-database sub-table design experience. At the same time, I am also responsible for the establishment and operation of the external brand of the overall project.



YAG Lee

Previously worked for the French game company Ubisoft, the core developer. 13 years of experience in the game industry, continuous entrepreneurs, from game engine to market operation "full stack engineer". Practitioners of blockchain pass economy are committed to the innovative integration of blockchain technology, pass economy, games and entertainment.,

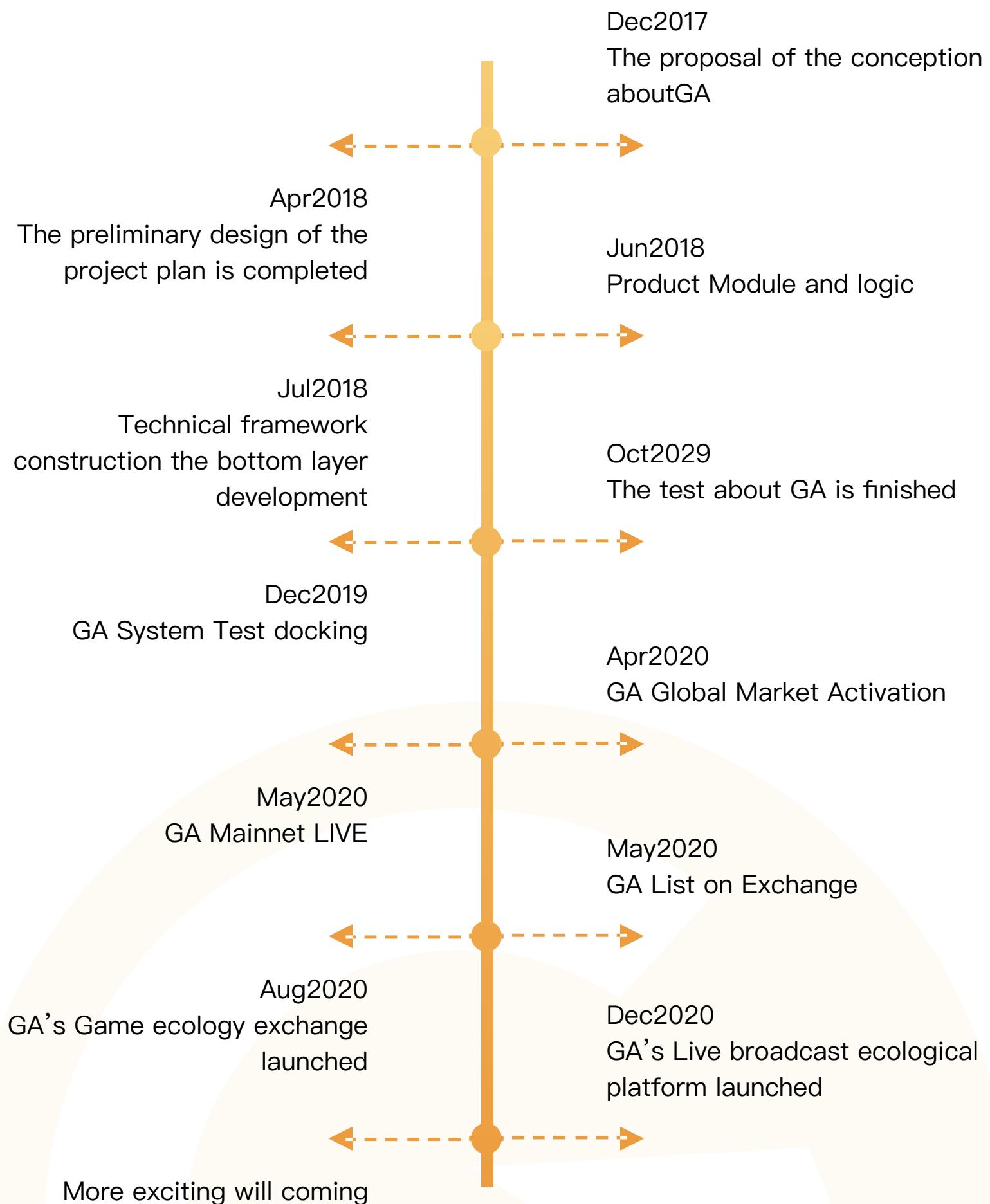


Benedice Singh

He has worked for listed technology companies and well-known game companies. Ten years of gaming industry experience, serial entrepreneur. Full stack engineer, proficient in multiple languages. Good at translating product requirements into a sound technical architecture. Versatile player, has been an architect, main program, core gameplay planning, game producer project management and other positions.



Roadmap



Risk and Disclaimer

Legal notices

Risk warning

8.1 Legal Notice

This is a conceptual white paper to explain the idea of GA public chain and core technical and economic concepts. The graphics, data, and text cited in the GA whitepaper come from consulting agencies, public channels, relevant networks or digital asset forums. The paper quotes some ETH smart contracts, ABA inclusive consensus mechanism, GFS distributed file system, fisco-bcos parallel computing model, and DOT cross-chain technology implementation. This white paper is subject to constant revision, but GA is under no obligation to update this white paper on a regular basis or provide any additional information. Readers are requested to read the following carefully:

◆ No regulated products in jurisdictions

This white paper does not constitute a prospectus or solicitation of any kind, nor is it intended to constitute an invitation or offer for any regulated product in any jurisdiction. This white paper has not been reviewed by the supervisory authority of any jurisdiction.

◆ No suggestions provided

This whitepaper does not constitute a recommendation as to whether you should participate in GA game public chain mining or purchase GA, nor should it be used as a basis for your participation or purchase decision.

◆ No statement or guarantee

We do not guarantee the accuracy and completeness of the information, statements, opinions or other matters in the white paper. Without limitation, we make no representations or warranties concerning the achievements and reasonableness of any forward-looking or conceptual statements. Nothing in the white paper can be used as a basis for future commitments or statements. We do not assume any legal responsibility for any loss caused by the content of the white paper.

◆ The English version shall prevail

This white paper is based on the official English version. Any translations are for reference only and are not certified by anyone. If there is any inconsistency between the translated version and the English version, the English version shall prevail.

You must listen to all necessary professional financial and legal advice: including communicating with tax, accounting experts and lawyers for handling related matters. At the same time, these professionals can remind you that digital assets and platforms involve risks. You must evaluate the degree of risk and your commitment. ability. As the relevant laws related to blockchain and digital assets are constantly maturing, please pay attention to the relevant laws of the country where your nationality belongs.

Risk Warning

The Game Token Foundation believes that there are many risks in the development, maintenance and operation of the GA game public chain,

many of which are beyond the foundation's control. Each potential investor should carefully read, understand and consider the following risks, carefully evaluate their investment risks and tolerance, and carefully decide whether to participate in the GAToken swap program. Participation in the GAToken swap program will be considered as the participants fully aware and agree to accept the following risks:

◆ Legal policy and regulatory risks

Blockchain technology is restricted by the regulation and control of many different regulatory organizations around the world. GA may be restricted by their requirements or actions, including but not limited to restricting the use of digital tokens. For example, GA may slow down or limit the function or repurchase of GA in the future. Token buyers must conduct due diligence on their own to ensure that they comply with all their local laws related to cryptocurrencies, taxes, bonds and other regulations.

8.2 Security risks

Digital asset accounts are not like bank accounts or other financial institution accounts. They are usually stored on GA accounts or related blockchain networks without insurance protection. In any case, there will be no open individual organizations to bear your losses.

◆ Competitive risk

With the development of information technology and mobile Internet, digital assets represented by BTC are gradually emerging, various

decentralized applications continue to emerge, and competition in the industry is becoming increasingly fierce. But with the emergence and expansion of other application platforms, the community will face continuous operating pressure and certain market competition risks.

◆ Risk of lack of funds leading to project undeveloped

Due to the significant drop in the digital asset value raised by the founding team or the development time exceeded expectations, it may lead to a lack of open funding for the team, which may lead to a risk of the team's extreme lack of funding and the inability to achieve its original development goals.

◆ Risk of losing Private key

After the GA that is purchased or minted is transferred to one's own digital asset wallet address, the only way to operate the content contained in the address is to purchase the relevant key (that is, the private key). The user is personally responsible for protecting the relevant keys used to sign transactions that prove ownership of the asset. The user understands and accepts that if his private key file or password is lost or stolen respectively, the GA related to the user account (address) or password will be unrecoverable and will be permanently lost. The best way to securely store login credentials is for the user to store the key in one or more places for safe storage, and it is best not to store it on a computer or mobile phone.

◆ Technical risk

As a game public chain, due to the technical complexity of its

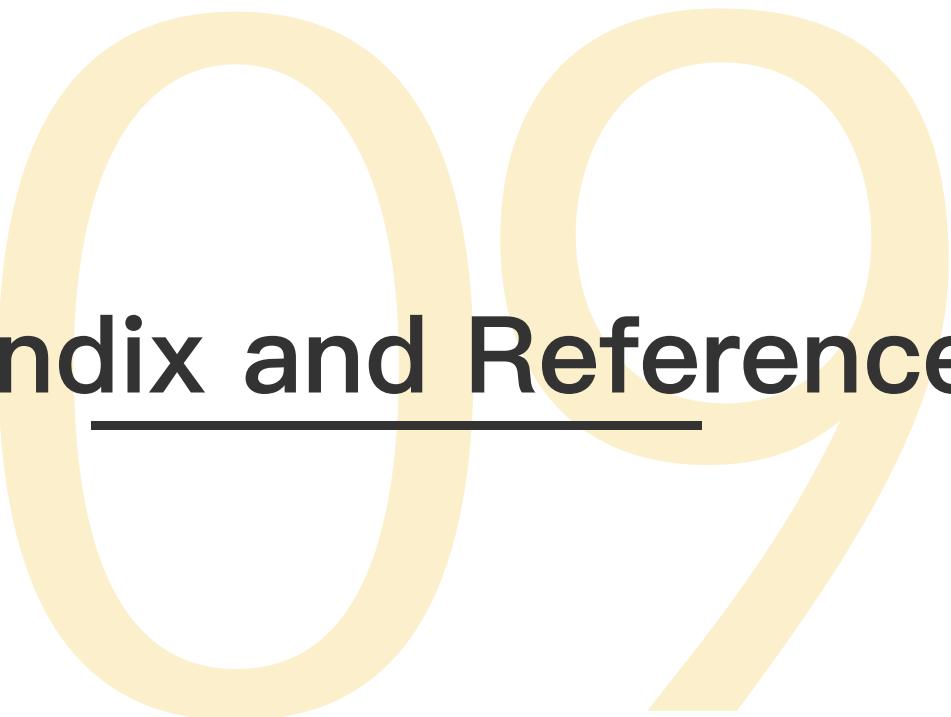
underlying public chain development, it may from time to time face unpredictable and / or insurmountable technical difficulties. Therefore, development may fail or terminate at any time for any reason.

◆ **Source code vulnerability risk**

No one can guarantee that the source code of the GA game public chain is completely flawless. The code may have certain imperfections, errors, flaws, and loopholes. It may damage the usability, stability, and / or security of the GA chain, and thus negatively affect the value of GA. Open source is based on transparency to promote community-based identification and problem solving of the code.

◆ **Systemic risk**

Risks caused by neglected fatal flaws in open source software or large-scale failures of global network infrastructure. Although some of these risks will be greatly reduced over time, such as fixing vulnerabilities and breaking computing bottlenecks, other risks remain unpredictable, such as political factors or natural disasters that may cause some or global Internet disruption.



Appendix and References

9.1 Appendix and References

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