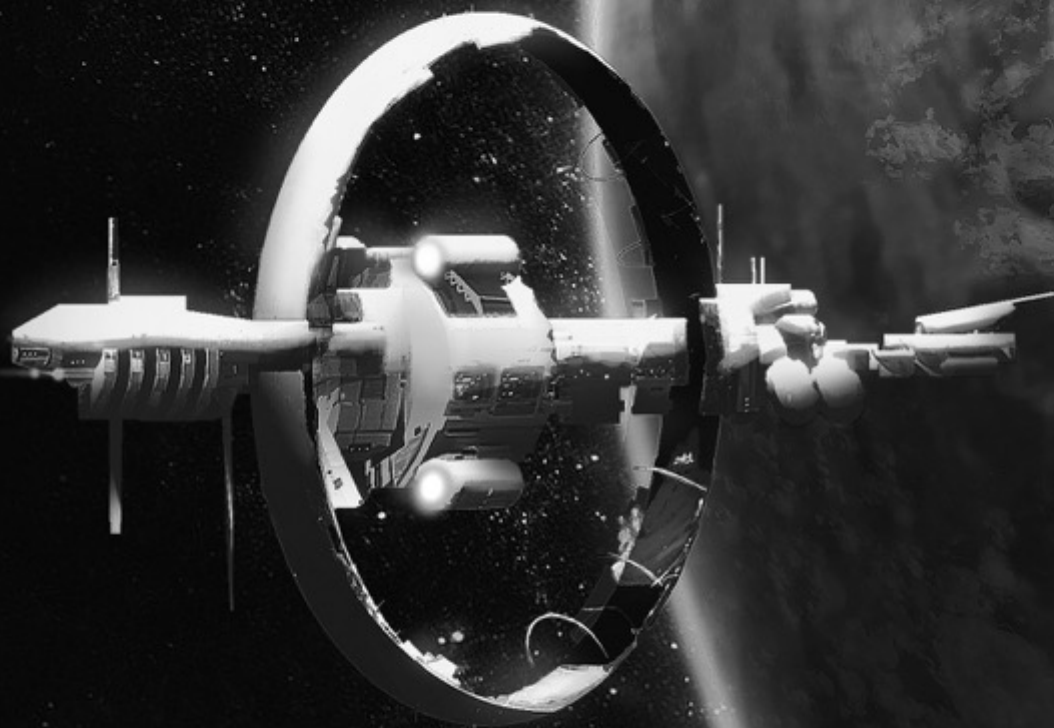


PARSEC FRONTIERS

Next generation blockchain gaming

DRAFT WHITEPAPER version 0.8



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Abstract

Parsec Frontiers is a massive multiplayer online persistent world with a virtual economy blockchain. Players can explore the Milky Way galaxy, extract and trade resources, freight goods, attack others at their own peril, manufacture new and more advanced objects, research technology, create or join alliances and utilize ownership of space stations and resource extraction rights to ultimately expand their empire and wealth. All in-game items and resources are stored on a blockchain.

Parsec Frontiers' economy is open and player-controlled. The currency for facilitation of trade and measure of wealth are Parsec Credits - an ERC20 token shortened to PRSC. It is used for transactions on trading exchanges throughout the galaxy, for

By using blockchain technology, Parsec Frontiers advances virtual economies to a new level. The project provides transparency and gives complete confidence in resources and ownership inside the world. Additionally, holders of in-game assets and in-game currency can quickly trade in and out of their holdings for fiat currencies or other cryptocurrencies on exchanges.

transactions between the participants and for transactions with the back-end system. Parsec Credits will be traded on secondary markets against major coins like BTC and ETH as well as fiat currencies.

The blockchain asset transparency provides a secure, trustless game environment, which combined with the liquidity of cryptocurrency exchanges transforms the virtual items into investable assets alongside more traditional asset

classes. Combined with a deflationary mechanism related to economic activity, holders of Parsec Credits should see steady value growth.

The project is undertaken by renowned game development studio Artplant, based in Norway and Russia. The team of 15+ people have 5-25 years of game development experience, and extensive experience with MMOs and virtual worlds.

This document further details how the world will be created, the technical considerations and the mechanics of the economy and gameplay.

1 Overview

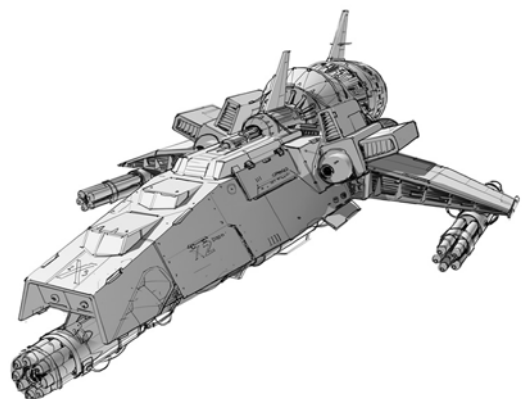
Parsec Frontiers features a virtual economy where all transactions of items in the game are stored on a decentralized ledger. The transparency this brings is an innovation for online games that enables new business models in the industry, and revolutionize how live online game services are continuously developed and used. We believe this will be an important trend in the games industry going forward.

1.1 Introduction

The popularity of massive multiplayer online games and virtual worlds has grown tremendously during the last 20 years, and some of the largest services have seen tens of millions of users. Advances in internet connectivity, computation and visual quality as well as an acceptance of gaming as a normal and mainstream pastime are important reasons for this. Due to the time invested in such games or virtual worlds, it is natural that progress, skills and virtual items resulting from player participation gains a tangible value. Sometimes illicit markets are created outside of such games to facilitate transactions of in-game currencies for real money.

As blockchain technology advances, several public projects are working to solve problems relating to scalability. Many projects are exploring new algorithms and architectures to either improve and expand existing platforms, or are simply creating new ones.

An MMO that supports millions of players with thousands of digital asset classes with corresponding positional information is a highly complex and demanding use-case for blockchain technology. Having all such in-game transactions on a main ledger platform such as Ethereum or Bitcoin would both cost millions of dollars per day, not to mention that current network validation capacity would bring them to a halt. Confirmations would also be so slow that usability in the game would suffer.



Parsec Frontiers plans to combine Ethereum with an open, public custom chain with permissioned for cost, speed, capacity and storage reasons. As scalable and cost-effective platforms become mainstream, switching to a new platform will continuously be considered.

1.2 The Foundations of Virtual Economies

Virtual item transactions have become commonplace in games, and the norm is now that online worlds develop humanistic economics. This highlights to all those involved with transactions that there is a real value attached to virtual items. The virtual market functions similarly to real markets, with fluctuating markets from fluctuating supply and demand enabling profits to be made.

Parsec Frontiers will be both an online game and a complex virtual economy, both largely impacted by decisions made by the players. Accountability of the economy is ensured by the virtual economy blockchain, which enables players to have full certainty on the number of items available and every single digital asset transaction.

Though there are many different motivations for purchasing virtual items, it is evident that a major ingredient to a successful multiplayer world is enabling social interaction. The longer participants are playing online and together, the more they invest emotionally and psychologically in the game. Parsec Frontiers will therefore be a game where joining alliances and interacting with other players in the world will be crucial to the experience.

1.3 Using blockchain for asset ownership

Online games have grown in importance and value over the years, and players are often spending as much money in a game as outside of it. As game assets in games have become valuable, accountability and proof of ownership is an important challenge in the face of cyberattacks, theft and fraud.

Blockchain technology is a fast-moving field, constantly solving new problems discovered as the popularity and expansion of the technology grows. Some of the most popular platforms still have challenges regarding transaction costs, validation time or block time, capacity and handling storage of a large ledger.

The traditional approach by gaming companies is to hold in-game assets on centralized servers. Since Parsec Frontiers uses blockchain technology, it solves many of the challenges that the games industry currently faces by making the game more transparent and fair. The blockchain is used to account for ownership and authenticity of virtual

in-game assets. By registering ownership of assets on a blockchain we also provide full access to virtual goods from outside of the game client and give players the ability to securely trade or sell them.

2 The game

2.1 Disclaimer

Parsec Frontiers has an open development, which means that we share much more information than what is typically viewed as standard in game development. For a blockchain game where the network owns the game, we feel this is the way it should be. We also think it is an exciting and more productive way to make games. But this also means that we will potentially share things which we later have to change, adjust or that are just plain silly. If we were not open to changing and iterating on ideas, then open development would just be a bluff. With that said, here follows an overview of our *current* design direction.

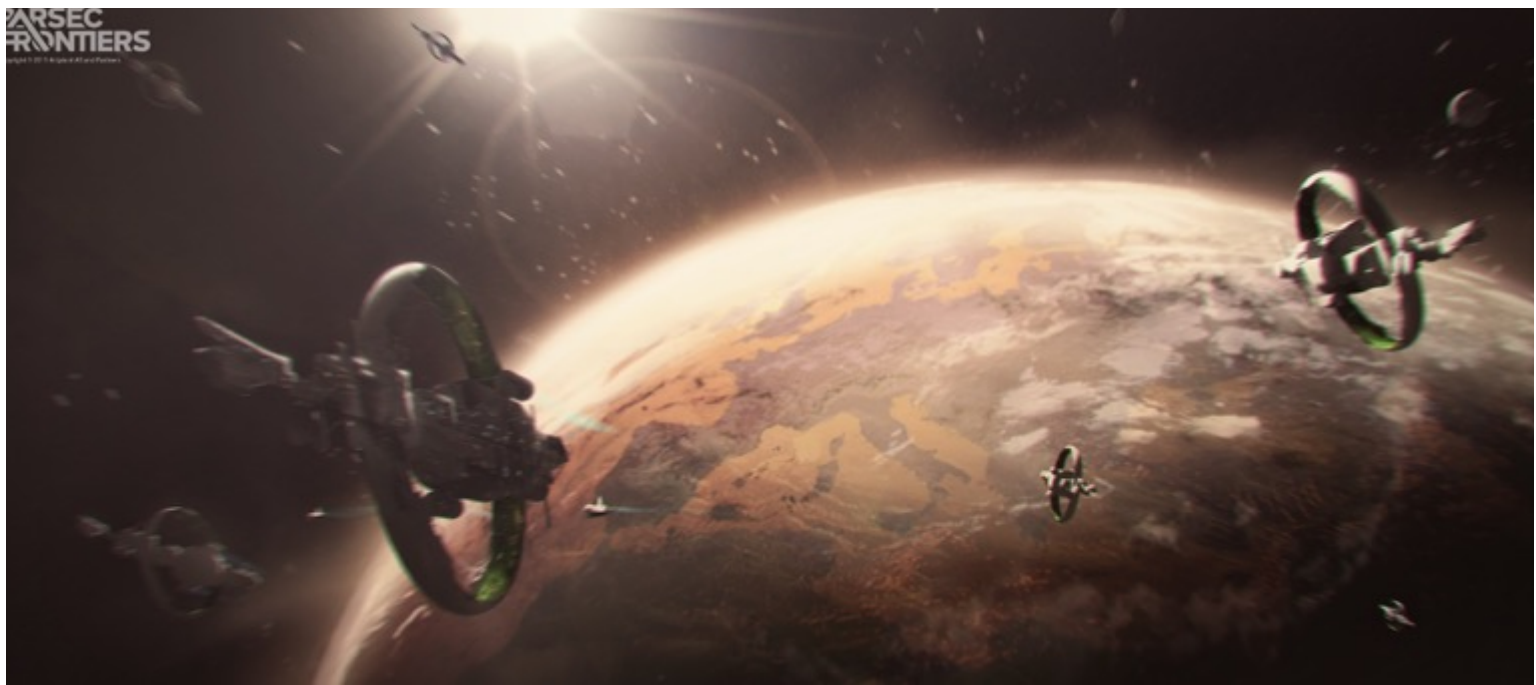
2.2 Backstory

After Earth falls to the White Reaper plague, the few remaining survivors are left stranded in orbit. With supplies running out, they are desperate to find new homes and rebuild civilization. A handful of brave captains set out to explore the galaxy in whatever ships they can prepare for interstellar travel. It is a dark and dangerous galaxy, and resources are scarce. But for those smart enough to endure it, there is also great opportunity.



New alliances form and trade federations rise, and the lucky survivors of the plague are shuttled out to these new havens, and soon scatter across the stars. Once survival is ensured, they turn towards infrastructure. Where some settlers are looking to make a quick profit and increase their own convenience, others are focused on power. Gigantic construction projects pop up, linking alliances together, and the ones governing them become the emperors of the new world.

As humanity spreads, the feeling of a common destiny is gradually replaced by separation, greed and envy. Human nature takes over and conflicts arise. Local conflicts, piracy, and all out war between multiple alliances and powerful trade cartels. And as we journey too deep into uncharted space we stumble across the ancient remnants of technology far more advanced than our own. Suddenly we find ourselves fighting a battle on two fronts.



You are one resourceful person
in an enormous galaxy.
How will you make your mark on it?



Exploration

Allowing players to discover the Milky Way in beautiful 3D

Expansion

Giving the community the tools to populate habitable planets throughout the initially undeveloped galaxy, creating outposts, jump gates, nations and interstellar alliances

Exploitation

Algorithmically generated resources scattered across planets and asteroids can be extracted, refined and used for all kinds of crafting, creating a flourishing interstellar economy based on supply and demand

Extermination

Tactical battles where decisions matter, and where careful planning can give an edge even when the captain is outgunned

Freedom and open markets

Goods are transported and traded between systems, with smart contracts letting players write their own job offers, trade agreements, and terms of use for their properties

Real economy

Players can exchange Parsec tokens from Ether and back again, making the in-game profits translate to real world profits

2.3 Gameplay overview

Parsec Frontiers is a science fiction MMO starting directly after humanity's demise. It is like the popular space MMOs before the space stations, jump gates and corporations. A procedurally generated version of the Milky Way gives our players a sandbox galaxy to explore and build up from scratch.

Players can buy or construct ships and travel to any point of the galaxy in 3D. After discovering resource locations or habitable planets they can harvest and exploit these for themselves or sell the information to others. The resources can be traded, used for crafting purposes or used to build infrastructure for more advanced projects.

There is also the option to resort to combat in an effort to protect your belongings, or to take the property of others. Explorers will have to tread cautiously as remnants of an alien civilization pose a very real threat when leaving explored space.

Through merging a spaceship game with a variety of 4X game elements, we will create a unique and strategic MMO experience where players have a broad range of playstyle options, and the opportunity to make a profit in the process.

2.4 The game world

Even with a large gaming community, it will only be possible to explore a tiny fraction of the Milky Way. However, Parsec will let the players themselves decide which parts they want to explore. Using scientific data, we will add the nearby catalogued systems and let the players experience them in 3D. Further out, countless more stars will be added using algorithmic rules, creating an enormous game world not limited by our current astronomical knowledge.

A system will consist of one or more suns, planets and any number of resource deposits that can be exploited. Planets provide the highest value, granting opportunities for resource extraction, colonization and building various facilities, assuming they meet all the prerequisites to support human life.

As settlements and extraction are costly, lucrative systems will be highly treasured among our players. Those who discover habitable planets can do well by either claiming these for themselves or selling the information to others. As a lot of resources are needed for expansion, mapping data of where good resource accumulations are to be found can be highly lucrative.

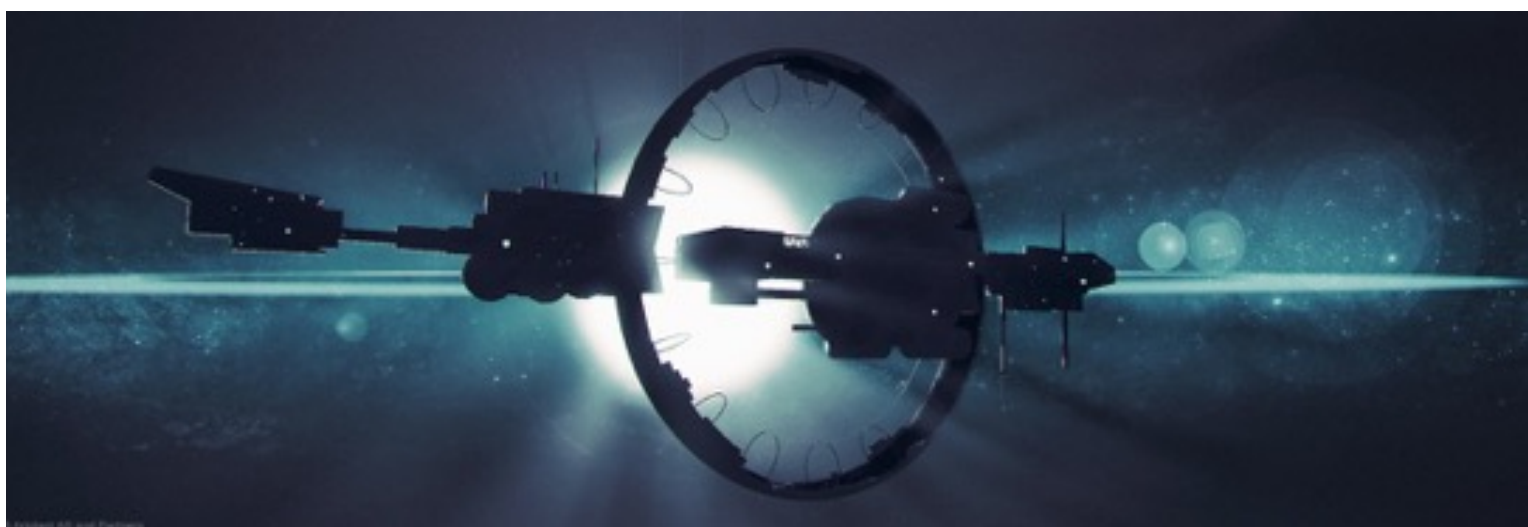
Initially, the entire galaxy will be untouched by human hands. It's up to the players to explore and populate it.

Parsec Frontiers will allow the players to explore any system in our galaxy in 3D.

2.5 Travel and exploration

The game offers two forms of travel: In-system and interstellar. In-system travel is done by travelling between points of interest, mainly planets and resource deposits. The player chooses the target location from her cockpit and the autopilot flies there in real-time. In-system travel is done at light speed in full 3D, allowing the player to monitor surroundings while it happens. The travel between two points of interest within a system typically takes minutes.

Travelling between stars happens in faster than light speed, but still takes a lot of time. By choosing a location in the space overview map, the player can set the ship to fly to a different star. These journeys are significant undertakings and can take days. While the journey is happening, the player can view 3D space around the ship, as well as deal with other affairs such as communication, trading, managing colonies and monitoring progress of her other projects. The journey will progress even while the player is offline. Crossing the entire galaxy would take decades, but there is nothing preventing the player from starting the journey should she choose to do so.



A lonely Ark ship drifting towards an unexplored solar system

To make interstellar travel more manageable, players can take on the project of constructing enormous jump gates. These are expensive and time-consuming projects that generally require the cooperation of multiple players to complete. A gate will point towards a specific solar system, allowing movement towards it at massively improved speed. By planning their gate networks carefully, corporations and trade alliances can set up efficient travel paths to link important systems together. Finally, players can also construct single-use jump drives to fit onto their ship, allowing one jump at FTL speed as if they were using a gate.

2.6 Resources and extraction

Resources in a system are generated based on algorithms, with some systems and areas being very rich in some- while mostly void of others. An important source of materials is asteroid mining. Players can scan resource deposits from afar to obtain some general estimates on how profitable they could be. Once closer, they can get more accurate scan results to determine the resource distribution, and to locate the best spots to mine.

Once in a prime location, the player can drop one of her extractors. These will automatically collect resources until their storage is full or the resources in their proximity are depleted. Standard mining drones are vulnerable and need to be protected, or if it feels safe, the player is free to continue exploring the system or perform other tasks in the meantime.

Habitable planets also have a range of resources available. To extract these, the player first needs to own a section of the surface. She furthermore needs colonists on the ground, and has to develop the right type of infrastructure for resource extraction. Finally, extraction and transportation into orbit is costly, meaning the player has to calculate whether the efforts will be profitable given the expected yield, location and local market prices.

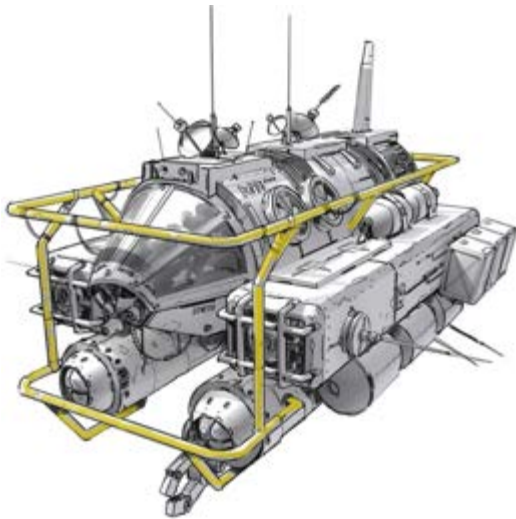
Resources are finite and will be gone forever once they have been mined. Even if this timespan for depletion is very long, it means the profitability of a system will change over time until it reaches a point where extraction and refining is more expensive than the value of the yield.

We intend to share the detailed designs on how the resource distribution works, as well as open source it's implementation. This way the players don't have to trust that the developers are exploiting valuable information that they don't have access to.



2.7 Crafting

Any object in Parsec Frontiers except raw materials are crafted by players. Resources are turned into small items or components, which again often can be used as a part for a more complex crafted object. An example could be raw metal, which together with polymer and the correct blueprint can be turned into a control board. The control board could then be combined with other objects to craft an engine, which again could be used as a component to create a vehicle or a component for a vehicle. Certain objects can be crafted by simply having the materials and recipe available. Others, more demanding projects, require a construction facility which can be built on habitable planet plots controlled by the players.



The recipe for each item is contained in templates. Once you have obtained a template for a specific object, you need to gather the components necessary to craft it. Many templates give the players a choice of components. A “metal” requirement may for example be filled with copper, iron, aluminum or other metal types, each with unique stats that will affect the stats of the crafted object. Players can thus greatly customize the objects they create by finding the ideal composition of components for them.

The largest projects are massive undertakings and often require the combination of several players and significant investment of time to complete. The blueprints for large objects such as high quality ships are not easy to come by. Players can secure the exclusive rights to craft these blueprints, and either keep them to themselves, or distribute them to a selection of players for a fee or for mutual benefits. The game will continue to release blueprints for new objects as humanity rebuilds and expands their technology base.

2.8 Colonization

Our knowledge of planets outside of the Sol system is limited. But as our knowledge grows, we find that there is an almost infinite amount of them, some of which are likely to have the parameters to support human life. In Parsec Frontiers, habitable planets are a scarce and valuable resource. When players stumble across data suggesting a likely candidate, they can move in closer to do more accurate scans. Should the planet prove to be habitable, it can be claimed by the player for a fee, or the information about its whereabouts can be sold to someone more capable of colonizing it. Only planets that can naturally sustain a human population can be claimed.



Dropships shooting down towards the surface of their new homes

Each planet has a few different plots that can be populated, and these all have individual deeds, meaning they can be owned by different players. The planet itself has properties that determine the types of plots it's likely to harbor. The plots also have individual characteristics, making them suitable for different purposes. Some will have rich resource contents, making them very profitable if the owner uses it to build extraction facilities. Others may have soil and vegetation that gives good yield of food production. Or maybe it has surfaces that make large refining or construction facilities cheap and fast to produce.

Since different plots generally will have different owners, location is also key. A ship production facility is nearly worthless in a sector without ample supplies of metals and pilots, and a grand chain of farms won't be utilized unless there are nearby human populations large enough to consume most of the yield. Players must coordinate their efforts and plan, like real world investors predicting the future development of a city. We're looking forward to seeing how, much like the real world, this open economy will unite and separate players and create a living breathing game world.

2.9 Trade

Every colonized planet has a local exchange, so habitable planets will serve as Parsec Frontiers' trading hubs. Here players can trade any resource, component, ship or title deed. They are given convenient displays to see the local common price range of all items in the game, as well as graphs for the price- and availability history of the object.

Trading on any exchange is permitted even from a distance, meaning players can research- and put up sales- and purchase orders on exchanges far away from them should they wish to do so. Since supply, demand and pricing can vary greatly on different exchanges, this allows players to seek out better prices, or find hard to reach components even from a distance. However, the items will remain at the exchange where they were sold. The player must either transport it or hire someone else to transport it if it's to be used in a different system.

This will create a very dynamic economy based on supply and demand. It will also open up opportunities for players that don't want to be pioneers, warriors or rulers, but that rather want to work in fields such as transportation, infrastructure or speculation trade.



2.10 Warfare

Not all conflicts can be resolved through diplomacy, and players will occasionally be put in a situation where they resort to armed combat. Players can attack and defend strategic plots, resource extractors, construction sites and outposts. And in the depths of uncharted space, piracy is also an option for those ruthless enough. The cost of defeat will be high, and engaging in combat is not something that should be done lightly.



Parsec Frontiers is a game of tactical decision making, and combat will occur at a pace slow enough to think every action through. Captains will distribute their power across multiple systems which will make them more powerful and unlock new abilities that can be activated. They must direct their shields as well as maneuver the hull of the ship. Simultaneously, they must aim all weapons at enemy systems and hull location and fire

them at the most appropriate time. Captains will try to gain the tactical advantage while targeting exposed or vital systems on the enemy ship with various offensive systems. Range and speed is a crucial factor, allowing more agile ships to reach a tactical position or make a hasty retreat.

Since players will fight over things that matter, it's natural for many parties to gather at the same time. When players hire each other or unite for a common purpose, giant space battles can form. We will ensure that every ship has a purpose on the battlefield. Smaller ships are more agile than the larger battleships, while the larger ships have pure strength and systems that can protect a fleet of smaller vessels. It will take not just skilled pilots, but also brilliant admirals to coordinate the efforts and get the tactical advantage.

Finally, as players explore the depths of space, they will occasionally stumble across the remnants of an alien civilization. Ancient drones and weapon systems are a real threat when you explore systems where humanity hasn't settled yet. They are also a source of profit if you manage to destroy them and harvest their components. The ancient remnants serve as a PVE component in the game. Rather than randomly spawning from time to time, they will function more like a resource, with new systems having a chance of containing their presence. Once all hostile remnants are cleared from a system it will be free from their threat. The remnants will not be hostile towards players until the end of the 'non-aggression pact'. The most likely explanation for this is that they incorrectly assumed that humanity wasn't a hostile race.



choose what to learn. After a skill training is completed it is learned and new branches on the skill tree are unlocked. Training your skills may initially be a relatively quick process, with more advanced skills requiring a much larger time investment.

Skills cover all aspects from the game including piloting, operating weapon systems, resource extraction, various types of production and many more. The more you increase your skills in the various disciplines, the more efficiently you can perform actions of that type. A skill may for example improve how well you target laser cannons meaning laser cannons will hit more frequently at the system you're targeting in combat.

Skills don't only make you more powerful over time. They also mean there are clear opportunities to choose specializations that make you valuable to the community. We will encourage players with different skills to cooperate for mutual prosperity.

2.12 Audiovisual style

Parsec Frontiers will be built in full 3D, making the galaxy not only interesting but also beautiful. The real universe around us is very dark and cold once you leave the atmosphere. It has become common for games to exaggerate shapes and colors to make them more appealing, and to give a sense of motion as you travel through it. We aim to do the same. While keeping, a firm grasp on sci-fi realism, we will make nebulas visible and colorful, make the space dust dance around you as you fly, and paint the sky with glowing lights and dancing colors.

Our ships will be built as if designed by real world vehicle and ship designers, decades into the future, with the players customizing the final appearance. Whenever a ship is constructed, the creator will be able to make significant modifications on top of the base skeleton. Different types of segments and panels don't only modify the performance, but also the appearance of the ship. The player can then put a final distinct touch on her work through paint jobs and symbols. As all ships are built on a base skeleton, the core models will be recognizable even after customization. Just like a modern day airplane, they will be shaped for function, but modified for a slick look that highlights their purpose. Some will look aggressive and aerodynamic while others will be more compact with shining metal plates and grand weaponry.



On top of the 3D world, we will have a range of interfaces that let the players easily gain information and execute actions. The GUI should be simple and functional, and allow people access to their desired action with as few clicks as possible. We will keep an overall slick science fiction feel to this whole interface.

The game will feature a lot of ambient audio meant for setting the mood and creating a sense of being deep in space. Just like with the graphics, we will exaggerate sounds to some degree to make it feel less void than the real deep space. There will be soothing engine sounds, crackling flames and the creaking of grand objects outside the window.

The music will be slow and relaxing. It should feel lowkey enough that you can listen to it for hours without being bored. Electronic atmospheric sounds combined with piano themes will be prominent in our game, and we aim for a mysterious feel that let you drift into space. This will be complemented by harder musical elements fading in during tension and battle, and by grand main themes introducing the player to the game and the backstory.

2.13 API

Since so much of Parsec Frontiers revolves around information and planning, we want to give open access through an API. Through it, everyone who is interested can request information such as the properties of all the assets in the game, status on the different markets, newly announced discoveries, and much more. With this the community can create apps and websites that extends and builds upon the functionality and even set up data mining and other analytics initiatives.

We are hoping to quickly see info outside of the game client that covers exchange prices and development of these, maps, travel times and routes, recipes and calculators for extraction and crafting, and guides for skill- and build pathing. Anytime we introduce a new feature, we will make the relevant data as easy to extract as possible.

2.14 The Parsec Credit token

The foundation for Parsec Frontiers is the Parsec Credit token. All in-game trading will use this, making it the core of the economy. It can also be exchanged for Ethereum. And as the players accumulate wealth in-game, they also accumulate real world money. We aim to get Parsec tokens on as many cryptocurrency exchanges as possible and make it a liquid currency not just in the game, but also in the real world.

New players will buy into the game at a minimum price which gives them an allotment of Parsecs. These are then used to invest in ships, equipment, plots or resources which are needed to play the game. If the player is successful in her hunt for riches, her surplus of items can be sold on in-game exchanges for Parsecs. And Parsecs not needed for new in-game items can either be cashed out on an external currency exchange, or continuously held in the game account as an investment.

3 Business model

For Parsec Frontiers to succeed and thrive, it needs a successful business which funds continuous operations of the game world.

This chapter provides more details on how Parsec Frontiers will operate successfully from a business perspective.

3.1 Financing through crowd sale

The game development and launch will be secured by conducting a crowd sale where all contributors receive Parsec Credits to be used in the game. The currency will be traded on cryptocurrency exchanges.

3.2 Success criteria

The Parsec Frontiers project has several objectives:

- Create a lasting, immersive game world experience
- Provide crowd sale participants with unique service access
- Maintain user acquisition to the game through marketing
- Contributing to continuing increased economic activity
- Ensure continued in-game operations

3.3 Deflation mechanism

To incentivize holders of Parsec Credits, a deflationary mechanism relating to all in-game value transactions will reduce the money supply in the economy.

Every item sold on an in-game exchange will be subject to a small transaction fee. This fee serves a dual purpose with a portion of it going to the Parsec Foundation to pay for continuous development, market the game, or by other means benefit it. The rest of the fee will be burnt.

Additionally, the foundation will offer a set of premium services to draw PRSC out of the economy and continuously fund the game. These include the pre-release ship auctions, post-release auctions for exclusive space stations, and the sale of templates whenever new technology is released. There will also be a few in-game services provided such as registration fees for claiming newly discovered planets, a Parsec cost for high end construction projects like jump gates, and an option to buy item insurance.

3.4 Foundation

The Parsec Frontiers Foundation is set up solely to oversee Parsec Frontier's development and operation, and will manage the funds collected through the crowd sale. The foundation shall be domiciled in Switzerland due to the country's political and legal stability as well as legislation relating to digital assets and cryptocurrencies.

3.5 Development contract

The game will be developed by Artplant AS, incorporated in Norway. Artplant has pledged to produce the game and provide operations services and will also provide continuous development after initial launch.

3.6 Treatment of market sensitive information

The Foundation undertakes to publicize relevant news releases and keep a public schedule of planned events that may be reasonably expected to impact secondary market pricing of tokens.

The Foundation shall strive to ensure that persons with access to information, due to their duties and functions with the Parsec Frontiers project, that may significantly affect the market pricing of Parsec Credits shall keep such information in strict confidence and to not either buy or sell Parsec Credits on 3rd party trading exchanges until such information is made public.

3.7 User Acquisition and marketing

The game will acquire users through several methods:

- Targeted online advertising
- Affiliate marketing
- Player referral rewards
- Mainstream PR

3.8 Enabling 3rd party development projects

To incentivize the community to contribute useful third party extensions to the economy, a fund for rewarding such projects shall be created. The fund shall be operated by the Foundation in close cooperation with the community.

4 Blockchain and PRSC token

4.1 Initial technical requirements and platform

The following technical requirements are key factors to develop the project:

- Enabling the project to issue own in-game digital assets
- Support for smart contract programming and execution
- The technology must scale to support tens of millions of transactions per day
- Most of the game's blockchain transactions should be processed without incurring fees paid in a 3rd party token
- Fast (seconds) transaction validation
- The technology should support pruning/checkpointing
- Ease of organizing and executing crowd sale process
- Simple token trading integration for exchanges

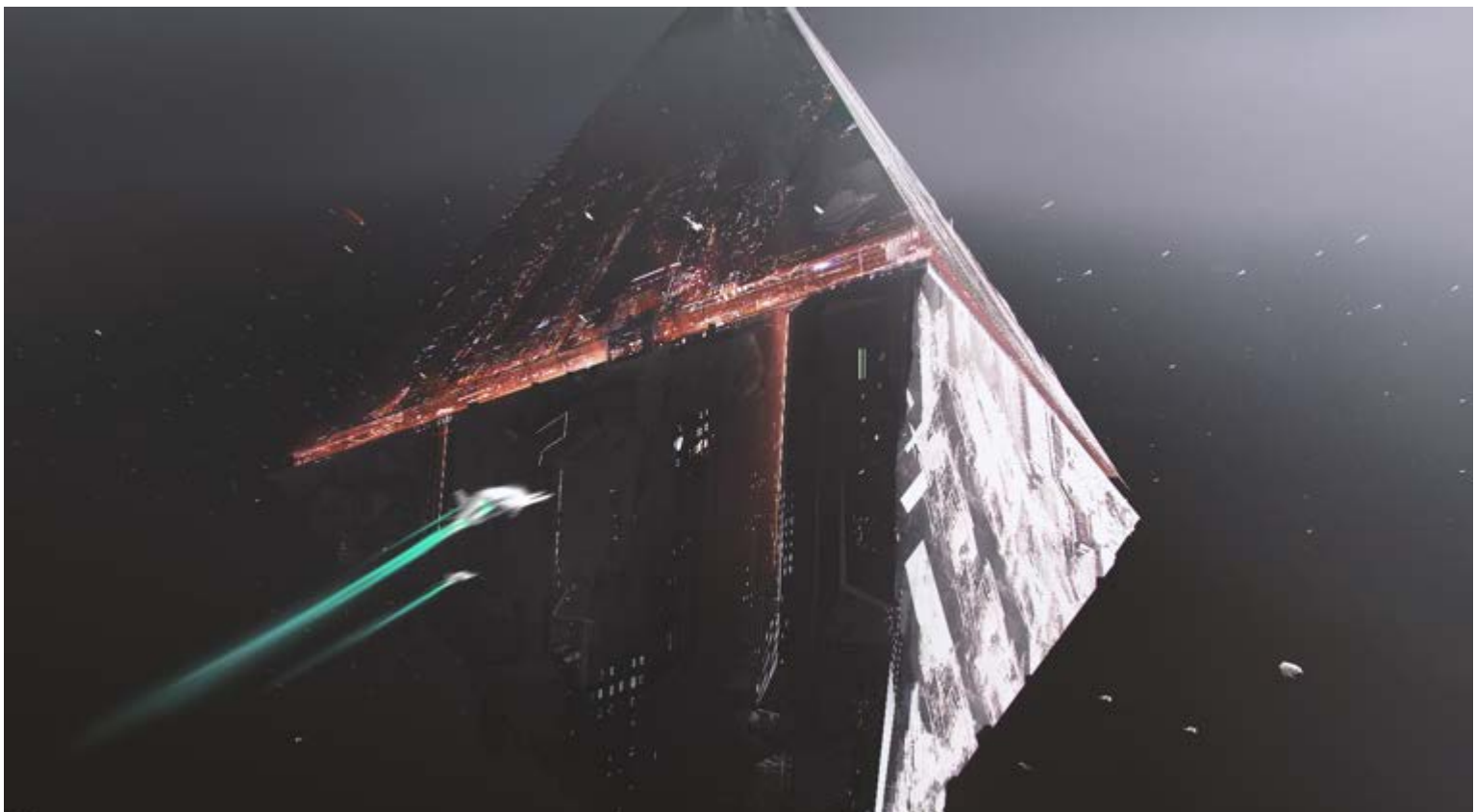
There are multiple scaling technologies currently being worked on that could possibly satisfy the project's technical requirements.



4.2 Combining Ethereum with a customized public chain

For cost, speed, capacity and storage reasons it is not suitable to use the Ethereum main net for an MMO with millions of transactions per day for thousands of digital assets based on separate smart contracts. However, Ethereum has become the current platform of choice for funding projects, and having an Ethereum token enables easier access to trading exchanges and enhances liquidity for all economy stakeholders.

Parsec Frontiers plans to use an open public customized blockchain inside the game, with node operation possible for everyone in the community. This will allow the project to process transactions without asset costs. It is also important to use a pruning technology to maintain an updated and leaner ledger with archival of older transactions.



4.3 Dual token structure and exchangeability

The PRSC token will be an ERC20 token on Ethereum to allow for an easier crowd sale process and ease of trading on external cryptocurrency exchanges. A corresponding PRSC asset will also exist on the game chain for use in the game world.

One PRSC ERC20 token can be converted into one PRSC customized chain token. The exchange between ERC20 tokens and the customized chain token is facilitated by smart contracts that control the exchange back and forth. The game client will contribute a front-end interface to facilitate the dual token swap transactions.

When a player transfers PRSC ERC20 tokens into the smart contract they will be locked. Corresponding virtual economy chain tokens will be transferred from a smart contract in the customized blockchain to the player's address. To convert PRSC from the game wallet to a player's Ethereum address, the player will transfer game chain tokens to the smart contract address and receive PRSC ERC20 tokens on the connected Ethereum address.

The Ethereum fee for transfers out of the smart contract will be payable in PRSC game chain tokens and can be player-adjusted per desired transaction priority.

4.4 Token allocation

Presale investors	7.81%	2,410,203,478
Available in crowd sale	52.19%	16,103,862,002
Foundation contribution	14.00%	4,319,948,612
Developers	10.00%	3,085,677,580
Advisors and partners	10.00%	3,085,677,580
Bounty	5.00%	1,542,838,790
Airdrop	1.00%	308,567,758
Total token supply	100.00%	30,856,775,800

4.5 Game client

The game will be created in Unity. Unity is a cross-platform game engine which supports more than 25 platforms, and has become the de facto platform of choice for the world's game developers. Artplant has worked with Unity since 2006, and helped the Unity team create some of the earliest tech demos of the platform's capability.

4.6 Game server

Artplant has many years of experience creating and maintaining MMO servers handling millions of players. The existing, battle-tested server-technology is written in Erlang and will be adapted for use with Parsec Frontiers and integrated with the virtual economy blockchain for the in-game assets.

The choice of Erlang is justified by the team's 10 year experience in Erlang and unique combination of its capabilities:

- Out of the box distribution support allows to implement horizontal scaling by adding more physical instances, capable of hosting thousands of concurrent online players each. That is the optimal approach for Parsec Frontiers where players are distributed among a certain number of perfectly isolated solar systems.
- Fault-tolerant architecture reduces the consequences (the number of affected players and the scale of discomfort caused to them) of environment and coding errors by proper isolation and restart strategy of different processes and subsystems.
- Parallel execution model of actors communicating with asynchronous messages is one of the most natural ways to implement the massive multiplayer game.
- The runtime introspection and hot code swap capabilities of Erlang virtual machine (BEAM) allow us to immediately respond to unexpected types of performance problems and various player-reported issues both in testing and production environments with minimal impact on the running system.

Artplant's server technology provides battle-tested solutions for various important aspects of the space multiplayer game. One of the most important aspects is the movement and physics synchronization over the network under the conditions of latency which may be rather high and unstable. Our approach is based on the adaptive time synchronization and predictable maneuver simulation, and allows to hide latency effects with adjustments of visual path and acceleration/deceleration times. Simulation approach also helps to reduce network usage.

The development team is backed by the tools team, which supplies us with the holistic set of facilities, including tools for Erlang development, game design, localization, community management, BI and design data tracking, QA, and glue DSL that allows them to cooperate with each other and the game itself. Parsec Frontiers will require specialized tooling for blockchain integration, but we've got the good foundation for that.

The data-driven design tool is probably the most influential one. We use CouchDB database for storing all the design metadata, with separate documents reflecting ingame assets and other types of resources. The design tool provides designers with the type-safe way of creating and updating documents and getting the instant ingame feedback, which drastically improves designers workflow. Additional features are: batch editing, table and diagram representations, data version control, comparison and synchronization tools both on document and database level, JavaScript automation, etc.



5 Team

The project team consists of experienced developers, marketers, blockchain enthusiasts and business executives who have worked together for many years.

5.1 Management



HENNING ROKLING

PROJECT FOUNDER

Henning has a background from the C64 demo scene, working at Funcom before co-founding game developer Innerloop Studios. An entrepreneur with a passion for games, Henning has also consulted with some of the largest organizations in Norway.



ANDREY TSIRULEV

TECHNICAL DIRECTOR

Andrey joined Artplant in 2008, and has worked as Lead Programmer on some of the largest projects in the company. He has a Master's Degree in Magnetic Physics from Tver State University.



JACK K. WULFF

CEO, ARTPLANT

Jack co-founded Artplant, and is a veteran in the games industry. Jack has worked as a game developer continuously for 24 years. Executive Lead on all projects.



TROND JOHANSEN

PRODUCER

Trond has been a core Game Designer and Producer at Artplant since 2006, working on titles such as Mech Tactics, GI Joe Special Ops, Block N Load and Battlestar Galactica Online.



MORTEN LARSEN

VP PUBLISHING

Morten is an experienced gaming industry executive with a passion for the business side of the games industry. He has launched and marketed games both locally and internationally for more than 25 years, most recently as Senior Vice President, Sales and Marketing with Funcom in Oslo for almost ten years.





MAXIM PUSHKAR

TOOLS AND R&D LEAD

Maxim has extensive back-end experience, including core server engine and many in-house tools. He joined Artplant 8 years ago. Has a PhD in Computational and Theoretical Physics, Tver State University.



5.2 Advisors



ØYVIND PEDERSEN JR.

BLOCKCHAIN STRATEGIST

Øyvind has been involved in the blockchain community since 2012, and has a background from telecom. He was a part of establishing content platform Hubii Network.



FRODE ASCHIM

CEO, ETHER CAPITAL LTD

With 25 years of experience in the financial and technology markets, as a previous hedge fund manager and influential investor, Frode is now the CEO of Ether Capital Ltd. and active in the development and investment of the blockchain technology. He's been an early investor in many high-profile blockchain projects.



KENNETH ERIKSEN

DIGITAL MARKETING EXECUTIVE

As the CEO of IAB Norway - INMA - Kenneth is an experienced digital marketer, web analyst and a prominent speaker on technology.



JOHN KAVANAGH

GAMES INDUSTRY EXECUTIVE

John is an accomplished industry executive with a video game career of nearly 35 years as he started designing, developing and licensing games and technology to Sega, Nintendo, Apple, Atari, Commodore and Broderbund. He's since worked at Eidos, Crystal Dynamics and Paramount Pictures.





SHABAN SHAAME

BLOCKCHAIN GAMING EXPERT

Shaban founded EverdreamSoft, a Swiss-based game company, in 2010. He pioneered in-game blockchain integration with Spells of Genesis and BitCrystals economy, giving players true ownership of their digital game assets. Everdreamsoft is also developing a Blockchain Gaming Platform which will help game studios embrace blockchain technology and transform the game industry. EverdreamSoft's ICO was back in 2015, and since then BitCrystals, the token of Spells of Genesis, saw x23 growth with x46 at its peak.



5.3 Development team



Ilja Chubarov
Lead client programmer



Alexey Antropov
Graphics programmer



Anatoly Shorin
Gameplay programmer



Max Kashubo
Gameplay programmer



Peter Rocchio
Lead game designer



Karstein R Ersdal
Game designer



Olivier Chateau
Game designer



Aleksander L Larsen
Community manager



Daniel Stakhovskiy
MD Artplant Russia



Ivan Koren
Lead artist



Joachim Barrum
Art director



Daria Rodionova
UX artist



Valerii Kriazhev
3D artist



Alexey Suvorov
3D artist



Valentin Pantyukh
3D artist



Yuri Faktorovich
3D artist



Sindre Børresen
Animator



Andrey Ashirov
System administrator



Eirik Johansen
Audio director



A typical day in Artplant's Russian office

6 Production

Any MMORPG is a massive undertaking. And especially one as ambitious as Parsec Frontiers that combines gameplay elements from multiple genres. Artplant is a seasoned game studio with robust online tech, a senior development team and many shipped projects. Nevertheless, one of the risks we evaluated during pre-production was the high rate of game projects that never get released due to underestimating and over-scoping.

For this reason, we chose a modular approach to the Parsec production. Rather than immediately jumping into the production of a fully featured MMORPG with 4X elements, we are starting with a solid foundation and expanding upon it brick by brick. We are first devoting ourselves to creating the galaxy generation and allowing travel through it. Everything in the game – exploration, economy, trade, and even warfare – will be built on this foundation. And with ships travelling freely through a realistic and beautiful galaxy, we already have a core experience few other games can claim to have.



The team at a 3-day Parsec seminar where we addressed a lot of potential risks

After this, we will steadily introduce new layers on top of the existing foundation. Each of these modules will utilize everything that's already in the game, but will be so independent that the game could easily work without it. Crafting will make the existing resource generation- and gathering way more interesting, and probably drive up the value of various resources. But resources already exist independently of the crafting, and players can extract and trade them no matter when we introduce the crafting module. Similarly, building up- and managing your colonies on planets will be an incredibly interesting element that fuels the economy and need for exploration. Even before this is functional, planets will already exist, be claimable and tradeable, and we will in no way be dependent on colony management to release the game. In this

way, no single delay in the chain will halt and knock over the entire production of Parsec Frontiers. And no systems should become so daunting and multi-layered that we never get to finish them.

The modular approach also has the benefit of scaling well with the money raised to fund the project. We see many projects requiring a huge amount of money just for an initial release, not to mention the cost it takes to run and expand an MMORPG. Parsec however is a manageable project to get out the door, but scales infinitely upwards as time passes and funding is secured. Over time, we believe Parsec will be one of the richest MMO experiences on the market, and a true next generation of blockchain gaming.

Most of the projects we see fail do so either because of biting over too much, or due to lack of experience. Artplant has a very experienced development team sitting on stable technology that allows rapid online game development. And with Parsec, we've planned production in such a way that potential delays or problems won't tip the whole production and prevent the game from being released. We look forward to exploring space with all of you in the foreseeable future, and are confident that we will achieve our goals.



7 Project roadmap

The project team is dedicated to meet the development schedule to deliver a completely immersive sci-fi world.

Completed deliveries

June 2017	The Parsec Frontiers concept was created
August 2017	Team and Advisors assembled
December 2017	Public announcement Whitepaper release
January 2018	Successfully completed Pre-Sale
April 2018	Crowd-Sale started Prototype of the Sol system Detailed game design Technical design shared with community

Future deliveries

May 2018	Parsec Credits distributed to sale participants Auction for starter ships started
July 2018	Auction for Colony rights on 17 initial inhabitable planets
December 2018	Release of Travel module, allowing for exploration and for transportation of the surviving human population
February 2019	Research extraction/production released Interstellar trade exchanges opened
May 2019	Crafting feature Upgrading of Colonies feature
December 2019	End of 'Non-aggression pact', combat gets introduced in the game

