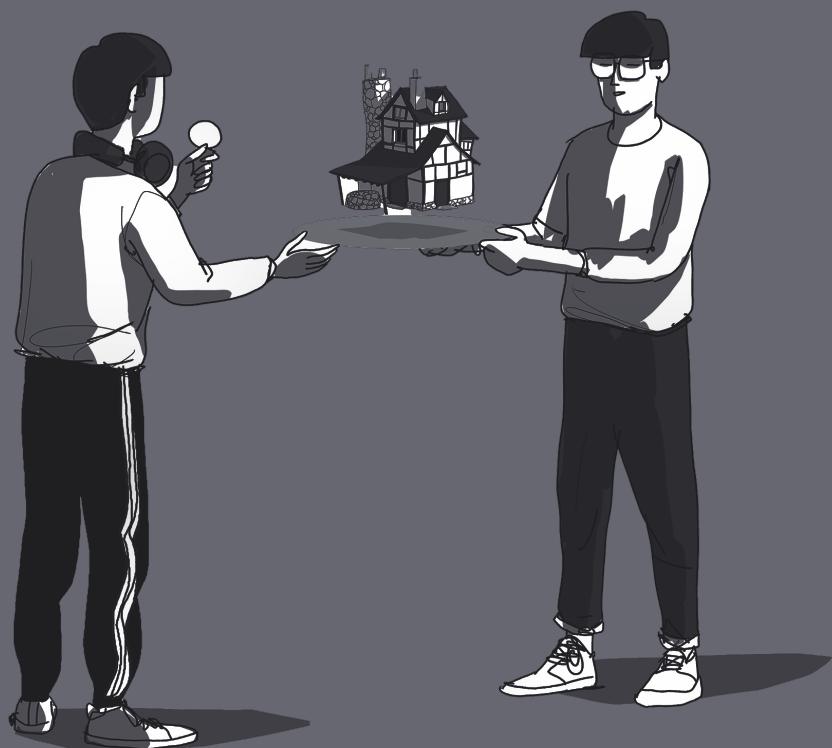


HOARD

True Ownership

February 2018



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Executive summary

The Hoard platform consists of 3 pillars

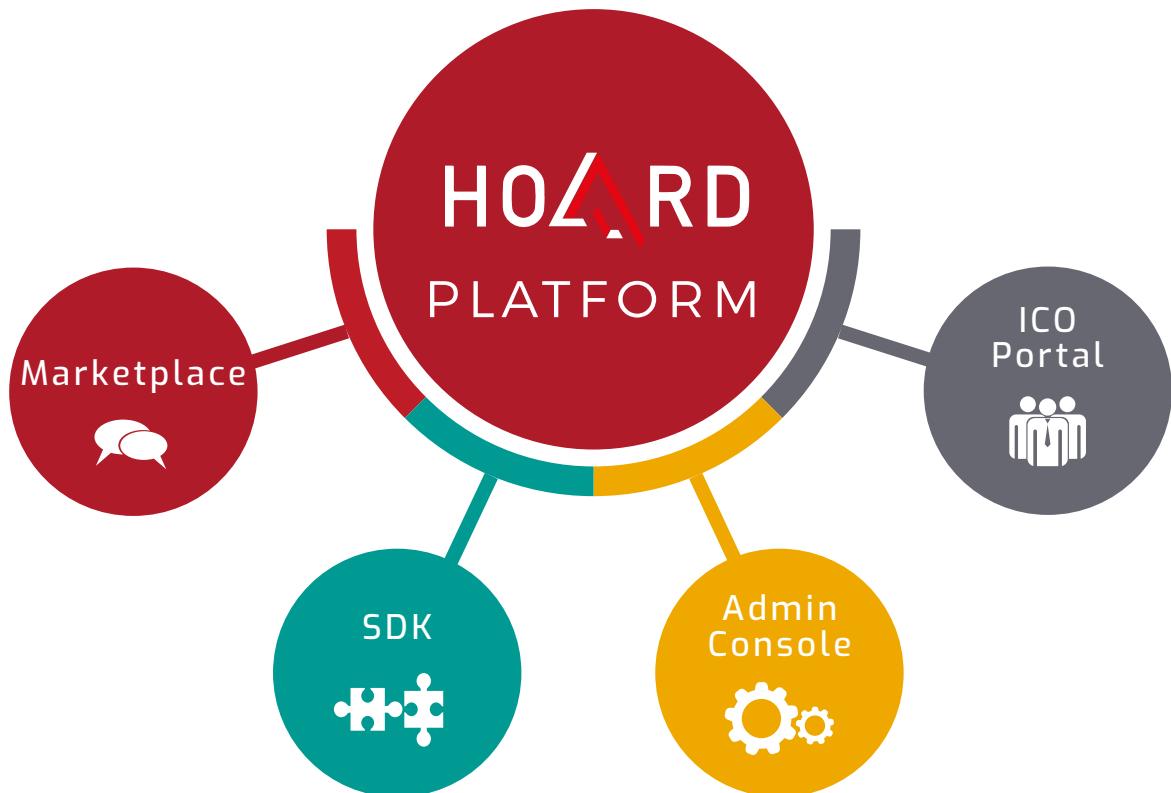
1. Enable True Ownership of virtual content in video games via blockchain tokens: in-game currencies, items, character skills & abilities, real estate, and much more would become truly user-owned. Users will be able to make their own decisions concerning swapping, selling, trading, and so on.
2. Serve as a fundraising platform for game developers by facilitating the creation of their own ICOs. Instead of forcing the developer to give trinkets, toys, and other diversions as rewards, they can instead give contributors actual in-game items and currency, possibly rare and unique.
3. Offer a possible direction to address so-called technological unemployment. Today, more and more people are selling virtual goods and services. With Hoard, all of this can be tokenized and made tradeable in a manner that is honest for all participants. Indeed, we believe that Hoard will facilitate everything from human-driven avatars - adding more realism to a game world - to "mom and pop"-style shops selling any and all forms of virtual merchandise.



Table of Contents

At a glance	4
Market and technological opportunities	5
Trends in the gaming industry	5
Why should today's developer care?	6
Ethereum And Blockchain	7
Product overview	8
Why does all of this matter? (What's in a game?)	8
"Real life" examples	9
Review of Hoard's three pillars	12
Added value of Hoard	16
Benefits to gamers	16
Benefits to game developers	17
The Hoard stack	18
The Hoard Exchange	18
The Hoard SDK (HSDK)	20
Hoard Smart Contracts	22
Technical considerations	22
Hoard token (HRD)	23
Hoard crowdfunding portal	25
Introduction	25
How is crowdfunding on Hoard different?	25
Hoard Crowd Contribution / ICO	28
Public crowd contribution	28
HRD token allocation	30
Legal compliance	31
Execution	32
Roadmap and timeline	32
Budget	34
Team, advisors and partners	35

At a glance



Hoard is introducing the "Hoard token" (HRD) an ERC20 token on the Ethereum blockchain that fuels the Hoard platform.

The HRD token serves as a utility token and value bearer of all content on the Hoard Exchange. Millions of gamers all over the world will trade their virtual items on the Hoard Exchange, either overtly or by indirectly interacting with the exchange inside of their games.

Meanwhile, game studios will be preparing ICOs, and engaging with their communities through the Hoard ICO portal.

Game developers are specifying and minting their game tokens & virtual game currencies using the Hoard admin & minting console.

Market and technological opportunities

Trends in the gaming industry

Before discussing the precise assumptions of the Hoard Platform, let's have a look at the relevant trends in the gaming industry, which ensure Hoard's long-term economic viability.

Whether classified as games, experimental social networks, or even art projects, virtual worlds have for a long time been established as a domain in which real economic activity is taking place. This is exemplified by an increasing number of people receiving a substantial fraction of their income from such activities, to the point where some people are living off the proceeds of their "play". To a large extent however, further growth of these economies is constrained by siloed structures in which exchange between platforms, worlds, and even players, is somewhere on the spectrum between difficult and dangerous.

When greater scrutiny is applied, the limitations of the existing framework, in which virtual goods are being stored and traded, are truly profound. We use the term *stored*, not *owned* because today a gamer never actually enjoys true ownership and the possibility of exercising their rights is left at the mercy of platform owners. This limits the scope of economic and social activities in which virtual goods can be utilised as the person who - at least in theory - is the owner, cannot actually rent their possession or may even be prohibited from transferring ownership altogether. On top of that, the fact that records of who owns what is kept in centralised databases poses threats which are both internal (platform owner meddling with entries) as well as external (fraud and attacks resulting in virtual goods being stolen).

Thus arises the opportunity for Hoard. We believe that the only sensible future is efficient, seamless; an unconstrained economic exchange between various games and gaming platforms. That is to say, exchange in which both sides are comfortable with the mechanisms; exchange offering flexibility, without compromising security; exchange in which there is a mutual understanding that both the transaction and the ownership are real and binding.

Even within today's gaming industry, virtual goods and downloadable content (DLC) are an ever-increasing aspect of the revenue stream enjoyed by game developers and

¹ The Global Digital Gaming Market Quarterly Update May 5, 2017

Why should today's developer care?

What are some other market failures which lead to inefficiencies in the process of game development?

publishers. This trend is likely to strengthen, with virtual items and DLCs estimated to remain the most important source of revenue in all market segments for the coming years, covering 78% of the estimated \$103B total revenue from the games industry in 2017¹. Nevertheless, the growth will be stifled by platform lock-in effects, which prevent users from truly exchanging value and ownership, as well as engaging in other forms of economic interactions. By eliminating barriers to trade in virtual goods – by fuelling the organic growth in this market segment – we believe that games will rapidly scale out their own economies, perhaps to the size of small countries. In any case, we are certain that today's highly simplistic revenue models will be altogether made obsolete.

Another apparent inefficiency relates to the process of raising funds for the development of new games. Classically, the multifaceted risk of game financing has been faced by a relatively small number of individuals and companies. The sometimes incredible cost of financing these titles has led to overall risk aversion for the entire industry. Consequently, the available room for experimentation with new genres and content is limited.

Of course, to an extent, Kickstarter has filled the gap for so-called indie titles with smaller budgets. But we think this is not enough. We believe it is time to create an entirely new framework for financing game development, in which potential risks (and possible successes) are much more evenly spread out. On the other hand, the recent wave of token sales/fundraiser events executed with the help of blockchain technologies indicates a clear path for creating vibrant ecosystems of numerous stakeholders who, instead of keeping their fingers crossed in exchange for cheap gadgets and trinkets, actually participate in the newly created economies.

Dividing the revenue stream once the final product has been brought to production. A large portion of payments made by gamers never reaches the developer, but is captured by the publisher and/or the platform on which the game is being distributed.

This setup not only limits incentives for game developers (especially indie studios) bringing real value to the users, but also results in unjustifiably high prices on the market due to the presence of an omnipotent intermediary, often with monopolistic powers.

What if we could create a totally different market setup in which game developers are not limited by the monopolistic position of platform owners? What if they could set their own path, guided by the social and economic interests of their own players?

Recent trends make the gaming industry particularly susceptible to this paradigm shift, which is going to replace the existing market setup with an entirely new framework utilising an efficient and extremely flexible exchange mechanism built on the principles of true ownership. All of this is going to become reality with the help of cutting edge blockchain technologies, notably Ethereum.

Ethereum And Blockchain

FEATURES OF THE CURRENT FRAMEWORK	RESULTING PROBLEMS	HOW ETHEREUM/BLOCKCHAIN ADDRESSES THESE PROBLEMS
State of ownership and transactions are stored and recorded in traditional databases	Entries can be meddled with both internally and externally; trust in third party actions is necessary	<ul style="list-style-type: none"> • Immutability of blockchain • Transactions already recorded cannot be altered ex-post by anyone
	Single point of failure	<ul style="list-style-type: none"> • Full decentralization • No single point of failure; cryptographic tools applied to prevent fraud • Transparency of transactions with a <i>reasonable</i> protection of privacy
Very limited room for exercising one's ownership rights over digital goods	Relatively low volume of transactions involving virtual goods due to platforms' policies, lack of trust, and philosophical incompatibility with the <i>potential</i> of digital goods	<ul style="list-style-type: none"> • "Trustless" transactions without relying on third parties • True ownership, enabling a variety of transaction types (not only transfer of ownership, but also e.g. short- or long-term rental) • Open ecosystem that makes it possible for third party tools & services
Traditional business models in game financing and development	Small and closed group of stakeholders who can potentially benefit from its commercial success	<ul style="list-style-type: none"> • Open and vibrant ecosystems built around particular games/tokens; • The success of a particular game leads to positive externalities throughout the entire ecosystem (due to the appreciation of value of the most successful tokens)

Product overview

Why does all of this matter? (What's in a game?)

Today, we don't think twice about speaking into a small handheld device as the sound of our voice is carried to our interlocutor a thousand miles away. We likewise think nothing when boxes appear with goods, after silent gestures are made with the stubby little flesh-knobs we call hands. Surely then we may be only *momentarily* impressed by a pair of glasses that, when worn, allow us to see virtual dinosaurs hanging out on a basketball court. What was fantastic yesterday and perhaps beyond our comprehension, is being manifested today. We are never more than two steps away from making the unbelievable a reality. And there's so much more to come.

When a distinguished but elderly scientist states that something is possible, he is almost certainly right. When he states that something is impossible, he is very probably wrong.

The only way of discovering the limits of the possible is to venture a little way past them into the impossible.

Any sufficiently advanced technology is indistinguishable from magic.

– Arthur C. Clarke
(Clarke's three laws)

Hoard, like much of today's technology, is a part of this trend of science fiction coming into being: it takes the products of the world's largest entertainment industry and transforms them into *tokens* which we can then exchange for goods and services, both virtual and real. In other words, Hoard blurs the line between various planes of intellectual existence, providing reinforced meaning for each other via common economic rails.

Cleaning Out the Digital Closet

Aashirya, 23, is a dedicated gamer who plays a new game every month. In each game, she typically buys a selection of valuable items and after a while she ends up amassing quite a lot of them. This is a rather expensive collection - perhaps to the tune of several hundred dollars. Some of the items are not used anymore because she stopped playing some title or another. In those cases she might not even have those games anymore.

With Hoard, Aashirya will be able to open her wallet and receive a precise overview of the items she owns in different games. She will see when she obtained different tokens, when she last used them, and approximately how much they are worth. From inside the wallet she is also able to create, buy, and sell orders, or trade an item directly with one of her friends.

Suddenly it's fairly easy for Aashirya to assess whether or not she needs those items, or if it makes sense to sell them in order to buy fresh items for a current game that she is playing.

Airbnb for Game Items

Peter, 31, is a busy executive by day, and a hardcore gamer by night. Overworked lately, he's taking his vacation in 2 weeks and plans not to touch his computer if at all possible, *even to play games*. He is however in possession of some rare and highly in-demand items in his favorite MMORPG, including a powerful axe that is the envy of nearly everyone. He decides to rent it out while he is away, for a little extra cash.

Peter goes to the Hoard Exchange and sets up a few rental contracts with terms; he specifies what tokens are rented out, for how long and for what fee. It doesn't take long for another user on the Hoard Exchange to notice this jewel of an opportunity, and with little effort agree to the contract. The transaction is immediately set in motion and the item transfers temporarily to the other user's account.

Upon his return from a much-needed vacation, Peter's axe has already been returned, and the rental profit now sits in his wallet.

"Real life" examples

The Young Breadwinner

Anne, 16, is a high-level blacksmith in a popular MMORPG, and is known for crafting some crazy-powerful items which are very hard to come by.

She decides to set up her own shop inside the Hoard Exchange in which to offer these very rare items, along with guides, reviews, and even support, so that her customers may get the most out of their purchases.

The store is set up in a few moments, and Anne then proceeds to add her own theme, logo, and colors. She also advertises this new shop to other players of the same game by paying a small amount of HRD.

In the first year, Anne is making half of her mother and father's combined income. To scale the business, she hires a few of her friends to help with the crafting, and ends up becoming the accidental breadwinner for her family by the following year.

Developer's Good Fortune

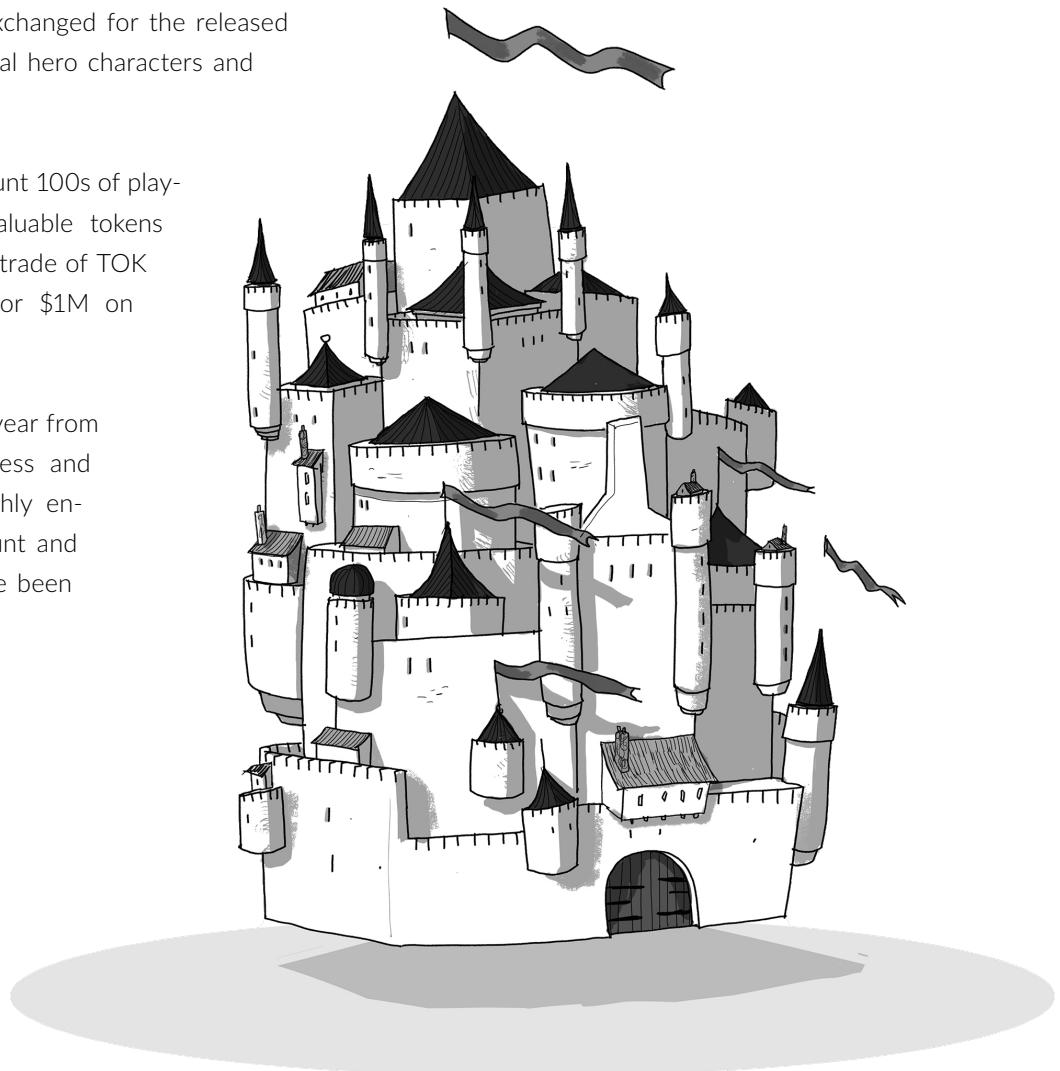
Liu, 42, is an experienced game developer who has just formed a new company with some of her old co-workers. They have a great idea for a new game, which they estimate will take about two years and \$5 million US dollars, to complete. After reviewing a few options for fundraising, they decide to try out Hoard's ICO model.

Using Hoard, Liu sets-up the basics of an ICO and designs the details of the primary token - including a name, TOK - that will be used in the world she and her collaborators will build. They also set up a reward structure for contributors which includes a percentage of the game currency and many of the unique in-game items. All of these are themselves unique tokens which can be swapped as soon as the ICO is over.

After everything is set-up, Liu spends a little bit of HRD to advertise this ICO to other users of Hoard. The ICO is completed within hours. Token holders are now spreading the word to significantly increase awareness of the game and the TOK token. The token is listed on third-party exchanges and begins to converge on an agreed upon market value. Everyone wins: contributors, players, and of course Liu and her team, who now have the funds and the community necessary to successfully complete the project.

Continuing the Game

- 6 weeks after the ICO the TOK holders are rewarded with a token airdrop. This token can be exchanged for a special remastered version of the developers' earlier game on the newest playstation.
- Some of the token holders choose to trade away this airdrop token, which is in high demand.
- 6 months after the ICO, the TOK holders are having airdropped mysterious different tokens, twitter hints to certain URLs and soon a treasure hunt is in effect. 1000s of people are playing mini-games on the web, exchanging tokens, combining tokens, obtaining new tokens - all in the theme of the upcoming new game.
- In the end 5 players are rewarded with extremely rare tokens that can be exchanged for the released game and some special hero characters and unique skins.
- During the treasure hunt 100s of players have received valuable tokens and there has been a trade of TOK and related tokens for \$1M on exchanges.
- The game is still one year from release but game press and gamers have thoroughly enjoyed the treasure hunt and 1000s of tweets have been sent.



Review of Hoard's three pillars

As we said earlier, Hoard's objectives consist of three pillars. In light of the use cases above, let's again review those pillars and add a bit more meat to their bones.

1. Enable gamers to have True Ownership over their virtual items.

Hoard will disrupt the virtual asset market by bringing blockchain technology to video games, enabling user-owned tokens that represent game items. In other words, the owner of the token is the person who *actually has* the item. And that token can be an object in a game, such as a sword, an in-game currency, or nearly anything else.

Still doesn't sound like a big deal? Let's think about how the world is different when this pillar is actualized:

- A. Virtual items become a real part of a gamer's "local" economic/financial situation. These are assets little different in functionality to any other kind of digital money; technically, there will be almost no difference, and thus conversion between them will be trivial. To quote a conversation had between a Hoard co-founder and Ultima creator/game design legend Richard Garriott:

"Wait, so this means I could defeat some enemy in an MMORPG, loot them, and then... Go buy groceries with it?"

We are indeed suggesting that it will be like that, or in other words, that it will be just as easy to go to a real-life coffee shop and pay for your java with a SHIELD token that the user crafted in a game... as it will to pay with your credit card or \$5 in cash. Advanced wallets coupled with decentralized exchanges will automatically ensure that each side gets what they want. This admittedly crazy future is coming very soon.

- B. Some tokens will be used as a storage of value; a rare game item might end up being worth as much (or more) as a real-world piece of art. Expect actual "art collectors" and the digital equivalent of precious metal hoarders to both enter this space.
- C. Since all aspects of games can be tokenized (levels, storylines, characters, real estate, skins), game developers may find it appropriate to allow aspects of their worlds to seamlessly flow into others. The ultimate implication of this may be the true, universal metaverse, long-anticipated by science fiction.
- D. User-created content may evolve into a kind of massive cottage industry, resulting in an almost decentralized way of *actually developing* computer games: 10s, 100s, or even 1000s of people collaborating on works that can be assembled into new game worlds, again all connected to the "metaverse".

TRADITIONALLY VIRTUAL OWNERSHIP:	BLOCKCHAIN BASED TRUE OWNERSHIP:
<ul style="list-style-type: none"> • Player's items are represented inside a database owned and controlled exclusively by the game developer. • The game developer dictates 100% of what happens with these items. 	<ul style="list-style-type: none"> • Items are represented by a token on a blockchain. • The properties of the blockchain (immutability) also pertain to the tokens. • It's cryptographically proved (and guarded from fraud) that the player owns a particular token and is the only one who can access it (with a private key). • The player is in full control of the item and can decide to transfer it directly to another player, trade it on a marketplace or even dispose of it.

2. Disrupt "game finance" by walking game developers hand-in-hand through the process of creating their own ICOs.

And how is the world different when *this* pillar is actualized in the proverbial code cauldron?

- A. Very small productions could be funded this way and the economy could scale with the success/popularity of the game.
- B. A game could start with issuing 1M tokens and selling 50K tokens for \$50.000 to 50 people. As the game is developed and grows in popularity the game dev could sell off more tokens and the value would rise as more people are drawn to the game. The game developer could sell special tokens that would open up the game for early enthusiasts (e.g. alpha/beta testing, focus testing) - and at the same time offer an opportunity to get the finished game on a discount and at an early stage.
- C. The tokens from an ICO should create lots of mini-games and activities around the game before the game is even released.
- D. To have their games funded directly by their future customers, fans and investors. The Hoard platform makes it possible to create real life economy around games, and bring real life value to funders.
- E. Open source games.

3. Pave the way towards true virtual employment.

The rise of automation!

The robots are coming for our jobs!

AI is taking over the world!

Mass unemployment imminent!

These are examples of rhetoric over the past years. More and more resources are poured into automation and AI and our society is slowly (but accelerating) changing accordingly. While we won't debate if this leads to positive or negative consequences on society, it's obvious to see that it will have an effect on people whose jobs will be replaced with automation.

In the past, we have seen the industrial age where work provides physical goods transition into the information age where work provides services. We could argue that the next era could be "The Virtual Age" where work provides experiences.

ERA	PRODUCES
Industrial age	Physical goods
Information age	Services
"Virtual age"	Experiences

Over the past 30 years, we have used AI (in various incarnations, from very simple state machines to neural networks) to control the NPCs (Non-Player-Character) in computer games. So, when you are playing a first-person shooter you are playing "against the computer" battling waves of enemies. Likewise, an end-of-level boss in a Mario game is also controlled by algorithms. Now AI is getting so sophisticated that it's ready to replace real people's jobs. The fascinating thing is that on the flipside people are getting ready to take the AI's jobs in computer games.

Multiplayer games are so popular because it's much more fun to play against other people instead of a computer. We can share the story of playing a game, we can ridicule each other and earn the bragging rights when defeating a friend.

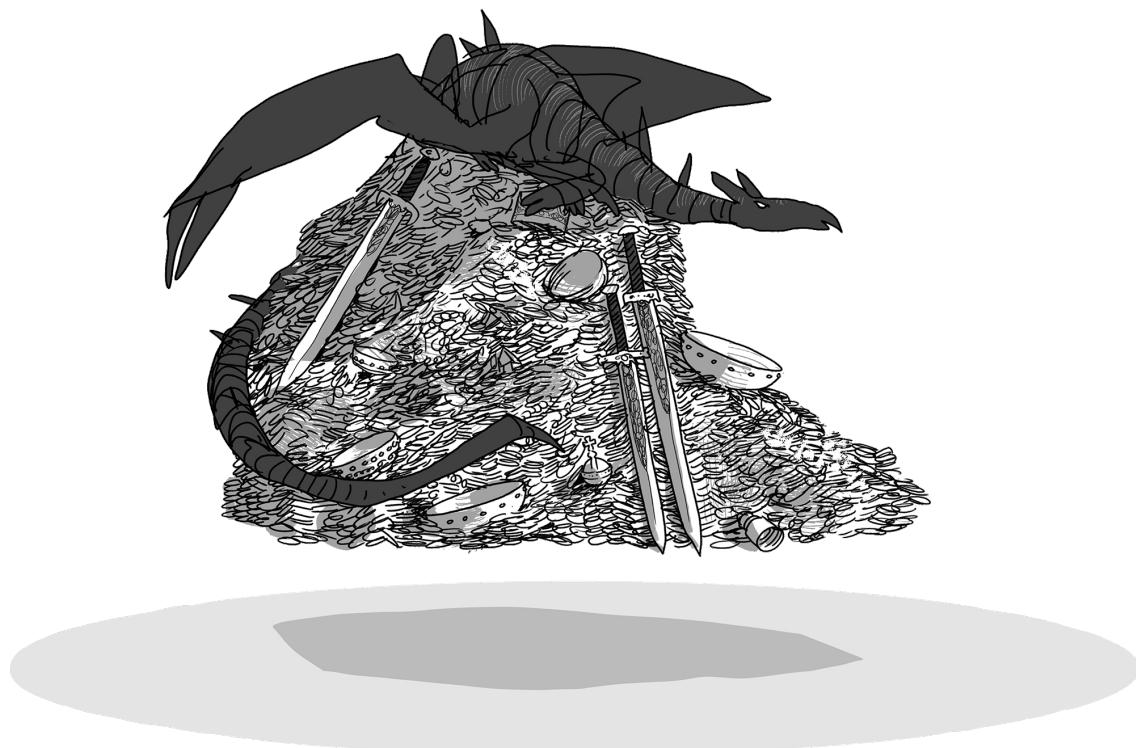
We believe that with the core Hoard technology we are offering options in the digital domain by facilitating a real economy inside computer games. It makes it possible for people to earn a living by providing a premium experience of a real human player as an opponent or team player in a computer game. The provision of experiences could come in all shapes and sizes: craftsmanship, guiding, opponents, team player, main characters in a complex storyline etc. etc. The possibilities are endless.

Outside the games, Hoard will facilitate the economies on the Hoard Exchange and will even make it possible for our users to set up "mom and pop"-style shops.

WHAT ASPECTS OF GAMING CAN BE TOKENIZED?

Pretty much only the imagination of game developers sets the limit of tokenisation use.

- In-game items
- Rarities and special editions
 - Rarity: could e.g. be "the sword that killed the final boss in WOW", or the weapons of the winning team of 2017's finale of League of Legends. Ownership can be verified if one wishes too. It could also be the item used during a beta period of a game. They are absolutely not different from non-beta items but it shows that the player was in there from the beginning and thus is an early adopter and cool.
 - Special editions: some items could only come in a limited amount or have special properties. Game of The Year items coming with a special edition of the game.
 - Very special editions: some items could only exist in 1 version - maybe with very different colors or some other attributes.
- Levels
- Whole games
- Characters
- Game currencies
- Skills & abilities - some could be crafted/developed by the player over time and traded with others in e.g. a RPG or MOBA
- User generated content (items, in-game resources)
- Real estate
- Skins



Added value of Hoard

Benefits to gamers

TRUE OWNERSHIP OF DIGITAL ASSETS	<ul style="list-style-type: none">• Your ownership is real, unconstrained, and does not need to be shared with anyone, nor does it rely on the actions and decisions of others.• Your ownership is secure due to the application of cutting-edge blockchain technologies.• Your ownership is flexible: you may for example rent out your digital items whenever you do not need them.• Your ownership can be lucrative, as the market value of tokens reflects the success of a particular game (in the case of game tokens issued in connection with an ICO using the Hoard Crowdfunding Portal) or the entire Hoard platform (in the case of HRD).
IMPROVED USABILITY OF NEW AND EXISTING GAMES	<ul style="list-style-type: none">• You can access a single tool to view, manage, and trade all your digital assets from different games (a proverbial "one-stop shop").• Items from one game can be exchanged for items from another game. This can be done either permanently, or temporarily; usage can be independent of ownership.• Trade in virtual items and the resulting transfer of ownership is secure, predictable, and at no stage <i>requires</i> the involvement of a third party.
NEW EARNING POSSIBILITIES	<ul style="list-style-type: none">• Digital assets accumulated in one game are secure, and can be exchanged to virtual goods from another game, or liquidated into "real money".• Renting out of assets gives additional revenue – and you can be sure that your items will securely and automatically return once the rental period is over.• The possible ways of earning money are unlimited, thanks to the innovative designs of games backed by their own tokens and the open and decentralized nature of the Ethereum blockchain, and the Hoard platform.

Benefits to game developers

RAISE FUNDS AND AN "ECONOMIC COMMUNITY"	<ul style="list-style-type: none">• Bypass traditional funding models and raise funds to develop your game from hundreds or even thousands of individuals by offering them real value, e.g. rare in-game items.• Take advantage of all off-the-shelf developers' tools offered by the Hoard platform.• If HRD tokens are not sufficiently flexible for your desired business model, come up with your own innovative token designs. Tweak existing ownership models, offer token holders access to unique items and features, or even get them engaged in decisions regarding future development of your game.• The token distribution represents a new kind of incentivized community which you can activate and engage in all kinds of new ways.
NEW OR IMPROVED WAYS TO MONETIZE YOUR GAME	<ul style="list-style-type: none">• Make profits not only from primary, but also from secondary-market transactions as well as every rental of your game's assets.• Introduce new content to existing games to extend their economic viability.
NEW FORMS OF PRODUCT DESIGN AND ACCOMPANYING MARKETING MODELS	<ul style="list-style-type: none">• Create ecosystems of fans who not only love your game, but also hold the token and thus have a stake in your game's potential success, resulting in an unprecedented level of engagement.• Enjoy network effects by launching multiple games and platforms with interdependent features and take advantage of synergies with other titles on the Hoard platform.• Access Hoard's platform-wide marketing and advertising tools or come up with your own methods of doing business, baked right into your token design. Engage in supportive activities (e.g. web minigames) which enable gamers to acquire items, create charity campaigns ("mining gold for good"), etc.

The Hoard stack

The Hoard Exchange

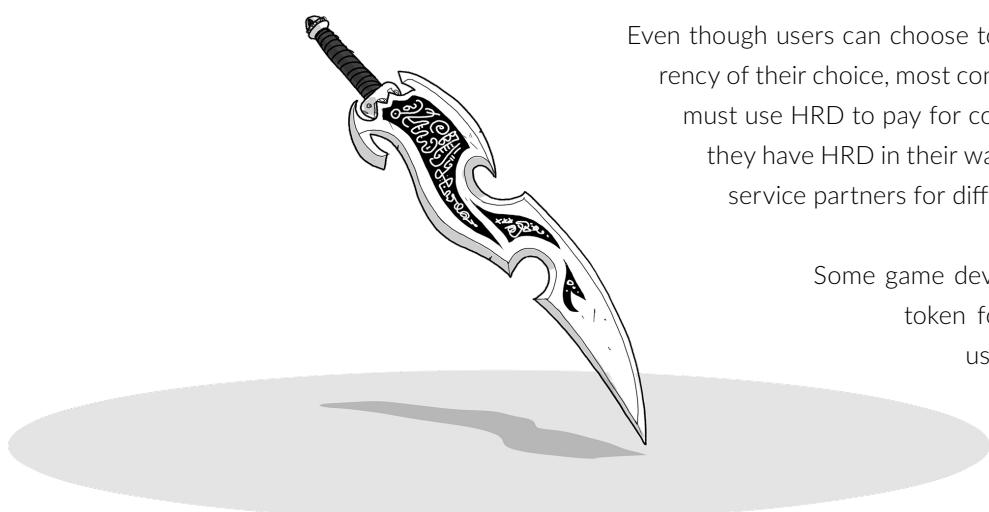
The Hoard Exchange web application is the beating heart of the Hoard Platform. This is where users gather to browse and get up-to-date on the latest content from their favorite games and to engage in the different communities that are forming around in-game content. Community-centric activities also include engaging in reviews, discussions and updates of in-game content or follow the latest news from games backed using the Hoard Crowdfunding Portal.

Most users will frequent the Hoard Exchange for the primary functionality of using the slick interface for buying, selling and auctioning all kinds of game content, or exchanging items directly with other users. This is all done using secure and simple web interfaces that removes any complexity of the underlying blockchain mechanisms.

Users will even be able to gift or rent items or set up their own shop inside the Hoard Exchange.

The economy of the Hoard Exchange

If the Hoard Exchange is the beating heart of the Hoard Platform then the HRD token is the lifeblood. Interacting with the Hoard Exchange and making use of the offered functionality requires HRD tokens – same as Ether is used as gas on the main Ethereum network. In fact, part of the HRD fees are used to pay for the gas cost involved using the Ethereum blockchain.



Even though users can choose to view the content prices in a currency of their choice, most content is valued in HRD and the user must use HRD to pay for content. Users can do this directly if they have HRD in their wallet or they can use one of Hoard's service partners for different payment gateways.

Some game developers may have their own main token for their game or games - created using the Hoard Crowdfunding Portal - and items from within that game may be valued in that specific token.

Exchanging currencies on the Hoard Exchange

The Hoard Exchange facilitates ways to cash in and cash out to fiat currencies or stable coins using service partners. This is handy for users who do not want to be exposed to the volatility of cryptocurrencies.

Selling and buying items on the Hoard Exchange

The main functionality of the Hoard Exchange is the trading of in-game content. The users can buy, sell, auction or rent content using straightforward and simple interfaces.

When creating orders (e.g. sell) users must provide required info such as the selling price in a currency of their choice. According to exchange rates the users will always receive HRD (or potentially a game specific token) in return for content - however, it is possible to immediately "cash out" to fiat or a stable coin using one of our service providers.

Once an order is set-up and then accepted by a second party, the transaction is executed in one automatic operation. Simple and secure.

Some orders require more information than others, e.g. renting out an item involves specifying items to rent, the availability period and the desired payment. The order might be executed for part of the available period, like two of the five available days.

Setting up your own shop on the Hoard Exchange

One of the more advanced features of the Hoard Exchange is the functionality to set up a custom shop. Users might be engaged in creating content inside a game and want to provide a full package of services or use custom branding to sell their goods.

Users will be able to set up a custom theme and layout and there will be functionality to provide basic customer support as well as offer additional content such as guides and tutorials.

Paid services on the Hoard Exchange

The HRD token will be used to pay for services on the Hoard Exchange. Some of these fees are considered micro payments and will also function as counter-spam methods.

Paid services on the Hoard Exchange

The list of paid services includes (but is not limited to):

- Creating buy, sell, trade or rent orders.
- Setting up custom shops.
- Promoting sales advertisements with e.g. highlights, headlines & themes.
- Registering vanity usernames.
- Discussing sales advertisements in comment threads.
- Reviewing items.
- Cold messaging: user A can use HRD to cold message another user B, and user B will receive the HRD if accepting the message.
- Tipping other users for creating good content (e.g. guides or reviews).
- Gifting items.

The Hoard SDK (HSDK)

In order to integrate True Ownership into a game, developers need to communicate with both the game backend and the blockchain. To make this process easy, secure, and even a bit of fun, the Hoard software development kit (HSDK) will provide an out-of-the-box integration with commonly used game development tools and libraries. We are doing most of the heavy lifting for developers, so they can focus on making the game.

The HSDK will consist of two separate packages. One designed for game applications and the other for game servers (backends). It will contain full documentation for the platform API, and step-by-step tutorials with samples for popular game engines. Additionally, the HSDK will be packaged with monitoring and debugging tools, like setting up private blockchain for development and external blockchain viewer, and a complete Hoard platform management console.

HSDK for game application

This part of the HSDK will be responsible for providing an API to integrate game applications with the Hoard platform. Game applications will need to communicate directly with blockchain and Hoard smart contracts stored there, as well as transferring data from a game server maintained by game creators that provide game specific details and resources.

The Hoard team will implement the HSDK GA (game application) library for popular game engines like Unity and Unreal with Unity being supported early on. The Hoard team will also be available to support integrations with proprietary engines.

The HSDK include (but not limited to) the following features:

- Authentication with Ethereum blockchain and Hoard Exchange.
- List and review player's in-game items accessible during game session.
- Lock/transfer items on Hoard exchange.
 - Possibility to lock items currently used by player to make them untradeable on exchange while in use.

- Ability to transfer ownership of items for even more control (except lost/found items in PVP arenas).
- Securely handle item tokens and resources owned by player.
 - Secure transfer of gameobject resources associated with blockchain tokens.
 - Manage local and remote access to gameobject resources.

HSDK for game server

Hoard Game Server serves two main purposes. As an asset backend it provides game applications with item assets stored and retrieved in a secure way.

The feature list of the HSDK for game servers will be expanded during feature releases, in step with the needs presented by use of the platform by game developers. Our initial release of the platform will contain basic functionality which can be exposed to players, such as listing in-game items, transferring item ownership, sharing items assets' with the game application and player according to inventory state, and authorizing the player using his/her public address.

From an administration perspective it will be possible to easily add new items to a game, register them on the blockchain, and of course upload and fetch item assets to/from a distributed file system.



Hoard Smart Contracts

A fundamental principle of the Hoard platform is to develop a decentralized and fully distributed solution which provides users with the security features of blockchain technology as well as the trust of an always-on network that no central authority can turn off.

This principle is in part implemented using Smart Contracts deployed to the Ethereum blockchain. The code in these Smart Contracts is what ultimately creates the True Ownership.

The Hoard SDK and admin console contain all necessary contracts that are needed for game developers to provide True Ownership as well as procedures for testing on private networks and deploying to the main network.

Technical considerations

Blockchain technology in general and Ethereum in particular are still young technologies. A current limitation of the Ethereum blockchain is transaction throughput, which at the current time doesn't scale well enough to handle millions of players trading virtual items at the same time. These players might experience some delay in seeing their transactions execute.

Several initiatives are underway to improve this limitation, including Casper, Raiden and Plasma. Each of them is targeting specific areas to improve transaction throughput directly or indirectly. Over the next few years these initiatives are going to be rolled out, bringing benefits to the entire Ethereum ecosystem.

Until then, however, we have to implement mitigation strategies in order to ensure an optimal user experience without prolonged waiting for transactions to go through and establish the True Ownership on the blockchain. The mitigation strategies include partial centralization while waiting for transactions to be executed on the blockchain and bulking multiple transactions together.

We will actively support the ecosystem and community in the efforts towards a massive scalable blockchain to support the anticipated huge number of players and transactions in the future.

Hoard token (HRD)

The 'Hoard token' (HRD) can be considered the lifeblood of the economic system functioning on top of the Hoard platform. As a token running on the Ethereum blockchain, it is going to enable near-instantaneous and secure transfer of any virtual content on the Hoard Exchange. Moreover, being a programmable virtual currency, it will serve a variety of additional functions, such as enabling gamers to register and trade the most coveted usernames, assisting Hoard-entrepreneurs in running effective advertising campaigns, or introducing a tipping functionality to let users express their gratitude to their favourite content creators.

In addition to being very flexible and applicable to a wide range of transactions, by default all goods on the Hoard Exchange maintain their underlying value in HRD.

Some game developers might want the flexibility of their own token and they will be able to create and launch tokens (including complete in-game virtual currencies) native to their virtual worlds during crowdfunding events completed on the Hoard Crowdfunding Portal. Digital content issued by game developers can be valued in their own issued token and can be bought and sold using that.

Owing to limitless possibilities of Ethereum smart contracts, the scope of additional features is going to be constrained only by developers' creativity. These can include e.g. defining how proceeds from secondhand sales of game items are shared, or offering crowdfunding participants unique access to certain in-game content. We envision game developers own tokens, combined with the power of HRD, as tools for innovators, who compete with each other in bringing the most novel approaches to virtual economies.



It's worth noting that while game developers have the opportunity to use native tokens as a way of raising funds for game development it's not a requirement. Game developers are free to use Hoard to create their own native token without running an ICO.

So, why does Hoard actually need HRD?

- Using Ethereum-based tokens (either HRD or game specific tokens created on the Hoard platform) as the sole method of payment in the Hoard Exchange enables people to take advantage of unique features of blockchain: trustless security, no double-spending, as well as relatively fast and cheap processing of transactions. With the help of Hoard partners the UX-related downside of using blockchain is going to be effectively addressed by, e.g. displaying prices in fiat (e.g. USD, EUR) instead of crypto currencies, which is going to foster adoption among less tech-savvy users.
- HRD, being payment rails for the entire Hoard platform, is going to help create a vibrant ecosystem of users, developers, and entrepreneurs, who today are locked in game and platform silos. For the first time, it will be easy and secure to exchange content between different games and worlds as well as to engage in a variety of different economic interactions, such as rental of virtual items. This cross-game exchange is going to trigger network effects, as the growing number of titles present in the Hoard platform makes it even more attractive from a user's perspective.
- Developers issuing their own tokens are not only going to create their unique communities, but also create a trigger feedback loop with the entire Hoard ecosystem, by bringing new groups of users to interact with the Hoard Exchange.

HRD token holders to participate in new universes

HRD token holders will participate in the creation of the new universes being funded using the Hoard Crowdfunding Portal. A percentage of the new game token minted on the portal will be distributed equally to all HRD token holders via airdrop.

Hoard crowdfunding portal

Computer games are an incredibly complex product intersecting with a vast number of high arts and sciences. Graphic design and animation, music composition, storytelling, engineering, marketing, sales, all must be harmonized to create a successful game. Naturally, this often requires large teams of highly specialized people, which means that one of the most difficult challenges in game-making is raising sufficient money to keep things moving. Even smaller-scale “indie” games can have rather high development costs, to say nothing of so-called AAA titles, which can easily chew up budgets in excess of \$100M US.

Gamers have unfortunately borne these high costs in more ways than they know: Publishers are now very risk averse, which often incentivizes them to dissuade or completely disallow new ideas. Hence, we see a very steady market of sequel upon sequel: prettier but not always more interesting versions of old games that had some success; franchises grown for mainstream appeal. Which of course is not to say that this is *always bad*; many great games, including some that we ourselves have worked on, were borne from this model. But, between this approach and substantially lower-budget indie titles, there is admittedly a great no man’s land where sublime inspirations go to die: too expensive for indie, and too risky for the small handful of publisher-financiers with quarterly earnings to report.

Of course, you are probably saying to yourself, *but crowdfunding paper narrator, isn’t all of this solved by Kickstarter already? Didn’t Chris Roberts raise a bajillion dollars there or something?* And the answer is no, and yes, kind of.

First of all, let’s give the devil his due: Kickstarter is a brilliant crowdfunding platform, the quintessential product-as-verb in a shimmering sea of thoughtful fundraising tools. For the indie games industry in particular, Kickstarter has clearly been something of a godsend, allowing smaller projects which would otherwise have had no chance to get off the ground and even be completed. It has also enabled a *small handful* of larger projects – but we do mean a *small handful* – to successfully bootstrap. So yes, let’s have a moment of silence to appreciate Kickstarter.

Introduction

How is
crowd-
funding
on Hoard
different?

And now let's go into the details.

It turns out that almost all of the titles on Kickstarter in the aforementioned not-in-die, not-AAA no man's land (*and* the few aspiring AAA projects), tended to raise a bit of money on Kickstarter, *and much more money elsewhere*. One could say that Kickstarter was used as a kind of self-funding marketing tool for the title. This is of course fine, but, perhaps we can do one better. Perhaps we can create the *right* incentives to completely fund the title in one place, giving fans something valuable that they actually want in trade for their contribution, without the additional burden of distraction from the primary goal.

First of all, both the Kickstarter model and the Hoard model are on the same page with respect to giving a reward – that is, *something of value* – back to the funders. This is an important part of any successful crowdfunding. Where we diverge however is in regards to the nature, origin, and *ultimate utility* of this reward, and the consequent nature and scale of the community that manifests as a result.

The main point behind using the Hoard Crowdfunding Portal for funding is that the game developers offer a special token, that represents one perspective of the future economy of the game as well as gives some direct utility to the game.

With those tokens, funders are able to buy items and engage in the various activities and services the token gives access to (solely designed by the game developers). One way of thinking about this is that for the first time in history the small-scale funders can participate directly in the economy that they helped create.

Using the Hoard Platform to tokenize virtual content, the game developers can reward funders with something they in any case would pay good money for when the game is out. But it doesn't stop there. In addition to the game token itself, the game developers can reward funders with special edition items, rare items, extra levels and much more. What's so special is that the funders own and dispose of these items/content immediately and can decide at any point in time to sell the content or buy even more if the crowdfunding period is over.

This allows the game developers to create a community even before the game is out. Here are some examples:

1. Arranging activities e.g. competitions or virtual treasure hunts and reward participants with their game token.
2. Kickstart trading of in-game items by distributing various content that the community can start to piece together to form bigger, more valuable in-game content (e.g. quests or epic items).

What services are included when funding a game using the Hoard Crowdfunding Portal?

Being a close partner, Hoard will be facilitating and helping out with the ICO in a multitude of ways, including structuring the ICO, promotion, designing a token model, technical integration and supporting the deep integration of tokenized virtual content in the game. Hoard will also provide the needed technology and infrastructure (including Smart Contracts).

The Hoard team has experience from many of the most successful ICOs completed and has been part of the space from the very beginning - as well as being very well connected in game industry.

Preliminary overview over Hoard Crowdfunding Portal features:

- Browse upcoming and current ICOs, learn about the projects in detail, including executive summary, token model, crowdfunding paper, team, advisors, rewards.
- Interact with the game developers, ask questions & get answers, receive updates.
- Participate in ICO.
- Preview live ICO stats for each game.
- Access game ICO community portal.

NATIVE GAME TOKENS GENERATED USING THE HOARD CROWDFUNDING PORTAL

Some game developers might fund their game using the Hoard crowdfunding portal and in that process, they will issue their own native game token.

Example:

Game studio "Green Rocket" are crowdfunding their game "Rocket Blues" and issue a new token "RBT" (Rocket Blues Token) to their funders.

All virtual content in Rocket Blues will be valued in RBT and gamers need to hold RBT in order to buy Rocket Blues items. Users on the Hoard Exchange can choose to buy RBT on an exchange listing it, or if they already hold HRD, they will be able to buy the items via an exchange functionality on the Hoard Exchange.

Green Rocket allows gamers to use RBT to pay for new episodic content, they will periodically airdrop special content to RBT holders and in general use their token in a lot of different ways to bring value to the community around their game. As Rocket Blues gains in popularity and attracts more gamers the demand for RBT increases and RBT holders participate in the economy.

Hoard Crowd Contribution / ICO

Public crowd contribution

Hoard A/S will fund the majority of the development by the means of a crowd contribution, offering the ERC20 utility token HRD.

The date and time for public crowd contribution will be announced on the Hoard project website (<https://hoard.exchange>).

Contributors will be able to participate by sending ETH to a Smart Contract on the Ethereum blockchain. The Smart Contract address will be announced on the Hoard project website.

Contributors are urged to verify the source from where they get the Smart Contract address and to double check that they are sending ETH to the correct address.

Contribution goal

The contribution goal is the ETH equivalent of USD 30,000,000. The ETH goal is set by using the average price of ETH the past month before the Smart Contract is deployed, so: $\text{ETH goal} = \text{USD } 30,000,000 / \text{AvgEthPricePastMonth}$.

Contribution period

The contribution period will run for 30 days or until the contribution goal is reached - in which case the contribution will close 48 hours after.

Terms and conditions

The full terms and conditions will be available prior to the contribution period on the Hoard project website [INSERT URL HERE].

Crowd contribution design

In the case the ETH goal is surpassed, all contributions are linearly scaled down according to amount the goal has been exceeded. In effect the contributors will receive HRD tokens for part of their ETH contribution and will be refunded the rest. Contributors will receive their tokens and potential refund within two days after the end of the contribution period.

Example 1

ETH goal	100,000
Total contributed ETH	200,000
HRD per 1 ETH	10,000 (*)

(*) $1,000,000,000 \text{ HRD tokens} / 100,000 \text{ ETH} = 10,000 \text{ HRD tokens per 1 ETH}$

John contributed with 100 ETH.

John will receive HRD tokens for $(100,000 / 200,000) * 100 = 50 \text{ ETH}$ and will be refunded 50 ETH.

John will receive 500,000 HRD tokens.

Jane contributed with 50 ETH.

Jane will receive HRD tokens for $(100,000 / 200,000) * 50 = 25 \text{ ETH}$ and will be refunded 25 ETH.

Jane will receive 250,000 HRD tokens.

Example 2

ETH goal	100,000
Total contributed ETH	125,000
HRD per 1 ETH	10,000 (*)

(*) $1,000,000,000 \text{ HRD tokens} / 100,000 \text{ ETH} = 10,000 \text{ HRD tokens per 1 ETH}$

John contributed with 100 ETH.

John will receive HRD tokens for $(100,000 / 125,000) * 100 = 80 \text{ ETH}$ and will be refunded 20 ETH.

John will receive 800,000 HRD tokens.

Jane contributed with 50 ETH.

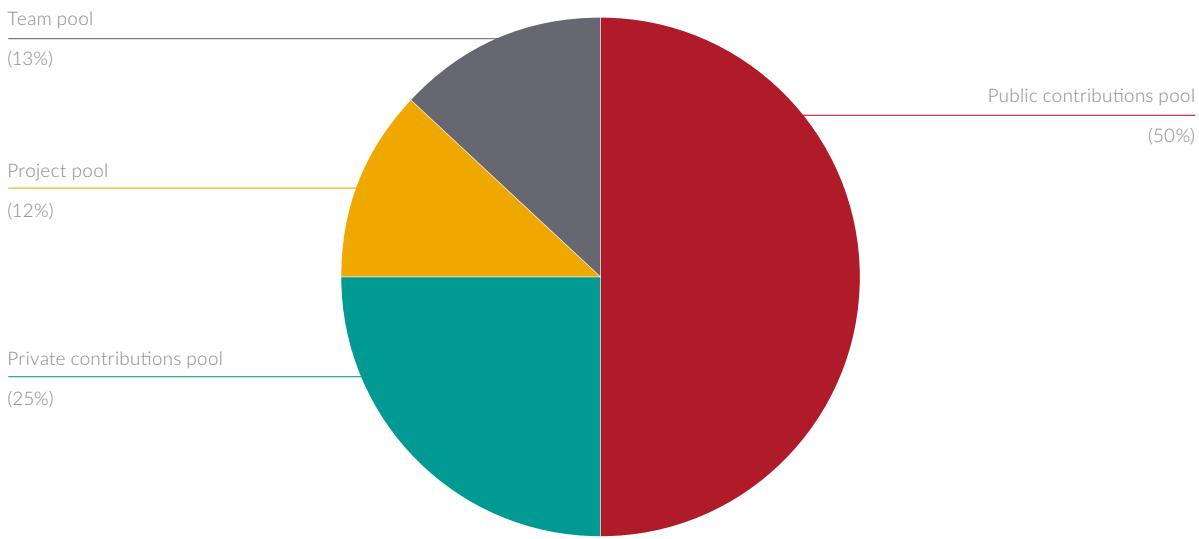
Jane will receive HRD tokens for $(100,000 / 125,000) * 50 = 40 \text{ ETH}$ and will be refunded 10 ETH.

Jane will receive 400,000 HRD tokens.

HRD token allocation

The total supply of HRD will be 1,000,000,000 (1B) tokens. All HRD will be minted by the token contract at the end of the public crowd contribution, and the contributors will receive the tokens by calling the “finalize()” method on the contract. All tokens will be distributed to contributors regardless of reaching the contribution goal or not.

HRD token allocation overview



Public contributions pool (50%)

Offered to the public during the public crowd contribution period.

Private contributions pool (25%)

Hoard A/S has agreed with certain entities and individuals that they will participate in a private pre-contribution and be secured a number of HRD. No discounts given.

Hoard A/S/project pool (12%)

12% of the HRD tokens will be allocated to Hoard A/S for project beneficial purposes, such as incentives, rewards and other means to increase engagement in the Hoard Platform.

Founders, investors, advisors & team members (13%)

13% of the HRD tokens are allocated and distributed to individuals and entities that have played a big role and participated from early on with ideas, development, and support of the Hoard Platform.

Hoard A/S is a Danish legal entity and is working closely with Danish regulators. Complete legal compliance of the platform is of the utmost importance for Hoard. Hoard A/S is working closely with a top law firm specializing in compliance and legal around blockchain technology to develop the terms of governance of the HRD ICO and insure full business compliance both during and after the event.

Legal compliance



Execution

Roadmap and timeline

Software development is most successful when executed with an iterative approach, specially working with cutting edge technology.

While development will be active concurrently on multiple areas of the Hoard Platform the results will be released over a number of specific milestones with each their own public-facing theme. Core technology (e.g. decentralization, smart contracts, scalability) will be continuously developed throughout the milestones.

Initial prototype & research stage (current)

Blockchain is still a new technology, especially in relation to computer games. The Hoard development team is well aware of this and has allocated considerable time to prototype the technology and to uncover risks within the project.

The Hoard platform is currently in a prototype state with some key areas still being developed and other key areas still in a conceptual form. This prototyping will continue until the development team has uncovered as many risks as possible and proven key concepts fully.

During the prototype & research stage the development team is still experimenting with the technologies to find the best solutions and lay a stable foundation for the remainder of the project. At this point key concepts are still being developed and ideas are tried out and potentially rejected or kept.

Deliverables:

- Technical prototypes
- Prototype game with early Hoard SDK integration

Milestone 1

The main purpose of this milestone is to develop the prototypes into a coherent platform with all key features available. This will be done in cooperation with selected close partners. The basis of Hoard SDK will be established, which includes Game Client library, Game Backend library, common library with blockchain communication and a set of utilities to monitor and debug processes. The technology will be chosen based on partner games' platform and required features.

Deliverables:

- Barebone administration & minting console
 - Smart contracts for minting and game tokens
- Essential SDK functionality
 - Authentication & interacting with player wallet
 - Integration of blockchain tokens to game objects
 - Serving game resources
 - Game token transactions
- Shell exchange
 - Authentication
 - Trading game tokens

Milestone 2

The main purpose of this milestone is to have the platform developed to a state in which it will be possible for game developers to start integrating with the SDK. This includes the first versions of the Unity and Unreal plugins.

Effort is put into making the SDK easy to use, while considering the performance.

Deliverables:

- Hoard SDK integration in partner game(s)
- Hoard SDK beta
- Administration & minting console beta
- Hoard Exchange alpha release

Milestone 3

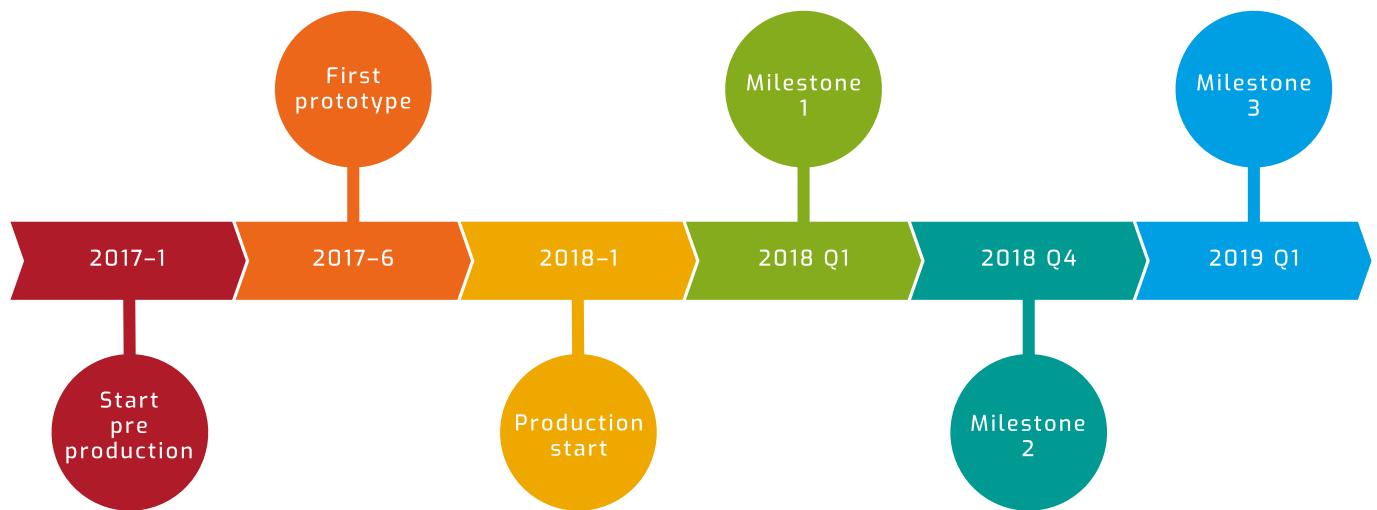
The main purpose of this milestone is the first public release of the Hoard Exchange. From this point on the Hoard Exchange will continuously expand with feature releases.

Deliverables:

- Hoard Exchange 1.0



Timeline figure



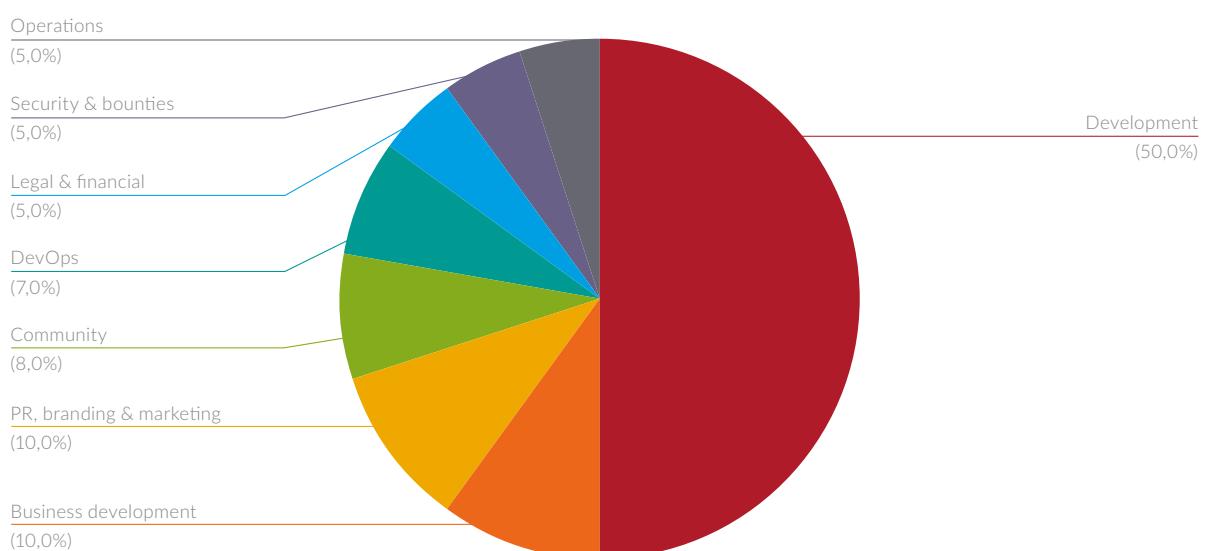
Budget

A significant amount of work and resources are needed to bring the Hoard vision to life. The core development team will be expanded and new teams created to facilitate both software and business development.

The Hoard platform, developed by Hoard A/S, will be funded by contributions in the HRD ICO as well as existing investments into Hoard A/S.

In addition to development of the Hoard platform the contributions from the HRD ICO will be used to fund general development and governance of Hoard, such as marketing, business development, legal services, game integrations and expansion of the ecosystem.

Budget breakdown



Team



Martin Amor
CEO, co-founder

18 years game developer experience.
Lead programmer, MMORPG Anarchy Online.
Technical producer, Hitman & Mini Ninjas.
Technical director, IO Interactive.



Thomas Hagen Johansen
COO

Tech entrepreneur for two decades.
Development director at ITE, Section and online
development manager at IO Interactive and
independent contractor at Unity.



Wendell Davis
Product design, co-founder

Serial entrepreneur, futurist.
Deep blockchain experience with involvement in:
OmiseGo, Steamr, Golem, Cosmos, ++



Radek Zagorowicz
Programmer

Background in computer graphics.
Involvement in Ethereum since beginning.



Cyryl Matuszewski
Lead programmer

Expert low-level & console game programmer.
Worked on most major consoles; from PS, XBox
to PS4 and Xbox One. 10+ game titles.



Kuba Lesisz
Programmer, co-founder

Background in finance.
Full stack experience.



Mikkel Thykjær Jørgensen
Legal

Corporate law, investments and acquisitions.
Deeply involved in tech start-up scene.
Co-founder of HEJM Law.



Adora Goh
Communication/community Manager

Experienced marketing and communication
manager who has spent the past 5 years helping
early stage startups grow and engage their
communities.

Advisors



Julian Zawistowski
CEO, co-founder of Golem
and imapp



Piotr Janiuk
CTO, co-founder of Golem
and imapp



Steffen Toksvig
VP of Engineering / Spotlight,
Unity Technologies



Janos Flösser
Senior partner,
Promentum Equity



Jeremy Petreman
Senior artist / designer,
Playdead



Vansa Chatikavanij
Managing Director,
OmiseGO

Partners

im^{app}

omise^{go}



HOARD