Whitepaper v1.0

Abstract:
D-Drops is an AR treasure hunting experience that allows users to drop their treasure chests or hunt for an existing treasure chest in the D-Drops World. D-Drops aims to integrate the metaverse into the real world and enable its users to embark on glorious and exciting adventures.
D-Drops uses a tax on the transaction to generate funds, which are used to fill the content of a treasure chest and drop it anywhere around the world. Furthermore, users who hold a certain amount of DOP (D-Drops native token) tokens can join the validation system and earn money by validating claim requests submitted by other users. With the unique concept of treasure hunting combined with validation by the community, D-Drops uses the power of decentralization and blockchain technology to create a real-life play-to-earn game.
In short D-Drops World is a play-to-earn real-world adventure game where the users can earn blockchain assets either by hunting for treasures or validating treasure chest claim requests.

Introduction

Submerging the metaverse with the real world and creating real-world adventures for users to embark on while at the same time being rewarded with blockchain assets. This is the mission of D-Drops. By creating real-life treasure hunts worldwide, we aim to enrich the world using the newest technologies and, therefore, create the most realistic experience our current day technology has to offer. As most are trying to get into the virtual world (Metaverse) we are bringing the virtual world to us. Instead of physically isolating users from each other we are bringing them together in the real world and using the infinite experience opportunities the real world has to offer to create the most exciting adventures.

Using blockchain technology, we create adventures for users to embark on, which will be decentralized, fair, rewarding, and very exciting. Through our rewarding and validation method, we ensure the treasure hunt to be spoof proof, fair, and completely community-driven. Furthermore, by creating a straightforward app requiring no blockchain familiarity from the users we make D-Drops accessible to the general audience as well as the blockchain community. The D-Drops world that we envision can be viewed as a Cyberpunk type of world where the virtual reality is embedded in the real world and some aspects of the real world are even controlled by the virtual reality. To achieve such a vision, we first start by creating a decentralized AR treasure hunt experience and will be extending it to a whole system where our app together with our future technologies will work together to create a whole new layer on top of the physical world.

Chapter 1. The Concept

In the subsequent sections, a description of the D-Drops concept as well as some additional information about the implementation of the concept is provided.
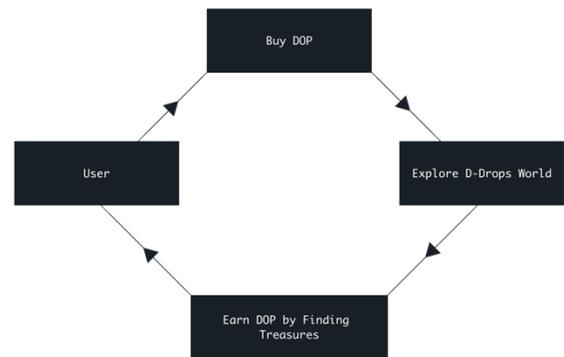
1.1 System concept
D-Drops World creates digital treasures and overlays them in the real world with real-world coordinates. The treasures have real-world value and users can search and collect them using the tools provided to them by the D-App. Value is added to the treasures by backing them with cryptocurrencies, crypto tokens, and NFTs. Furthermore, users will be able to unlock lots of achievements and earn ranks, titles, and in-game rewards which in turn they can use to mint and collect new amazing and valuable NFTs.

1.2 Worlds and Hotspots
The D-Drops world is divided into worlds which in turn are themselves divided into hotspots. A world can be viewed as a big circle that covers a certain area of the physical world. Thus, a world could be anything from a whole continent or just

a country on that continent. Each world consists of a big number of hotspots spread all around but within the boundaries of that world. The hotspots are circles with an average radius of 2 km. There are several types of hotspots, and more types can be added in the future. Each hotspot type can vary in size, the type of treasure drops within that hotspot as well as the requirements to be able to enter that hotspot.

The treasures dropped by the smart contract as well as most in-game rewards can all be found only inside the hotspots. Depending on the hotspot type users will need a certain rank to enter a certain hotspot. The ranks can be earned by being a holder with a certain number of DOP or unlocked by finding a special NFT.

1.3 The radar
To be able to find treasures, you will need to utilize the radar. There are a total of three types of radar's each varying in its ability to detect treasures. The basic 'core' type radar can detect treasures only within a few tens of meters from the users' position while the 'special-range' radar can detect treasures from a few meters up to 2 km away. The 'mid-range' radar operates between these two extreme ranges and can detect treasures up to a few hundreds of meters away. The type of radar available to you will depend on your DOP holdings and will update accordingly.

1.4 Claiming and Validation
Once a treasure is found the users can claim it by sending a claim request to the treasure contract. The claim request then is validated by the community through our unique validation system. The validation occurs by five randomly picked validators using a picture in combination with the GPS location of where the picture was taken, both provided by the users. Validators check the validity of the picture by using google maps in combination with google street view to search for the location where the photo has been taken using the provided GPS location. If the picture is accurate the validators, then proceed to approve the claim request. Once the claim request has been approved by at least 3 validators the smart contract processes the claim request and sends the content of the treasure

chest to the claimant's wallet address.

1.5 Ethereum NFTs
Using the above concept, it is also possible to create a new mechanic for minting NFTs. Location-based mints are a new technology we will be introducing through our concept. By requiring users only to be able to mint NFTs at a certain geological coordinate more value can be added to an NFT. As of now, NFTs are valued based on their creator, rarity, utility, etc. with this new minting, mechanism value is also added through the sheer minting process itself i.e. an NFT that can be minted at a hard to access location will be more valuable than an NFT that can be minted in a more easily accessible location. Since acquiring one is easier than acquiring the other.

1.6 Launch "D-Drops Cities"
To introduce the concept to the world, D-Drops will at first be launched only in major cities all around the world. A list of all cities for the initial launch will be released by the team on the official channels.
By launching first in the major cities, we make it easy for people to get their initial few treasure hunts going and get familiar with the D-Drops concept and witness the exciting experiences it has to offer. Concentrating treasures in the cities will lead to people extensively interacting with the D-Drops world and attract more users. Furthermore, as the major cities are well documented on google street view, users will be able to take unambiguous pictures which will be easily verifiable by the validators. Another advantage comes from a marketing point of view.

Chapter 2. The System

The D-Drops World consists of three components: the app, server, and smart contracts. Each of which has a specific task and purpose.

The app provides users with handy tools to find treasures more easily as well as provides a user-friendly interface to the smart contract functions and a wallet to manage your assets. Furthermore, by using the app user can participate in in-game rewards and achievements which in turn can be used to mint exclusive NFTs.

The server serves the purpose of picking random validators as well as determining random locations for the treasure chest drops. All this data, however, is only stored in the smart contract thus none of this data is stored on the servers. Another important task of the server is to store the "proof-pictures proof pictures" on the use of which a claim request is validated by the validators. Hence the only data stored on the services are the proof pictures which in and of themselves pose no security issue or lead to any kind of centralization as users could decide to share the pictures through another channel with the validators.

The smart contracts govern all assets and are responsible for rewarding both the validators and the treasure hunters with their respective rewards. The rewarding/punishing system is thus completely governed by smart contract logic.

2.1 Smart contracts
The smart contracts system is responsible for managing the DOP token, dropping treasure chests, and keeping track of the states of each treasure chest. The most important task of the smart contract system is to decentralize the rewarding system and provide transparency for the community. All assets are stored on their respective smart contracts and the code is open for everybody to read and understand the exact conditions for acquiring treasure chest content. Furthermore, decentralization of the reward system lifts any ambiguity about the fairness of the treasure hunt as well as guarantees the promised reward.

Adding to the above our unique validation mechanism makes D-Drops completely community governed. To make sure there is no abuse of this power proper measures are implemented which are designed to punish malicious actors.

2.2 The D-App
The D-App provides a "zero-crypto-knowledge" user interface to all functionalities in the D-Drops world.
The basic functionality provided by the D-App is the following.
- Enable users to find the treasures
- Present the user with a visual interpretation of the bounds in which the treasure chest is guaranteed to be located.
- Keep a track of user interaction with the smart contract.
- Keep a track of users currently pending treasure chest claims
- Provide means to export funds from the user's account
- Provide means to swap DOP tokens for the blockchains native currency and vice versa
- Provide AR experience using smart contract backed data
- Keep the private keys secure

2.3 Tokenomics
Distribution
The Tokenomics are set up to create a
sustainable project for the long run. The team
will hold 10% of the tokens which will have a
lock period of 6 months and a vesting period of 1
year. All tokens distributed outside of the

private and public sale will have a multi-year
release schedule. This will ensure a smooth
increase of supply.

Partnership tokens will be used to scale and
promote the project by collaborating with big
brands and implementing new tech solutions to
improve the user experience of D-Drops. The
events wallet will be used as a price for special
events, such as a "New Year's Hunt" or
"Christmas Adventure Chests".

Token - Mechanism
The main goal when designing the Tokenomics
of D-Drops was to create a link between trading
activity and the rate of treasure drops.

The exact process is described below. When
tokens are purchased 6/10 (buy/sell) percent of
the total purchase sum is collected as a "tax".
This Tax is then divided and sent to two
different wallets. 50% will be sent to the treasure
wallet from which the smart contract can create
and drop new treasures in the D-Drops World.
50% is sent to the governing company wallet.
These funds are used for the development of the
product and all other expenses of the governing
company, which include profit. With these taxes,
in place, the project will be able to continuously
innovate and make sure the ecosystem is vibrant
and alive.
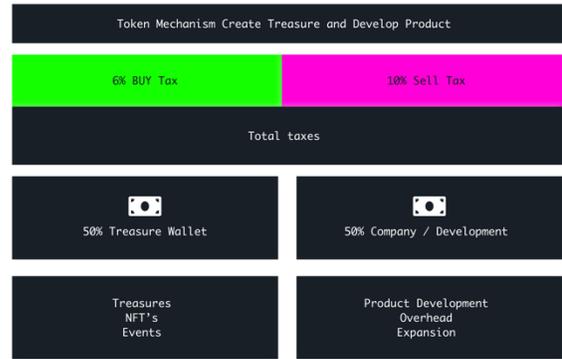
Treasure Value
All treasures are filled with DOP, to make sure
people always get more than they pay in fees, the
initial treasure values are set at certain values.
The values and the total amount of volume
needed per treasure chest to drop are given
below:

Treasure Type	Value	Volume
Common	$10	$556
Frequent	$25	$4,200
Rare	$50	$13,500
Exotic	$100	$44,500

The value of the treasures is variable and can be updated by the community.

Distribution	Percentage	Amount	Lock	Vesting
Total Supply	100%	337.5M	-	-
Private Sale	9%	28.69M	-	3 Months
Public Sale	17%	56.00M	-	-
DEX	17%	56.00M	LP LOCK	-
Team	10%	33.75M	6 Months	12 Months
Talent	3%	10.125M	6 Months	10 Months
Partners	20%	67.50M	6 Months	18 Months
Treasury	24%	81.00M	6 Months	30 Months

Chapter 3. Smart contracts

The D-Drops smart contract system consists of among others the following important to mention smart contracts.

- Token contract
- The treasure chest contracts which hold all funds and assets of the treasure chest
- The manager contract is responsible for keeping track of the validators and allowing users to either join or leave the validation process.

With new functionalities, new smart contracts will be added to the smart contract system as the project progresses. The initial smart contract is architecture in a way to easily allow new contracts to integrate with it without having to migrate each time a new feature is added to the D-Drops world.

3.1 Token contract

The token contract is responsible for tracking the tokens and the token owners as well as ensuring a total supply and implementing any other token-related logic.

The token contract uses a fee on transactions to raise funds. The funds are stored in the token contract until a certain threshold is reached. This thresh hold is currently determined to be equal to the value of the common treasure chest type, but it is susceptible to change in the future. This is done to drop a treasure chest as soon as it is available. Once the balance is over the threshold it then sends the tokens to the appropriate treasure chest contract as well as a message to the distributor contract to drop a treasure chest of a specific type at a random location somewhere around the world.

3.2 Treasure contract
3.2.1 Contract basic functionality

The treasure contract is responsible for triggering treasure drops at random locations around the world as well as keeping track of the states of all the treasure chests. Furthermore, it also handles the treasure chest claim request as well as provides the general functions used by the validators to validate treasure chest claims. For the exact use of each function per smart contract refer to the D-Drops Docs on the D-Drops official website.

3.2.2 Locational calculations and treasure chest drop area constraints

To describe a position on the globe use is made of the parameter's latitude and longitude. Together these two coordinates pinpoint a location on the surface of the globe sees the figure below.
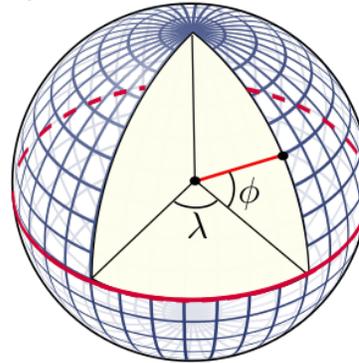

Figure 1: longitude (λ) and latitude (ϕ)

As the earth's surface consists of 71% of the water we need to be able to define a spotlight which we can aim at specific parts of the earth's surface. This spotlight is defined as a combination of a center point which is defined as the center of the spotlight in combination with a maximum deviation from this center point. A spotlight is defined as a point with some uncertainty tolerance and in our case, we can make the uncertainty tolerance as big as needed to contain a certain city, country, or patch on the earth's surface. This Spotlight is then used to drop a treasure chest within it. As it can be seen by choosing a certain center for the spotlight with the desired uncertainty tolerance one can control the treasure drop location. By combining several of these spotlights we can isolate the water portion of the surface of the earth and use only the parts of the surface of the earth consisting only of land. Furthermore, by carefully choosing the center coordinate of the spotlight together with the uncertainty tolerance one can even isolate whole countries or major cities. D-Drops uses this system to determine the treasure drop locations.

3.2.3 Claim request

The treasure contract also handles the treasure chest claim requests. Users can either submit a claim request directly by calling the appropriate function of the smart contract and input the proper parameters such as the exact location of the treasure chest position with a link of the proof of find or use the D-App where everything is handled for them automatically by the press of a button.

A claim request requires a fee in form of DOP tokens which are reserved for the validators to mine. Subsequently, the smart contract proceeds to check if the provided locational data matches the locational data of the to be claimed chest and if that is the case the chest will be reserved until the validation process is completed. When a chest is in the reserved state no other user can send a claim for that specific chest.

3.2.4 Validation

Another function of the treasure contract is to provide the validators with the means to validate treasure chest claim requests. The distributor smart contracts keep a count of the votes and determine when a treasure chest has been approved or rejected. Based on this the treasure chest state is either changed to completed or back to action in the event of a rejected claim request.
The contributor smart contract provides the validators with several functions to be able to read and write relevant data on the smart contract.

Chapter 4. Validation

4.1 General mechanics

The D-Drops validation system is designed to make D-Drops completely community-driven. Anyone who holds a certain amount of DOP tokens can join the validation process by staking their coins and earning DOP by properly validating claim requests. As of now the required amount to join the validation process is set to 100,000 DOP. The validation of a claim request is conducted by 5 randomly picked validators. Each validator can either submit a "1" to confirm the claim request or a "2" to reject the claim request. The majority i.e., 3 out of 5 votes will count as the final decision for the claim

request. Once 3 similar votes are submitted the smart contract rewards these validators with a percentage of the claim fee and process the decision accordingly. If a claim request has been approved the content of the treasure chest will be sent to the claimant on the other hand if a claim request has been rejected the claim request will be canceled and the chest will be added back to the D-Drops World.
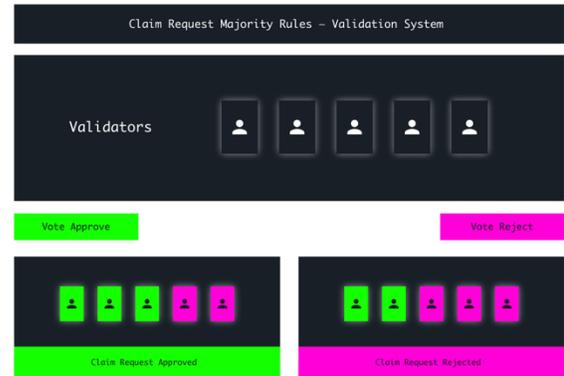
4.2 Staking

As mentioned previously users who wish to become validators need to stake at least 100,000 DOP tokens. The staked tokens are stored in a separate stake pool contract. The staked tokens are not locked, and users are free to retrieve them at any time. However, one does need at least 100,000 DOP tokens staked to be able to validate a claim request. Once a user has stacked the staking amount, they stay a validator until half of the staked amount has been lost due to slashing or when the user decides to leave the validation themselves.

4.3 Validation incentive

To create an incentive for validators, the claim fee which is paid by the claimant when making a claim request is completely divided among the validators.

4.4 Validator Penalties

To prevent abuse and improve the quality of the validators, we implement a so-called slashing penalty system. If a user is on the losing side of the vote count i.e., if they are losing, in the validation process five times within 24hours their staked tokens will be slashed meaning the slashing amount of 20,000 DOP will be deducted from their stacked tokens. This

encourages validators to validate properly, and it also serves as a warning system for validators who have been losing the validation vote too many times in the given 24-hour period.
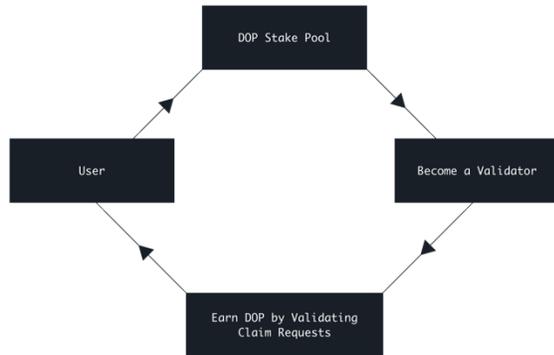
Chapter 5. D-App

In this section, a brief explanation of the basic functionality of the D-App is given as well as some background information about the data structure of the app and the amount of data that it will store from its users. Note that all the data mentioned here is only accessible through the phone of the user, D-Drops has no way of accessing this data or using it in any way shape or form.

5.1 D-App interface

The D-App is designed in such a way that it requires zero crypto knowledge from its users. This makes it possible for D-Drops to market to the mainstream audience and not limit D-Drops World only to the crypto space thus reaching a broader audience.

Throughout the design process of the app, our key design goals were to make the D-App simple, user friendly, and of course, fun to interact with. The way we have incorporated these design goals in the D-App is as follows.

5.1.1 Interactive map

By implementing an interactive map with clickable callouts and proper labeling of each button function the function of each button is clear for the user from the start. First of all, the approximate locations of all treasure chest chests are visible on the global map which on android is depicted as a world map in Mercator projection while on IOS it is depicted as a three-dimensional model of the globe.

5.1.2 The treasure radar

The app provides a radar that shows all treasures in the vicinity of the user. There are three different types of radar at launch and there will be more types added in the future. Each of the initial three radar types differs from each other in their treasure detection range however different radar types with different functionalities will be implemented in the future.

5.1.3 Sending and receiving (depositing) funds

As we are dealing with crypto here it is important for users to be able to manage their funds and for that we are providing a simple user interface to send, receive or buy funds. Furthermore, we are also incorporating an import option for users to import their accounts instead of using the accounts that are generated by the D-App.

5.2 How it works
5.2.1 Managing funds and private keys

When a user creates an account on the D-App always generates a usable Ethereum account. With this account, users can buy & sell and send & receive funds. However, D-Drops also provides the options for the user to either import an existing Ethereum account or connect their desired wallet through Wallet Connect to the D-Drops D-App.

In the case of the Ethereum account created by Drops D-App or privately imported through, the import function of the D-App and the associated private keys are stored in the Keychain and Keystore for IOS and Android respectively. These two products of IOS and Android are designed to secure secrets, passwords, and private keys and make them almost impossible to be extracted from the mobile phone.

5.2.2 Authentication

As the D-App enables functionality such as sending and buying funds as well as stores private keys it is important to have a secure and robust authentication system in place to ensure users' funds are protected as much as possible. For this, the D-App requires users to authenticate themselves for every transaction

that involves sending or buying funds as well as exporting private keys. Additionally, the app requires its users to authenticate themselves each time the D-App is launched. To aid the users and make authentication easy D-App supports biometric authentication.

Of course, it should also be possible for a user to delete their private keys or their entire account from their device, these tools are also provided.

Chapter 6. Security

6.1 Treasure location

Treasure chests have a few requirements which have to be met for the app to function as stated:

- Treasure chests must be stored in the blockchain.
- Treasure chests must be hidden for everyone
- The treasure chests must be claimable when players are in the vicinity of the treasure chest.
- Spoofing and bots should not be able to claim the treasure chest.

As stated before, the actual treasure chest location will be hashed making the retrieval of the location impossible through decryption. However, since an approximate position of the hash is given, and an array of hashes are given which indicate the proximity of the user, one can use a targeted brute force attack to find the location of the treasure chest. To make defend the app against these types of attacks, it has been decided to also add a physical location validation through the validation system stated in chapter 4.

6.2 Wallets

6.2.1 Third-party wallets

Third-party wallets are connected to the app using the Wallet Connect module. The security of the wallets is the responsibility of the user and the development team of the wallet provider.

6.2.2 In-app wallet

To make sure that the private keys of in-app wallets are stored securely, they will be stored on the mobile device through the secure storage that is provided by IOS and Android.

For more information please visit the IOS and Android documentation on secure storage.

6.3 Pin code

The pin code used to unlock the app is also stored in hashed form. And will be stored using Secure Store.

6.4 Privacy concerns

This section will attempt to answer some privacy concerns that may arise from users of the app.

6.4.1 Users location

The app makes use of the user's geolocation during the treasure hunt. The location of the user is watched during this process. We define the term watched in this context as followed: `A process that continuously monitory the user's location through the GPS and WIFI`.

The system does not send this location to any other system. Meaning this location will be used in the mobile phone itself.

The only location that will be sent to another system is the location in which the validation picture was taken.

6.4.2 Validation Images

The validation image will be stored in a system owned by D-DROPS, these images will be deleted after 2 weeks.

Chapter 7. Features

In this chapter we discuss the features of the D-Drops ecosystem, we will be discussing both features that will be available at the initial launch as well as features that will be added on later in the development.

Note: also that in the future different features can be implemented which are not described in this whitepaper.

7.1 Hotspot types

As mentioned before, we implement different types of hotspots. The different types can vary from the area they cover to what kind of treasures it contains as well as what the requirements and effects are of entering a hotspot.

7.1.1 Basic

The basic hotspot type has a radius of 1 km and anybody can enter it using the basic radar with minimum functionalities. The type of treasures dropped here can be anything from the common

treasure to the exotic ones as well as custom user dropped chests.

7.1.2 Radioactive hotspots

Radioactive hotspots have varying radii ranging from 500 meters up to 2,5 km. The treasure here arises treasures and a nuclear fallout resisting radar is needed to enter these areas. Entering a radioactive zone with a non-nuclear fallout resisting radar can damage or even destroy the radar which will then require fixing. As there are many risks to entering a radioactive hotspot the treasures in a radioactive hotspot tend to be more valuable and rarer.

7.1.3 Magnetic hotspots

Magnetic hotspots interfere with your radar and can cause the radar to show fake treasures or show the wrong location for a treasure. As it is hard to find treasures in a magnetic hotspot the treasures found inside magnetic hotspots tend to be more valuable than treasures dropped in the regular hotspots.

7.2 Radar NFT system

The radars used in the D-Drops world are NFT-based. Meaning the user will need to own the NFT of the specific radar to be able to use it in the game. The radar NFTs can be bought or found in a treasure chest if you are lucky. As an additional option, you can also mint a radar NFT by using achievement badges while minting a random radar NFT. The more exclusive and rarer badges you use the rarer radar you can mint.

7.2.1 Radar types

As of the initial launch, only three types of radars will be available. These three radars differ only in the detection range. We call these radars the basic three. Additional radar types are described below. Note that more radar types can be added in the future.

X-Ray radar

The X-ray radar allows users to inspect the content of the treasure from a distance as soon as the treasure appears on the radar screen. Using the X-ray users will have the advantage of being able to hunt for the more valuable or rarer treasures first.

Fallout resistant radar

The fallout-resistant radar enables users to hunt for treasures inside a radioactive hotspot. However, not all radioactive radars have the same resistance to fallout. Radars more resistant to fallout get damaged less and are cheaper to fix than a less resistant radar

Tinfoil radar

The tinfoil radar allows you to block magnetic interference inside a magnetic hotspot and thus negates the distorting effects of the magnetic fields. As for the fallout, resistant radars, not all tinfoil radars are resistant to magnetic fields. The more resistance the radar the easier it is to find treasures inside magnetic hotspots.

7.3 Achievement system

D-Drops implements an achievement system that will allow its users to earn achievements based on the number and type of treasures they have collected and the frequency of finding treasures. Each achievement has a certain prize attached to it like a badge or a token which can be used to mint special and exclusive NFTs.

Achievements are earned by collecting treasures in different hotspots and radars in a specific hotspot or owning a certain number or kind of radar NFTs.

7.4 Custom drops

An additional feature that will create tons of use cases is the custom drops feature. Custom drops allow users to drop their treasure chests which are not limited to just the hotspots. Users can drop their treasures anywhere in the world and attach conditions to them.
The conditions are limitless, but the way of proving that a user has done the actions described in the conditions of the treasure are all the same. It needs to be done through a photo using our validation system. This means of course that the conditions stated in a custom treasure drop need to be provable by a picture.

7.5.1 Location-based NFT minting
As briefly mentioned in the introduction of this white paper a side concept to the treasure hunting of D-Drops is the ability to let users mint NFT based on their geolocation. This way artists can let users mint their NFT only from certain places in the world. This minting mechanism adds additional exclusivity to the NFT.

7.5.2 Location-based NFT minting
Using (location-based) LB-NFTs to spread coupons, discount cards, and or flyers in the immediate surrounding of a local business is a fun way to attract customers and keep up with the digital world. For the bigger companies that are established all around the world, LB-NFTs offer even greater advantages. They can use them to specifically target certain areas where they operate and adapt each of these drops based on the given location. Drops that might be interesting in a rural area, might not be interested in the city. With the LB-NFTs companies can tailor their approach accordingly. Having the ability to guide and attract people to a certain geo-location will also be a tool that can be used to advantage all kinds of organizations.

7.6 Tiers
From the moment a user purchases his or her very first DOP token they will be placed in a tier list according to the amount of DOP token they hold, the tier list is updated during each transaction. Below you can find the tiers with the required amount of DOP tokens required to be placed in one.

Tier 1 Beginner
Tier 2 Explorer
Tier 3 Hunter
Tier 4 Pirate

Tier determines which treasure you will be eligible to hunt for. The higher your rank the more valuable treasures you can hunt for. Beginners will be able to hunt for a few hundred DOP, while someone with the rank Pirate or Hunter will be able to hunt for treasures with rare NFTs and much more crypto coins thus the rewards increase with one's tier.

Chapter 8. EndNote and Links
D-Drops is excited about the future we are building. We hope that you share our vision and will join us on this journey.
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D-Drops Founding Team
Samir, Zamir, and Shair Amiri

Website https://ddrops.world
Documentation https://docs.ddrops.world
Community: https://discord.com/invite/hwnGaXjrxK
Twitter: https://twitter.com/ddropsworld

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