ETHEROLL DICE GAME WHITEPAPER

Draft version 1.2

*Please note that this document does not constitute to it being a Prospectus of any sort, neither do we intend to misrepresent the sale of this sort as being an Initial Public Offering or Share/Equity offering. This token sale does not involve the exchange of crypto currencies for any form of Ordinary Shares in Etheroll, neither does the **DICE** token purchaser receive any form of dividend that is guaranteed. This crowdfund will not accept fiat currency.*

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Etheroll Whitepaper

Etheroll is an Ethereum-based dice gambling Dapp that enables individuals to place bets on the result of a 100-sided dice roll without user deposits or sign-ups, using Ether – the 2nd most popular cryptocurrency in the world. Players can choose their own odds with our unique UI and payouts are instant. Game code is built entirely on top of the Ethereum blockchain, which allows for a level of transparency and accountability that traditional online casinos simply cannot provide.

Table of contents

1) Abstract
   a. Provably-fair
   b. Market Opportunity
2) Solution
3) Attributes
4) Our Vision
5) DICE Token
6) DICE Conversion Schedule
7) Use of funds
8) Security
9) Platform Design
   a. UI/UX
   b. Architecture
10) Timeline
11) Disclaimer

Draft
February 2017

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Etheroll Whitepaper

Abstract

Etheroll is a provably-fair Ethereum-based dice gaming Dapp which allows individuals to:

i. **Place bets in units of Ether**
The Etheroll dice game has the following characteristics:
a. Transparent source code
b. Players set their own odds
c. No deposits
d. No sign-ups
e. Immediate payouts
f. Competitively low 1% house edge
g. Intuitive web-based user interface

ii. **Bet on the house by holding DICE tokens**
100% of all profit Etheroll earns is allocated to token holders. Profit is distributed to token holders proportional to the number of tokens they hold. DICE token holders enjoy exposure to every bet made on the platform, with the advantage of the house edge always being in their favour. Due to the law of large numbers, token holders should always return a profit. The house edge is 1% which means there is a consistent 1% expected value (EV) for token holders.

Provably-fair

Our random number generation uses open source blockchain-based Oraclize.it (a provably-honest oracle service) to retrieve an integer safely from outside of the blockchain. This integer is supplied by Random.org via TLSNotary. The Etheroll smart-contract then performs `sha3()` encryption on the result returned from Random.org and the IPFS address of the TLSNotary proof to achieve the final dice result.

Currently, this is the safest way for Etheroll to generate its random numbers. This method ensures potential attacking miners and/or 3rd parties cannot control the final value of our final dice result.

Etheroll will continue to develop on its random number generation. Etheroll is currently using the following method for retrieving a random number for the results of its dice game:

Upon receiving a valid bet via the `playerRollDice(uint rollUnder)` function, our smart-contract queries Oraclize.it via a partially encrypted, nested query. A partially encrypted, nested query ensures that the API key Etheroll uses to call Random.org remains safe, whilst publicly exposing our random number request and range, to ensure players the Etheroll smart-contract is behaving honestly.

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To protect the Etheroll API key, Oraclize utilizes an Elliptic Curve Integrated Encryption Scheme composed of the following algorithms:

1. An Elliptic Curve Diffie-Hellman Key Exchange (ECDH), which uses secp256k1 as curve and ANSI X9.63 with SHA256 as Key Derivation Function. This algorithm is used to derive a shared secret from the Oraclize public key and the sender private key.
2. The shared secret is used by an AES-256 in Galois Counter Mode (GCM), an authenticated symmetric cipher, to encrypt the query. The authentication tag is 16-bytes of length and the nonce is chosen to be '000000000000' (96 bits of length), which is safe because the shared secret is different for every encrypted query. Oraclize then returns the concatenation of the encoded point (i.e the public key of the senders), the authentication tag and the encrypted text.

The decrypted query is delivered to Random.org which in turn supplies the JSON response which includes an integer ranging from 1-100. The following is the Solidity code for this query:

```
bytes32 rngId = oraclize_query("nested", "[URL]
['json(https://api.random.org/json-rpc/1/invoke).result.random.data.0',
'\\n{\"jsonrpc\":\"2.0\",\"method\":\"generateSignedIntegers\",\"params\":{\"apiKe
y\":${[decrypt]
BBdNQjoFRtO/Od/8NmPt+rdMjLiRAciRv+NxvI5vtiSSgcrUFT9vx636i0xetTG5Rqy1tWtnG4Uaw7GuVe
b3HDYHoS2WXFYBpoK+XqXQIzcQwzgiyHjyGN+yl1ia581kX0fYb8FLOcFGIvRtx6aas8+mfXpGFvk=},\"
n\":1,\"min\":1,\"max\":100,\"replacement\":true,\"base\":10${[identity]
\"}\"},\"id\":1${[identity] \"}\"}']", gasForOraclize);
```

The random numbers requested are exactly as expected via the following request:
`n\":1,\"min\":1,\"max\":100,\"replacement\":true`

This query asks Random.org to return 1 number, a minimum of 1, a maximum of 100, and each request to be a separate event. Note the encrypted API key as the long sequence of scrambled characters.

When Random.org receives this query, it recognizes our decrypted API key and uses atmospheric noise to provide the Etheroll API key with a truly random integer. Atmospheric noise is caused by natural atmospheric processes, primarily lightning discharges in thunderstorms. On a worldwide scale, 3.5 million lightning flashes occur daily. This is about 40 lightning flashes per second.

The sum of these lightning flashes results in atmospheric noise, which is observed by a radio receiver in the form of a combination of white noise and impulse noise.

IPFS stored TLSNotary proof of the transaction proves Oraclize.it did not alter the results from the Random.org service in anyway. The proof string is exactly the IPFS multi-hash that identifies the TLSNotary proof. Players will fetch the proof if they wish, for example at http://ipfs.io/ipfs/proof

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At the time the Etheroll smart-contract receives the JSON response of the random number in the function `__callback(bytes32 myid, string result, bytes proof)`.

The integer `result` is `sha3()` on-chain to produce the final dice result. The following algorithm ensures the dice result is provably fair for our players:

```
Let r be the random value returned from Random.org via Oraclize.

Let p be the IPFS address of the PageSigner TLSNotary proof content.
```

The following Solidity code example is used to produce a provably-fair random number bounded between `1` and u inclusive (1, 100) and guaranteed to be evenly distributed across the range of values.

```
finalResult = uint(sha3(r, p)) % 100 + 1;
```

Our smart-contract then calculates the value of the integer `finalResult` against the original integer that was submitted by the player (stored as `playerNumber`) via a mapping to the player address via the following:

```
mapping (bytes32 => uint) playerNumber;
function playerRollDice(uint rollUnder){
playerNumber[rngId] = rollUnder;
}
```

If `finalResult` is lower than `playerNumber` submitted by the player, the player wins. At which point, the smart-contract calculates the required payout and pays bets instantly, whilst engraving properties of the bet into the Ethereum blockchain (as an event) for a tamper proof history of all bets.

Opportunity

The market size of the online-gambling industry for 2016 is estimated to be $45 billion USD. These are impressive numbers. However, online-gambling does not consist entirely of cryptocurrency gambling alone. Let's take a closer look at the current cryptocurrency gambling market. We will first focus our attention on the Bitcoin gambling market, and use this as a guide towards the future potential market of gambling on top of the world's 2nd most popular cryptocurrency, Ether.

i. Bitcoin currently has a market cap of ~$14 billion USD. [1]
ii. It is estimated that 50-60% of all Bitcoin transactions relate to online gambling. [2]
iii. In the past year, Bitcoin and alt-coin casino revenue was 3,173,833 BTC with a profit of 15,173.6 BTC. In the same period, 20.83 billion bets have been placed across Bitcoin casinos. [3]
iv. Bitcoin is currently the largest cryptocurrency by market cap and as such, represents the largest share of the cryptocurrency gambling market. SatoshiDice launched its

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Bitcoin based dice game in 2012 and currently enjoys a lion share of the Bitcoin dice game market with 134,374 Bitcoin wagered last year alone.

The following table illustrates reported revenue for popular Bitcoin casinos in 2016 [4]:

Casino	**Bets**	**Wagered**
Primedice	11.25 billion	1,222,914 BTC
Bustabit	205.35 million	606,083 BTC
BetKing	321.06 million	256,431 BTC
SatoshiDice	456.94 million	134,374 BTC
BetterBets	375.69 million	64,461 BTC
BitDice	32.17 million	168,726 BTC

v. The current market cap of Ethereum is ~$965 million.
vi. Ethereum was released in mid 2015 and by early 2016 was the 2nd largest cryptocurrency by market cap. No other cryptocurrency has seen such tremendous growth in such a short amount of time. [5]

Ethereum is a disruptive technology, that looks to change the way the world does business. Ether, which is the native token of Ethereum, is reasonably new to the crypto-currency market, having only launched in July of 2015. The rise of Ether has been gargantuan in a very short time, with many predicting its market cap to eventually outnumber that of Bitcoin, at ~$14 billion.

The Ethereum market cap is currently ~$965 million. The Ethereum market cap grew extremely quickly, in part, due to the programmable ability to run smart-contracts (auditable code) on the Blockchain. World banks, large accountant firms (including the big four), business solutions and application developers are looking at how to leverage this network to reduce the cost-of-business. This is something Bitcoin is unable to offer.

Hardening efforts of the protocol by the core development team in 2016 suggest an extremely positive and healthy outlook for the Ethereum protocol. The future of the Ethereum protocol and its underlying Ether token is looking extremely positive.

Taking the staggering growth of the Ethereum market cap (~$965 million) into account as well as the numbers related to Bitcoin gambling, Etheroll proposes tremendous opportunity arising for the traditional style of dice game to be ported over to the Ethereum protocol.

Such a platform requires experienced, honest and reliable operators with a proven track record, an intuitive web-based interface, adjustable odds, zero deposits, zero sign-ups,

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immediate payouts and a team committed to further innovation of their game in the fast-paced environment of Ethereum.

Solution

Etheroll is a service which provides a provably-fair and transparent, web-based Ethereum dice gambling Đapp (decentralized application). Etheroll game code is decentralized and immutable. Players will be 100% confident Etheroll behaves in a provably-fair manner, thanks to the nature of the Ethereum protocol.

Our smart-contract layer runs entirely on the Ethereum blockchain, it is auditable, transparent, verifiable and provably-fair.

Etheroll accepts wagers from players in the form of Ether via its unique web-based interface. The decentralized and immutable nature of our smart-contract layer, ensures players will bet in units of Ether with 100% confidence their funds are not being held by a 3rd party subject to the risk of hacks, theft, or misconduct by the Etheroll smart contract.

The decentralized nature of the Ethereum protocol also ensures that our smart-contract is immutable and always available, with no possibility of downtime via DDOS attacks, hosting issues, and/or government, or other forms of intended interruption to the service.

Players are assured the Etheroll dice game behaves as it is intended to, thanks to the open-source nature of our smart-contracts, which are verifiable by the public.

Attributes

i. **Provably-fair**

The result of our random number is provably-fair thanks to the following formula:

```
Let r be the random value returned from Random.org via Oraclize.
Let p be the IPFS address of the PageSigner TLSNotary proof content.
```

The following code is then used to produce a provably-fair random number bounded between l and u inclusive and guaranteed to be evenly distributed across the range of values.

```
finalResult = uint(sha3(r, p)) % 100 + 1;
```

ii. **Players Set Their Own Odds**

Players have the power and choice to set their own odds for each dice roll. This characteristic allows players to adjust *each dice roll to suit their individual risk profile*, in turn, increasing the overall enjoyment and user experience of the Etheroll dice game. Inspiration for this type of game play is drawn from the 'SatoshiDice style' of dice gambling. This is the real dice gambling experience on the Ethereum network.

iii. **A Web-based Web3.js Interface**

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A friendly and intuitive, Web3.js web-based user interface makes it easy for our users to place bets and interact with the Ethereum blockchain. User-centric design and development practices ensure Etheroll will be the easiest dice game to interact with on the Ethereum protocol. Our intuitive user interface is built with the player in mind and employs a responsive CSS framework for extra flexibility and maximum usage by a wide variety of web based clients. This is truly dice gambling on the Ethereum network the way you imagined it.

iv. **Low House Edge**

The Etheroll house edge is currently set to be 1%. Our house edge is also adjustable to suit the market, so it will always remain competitive.

The house edge is calculated and deducted only in the instance of a win. For example, if a player places a bet size of 1 Ether at 50/50 odds, the player will be rewarded a total profit of 0.98 Ether. The commission Etheroll receives in the event of a loss will be calculated accordingly:

```
(((betSize * (chanceOfLoss/chanceOfWin)) + betSize) * houseEdgeAsPercent)
```

In our example, a player placing a bet of 1 Ether at 50/50 odds, with 1% house edge, if Etheroll *loses* the bet:

```
(((1* (50/50))+1)*0.01) =  0.02 Ether commission
```

v. **A Trusted and Experienced Team**

Etheroll are early pioneers in the Ethereum dice gambling space and have real-world experience working on Ethereum since February of 2016. In June of 2016, Etheroll was in the *middle* of its original crowdfund (which was among the top 15 most successful crypto-currency crowdfunds at the time) when the DAO hack took place.

48 hours later, in the interests of our valued token holders, and on our own volition, we suspended the crowdfund and refunded the ~$50K that we raised in the few days the crowdfund was open. Whilst *we were not susceptible to the same attack vector that the DAO was*, we decided the simplest and absolute safest option was to refund all Ether and run the crowdfund again at a later date.

Since June 2016 Etheroll has researched, coded, implemented, and coded again, security oriented programming (SOP) techniques for Solidity and hired independent 3rd party security auditors (Piper Merriam - independent of Consensys) to audit our Ethereum smart contracts. We are proud to announce that we have recently received a 'pass' on the security audit of our core game and crowdfund contracts.

Etheroll's recent history proves it has the experience, honesty, and technical know-

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how to accomplish its goals, as proven by our recent crowdfund 'success' in June of 2016. Etheroll considers the postponed crowdfund in June of 2016 to be a tremendous success. After successfully refunding 100% of the Ether within 48 hours of the DAO hack, our valued token holders were pleased with the speed, honesty and transparency of our actions. Trust is earnt in the cryptocurrency community. We have earnt that trust from the Ethereum community over the past year. [6]

vi. **In-house Solidity Programmers**

All Solidity smart-contract code for Etheroll is written in-house. This means Etheroll is extremely nimble and will adapt quickly in an ever-changing Ethereum environment at low cost without the need to set aside a budget or waste precious time pursuing trusted, experienced and competent programmers. We are open to innovation and will continue to improve the quality and overall experience of our dice game. Faster processing times, and an improved RNG are areas of focus moving forward.

vii. **No deposits, no sign-ups**

Traditional online casinos retain player deposits and/or wins until a withdraw request is made by the player. Usually, withdraw requests take time, sometimes days, and expose traditional online casino models as a prime target for hackers and/or malicious employees who may see an opportunity to steal player funds.

Thanks to the nature of the Ethereum blockchain and the design patterns we have chosen, the Etheroll smart-contract *does not require players to sign up for an account, or deposit Ether to play Etheroll*. We only accept Ether from players at the time that they place their bets. This significantly reduces the risk profile of Etheroll compared to the traditional online casino model.

viii. **Open source and verifiable**

The Etheroll source code is open source and verifiable. Players and DICE token holders alike are free to verify the game does indeed do what it says. This unique set of characteristics allows for an environment that keeps Etheroll honest and levels the playing field in the online gambling space between players and the house.

ix. **Cryptographically Secure**

The properties and values of each bet are engraved into the blockchain in a tamper-proof manner. This provides irrefutable proof of the history of all bets. At any time, players will review their bet history with 100% confidence there is no room for tampering or corruption of betting results by Etheroll. Thanks to the nature of the Ethereum protocol, all bets submitted to Etheroll are cryptographically secure in nature when they are transcribed into the blockchain. At any point in time, players

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have the ability to review details about any bets.

x. **True 'Dice Gameplay'**
Dice gambling is by far the most popular game in of all cryptocurrency gambling. *The ability for players to choose their own odds is integral to dice games* and is what makes the traditional dice game so popular. Our unique web-based UI empowers the player by allowing them to set their own odds.

xi. **#1 in SEO**
Thanks to our expertise in SEO, Etheroll ranks extremely highly in organic Google search results for the term "Ethereum dice", "Ethereum gambling", "Ethereum casino". We will continue to see growth in this area.

Our vision

Our future, and data from existing Bitcoin online gambling sites tell an interesting story.

SatoshiDice is an existing Bitcoin game that runs on the Bitcoin blockchain and can be used as an insight into the potential future market size of gambling on the Ethereum protocol:

> *"Responsible for more than 50% of daily network volume on the Bitcoin blockchain, SatoshiDice reported first year earnings from wagering at an impressive ฿33,310 ($13,740,000). During the year, players bet a total of ฿1,787,470 in 2,349,882 individual bets at an average monthly growth rate of 78%. Earnings were calculated from eight months of data covering May to December, 2012."* [7]

Etheroll will play a significant role in the future of the gambling online using Ethereum thanks to the following characteristics of the platform:

i. Players will choose their own odds.
ii. No deposits, no sign-ups.
iii. Our web interface is easy and intuitive for players to place bets. Designed from the ground up to appeal to a wide audience used to 'SatoshiDice style betting', Etheroll is the first Ethereum dice game to *truly* offer a similar experience on the Ethereum protocol.
iv. Early first mover advantage – the network effect.
v. Low house edge. Our 1% house edge is the lowest on Ethereum.
vi. A nimble in-house development team that is quick to react to development advances in Ethereum, focus includes advances in RNG and bet processing times.
vii. Honest and experienced team.

Ethereum is the 2nd largest crypto-currency by market cap at ~$965 million. Many believe the Ethereum market cap will eventually be equal to or higher than that of Bitcoin. We envision explosive growth in the future of Ether and Ether dice gambling.

The Etheroll smart-contract development phase is 100% complete and scheduled for launch

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March of 2017. Our 6-month goal is to gain at least a 60% market share of the current online gambling marketplace on the Ethereum blockchain and from there world domination.

DICE Token (DICE)

The DICE token is an Ethereum ERC20 standard token with additional custom functionality for the purposes of being used within the Etheroll ecosystem. The DICE token is minted in a once-off event during our strictly limited 14-day token creation phase.

Each DICE token grants its owner the following rights and has the following characteristics:

Direct earnings – Proportional to the number of tokens they hold. *Token holders as a collective receive 100% of the Ether generated by the game*. Ether is generated by the game via players losing bets and the built-in 1% house-edge. Tokens holders are exposed to each bet that is processed on the platform with the advantage of the 1% house-edge always being in their favour.

Fully transferable p2p – The DICE token will be fully exchangeable p2p and available for trade on exchanges.

Voting rights – The DICE token enables holders to vote on proposals set-forth by the Etheroll team. For example, lowering or raising the house edge, or, adding a new game to the suite.

Conversion Schedule

The DICE Token is strictly limited in supply. Minted only during our token creation phase for a total of 14 days there is a total of 25,000,000 DICE tokens are on offer. There will never be another mintage of DICE tokens.

Start Date: The token creation phase begins 10:00 UTC February 13th 2017

Duration: 14 days.

Week 1: 200 DICE (ROL) tokens for 1 ETH (Ξ)

Week 2: 100 DICE (ROL) tokens for 1 ETH (Ξ)

Total supply: 25,000,000

The crowdfund address: 0x805129C7144688224c122c924E3855D5b4FA01D8

The founding team is pre-allocated 2.5m tokens. Any tokens that remain unsold after the token creation phase will be destroyed to rule out the possibility of dilution. The number of tokens remaining after the destruction of unsold tokens is the final mintage. No other tokens will ever be created.

Use of funds:

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i. 80% of all Ether raised during the crowdfund becomes the house bankroll to pay winning bets. Token holders as a collective receive 100% of profits the house bankroll generates.
ii. 20% of all Ether raised during the crowdfund period is sent to Etheroll to continue funding development of the platform.

Security

Our smart-contracts are subject to 3rd party security audits, conducted by Piper Merriam (independent of Consensys). Each smart contract we deploy to main-net is subject to the following internal security protocol. Internal live/automated Truffle testing phases, 3rd party security audit phase. Contracts are deployed from in-house private-chains to Ropsten (test-net) for live testing, only after internal live testing has been satisfied, contracts are then deployed to main-net.

We will not deploy a smart-contract that has not been signed off by an 3rd party independent security audit. Signed off 3rd party independent security audits are available for perusal for the entire suite of our smart-contracts.

Platform Design

UI/UX

Players are able to place bets and change their odds with our dice game directly on our website using the Mist browser and our intuitive UI.

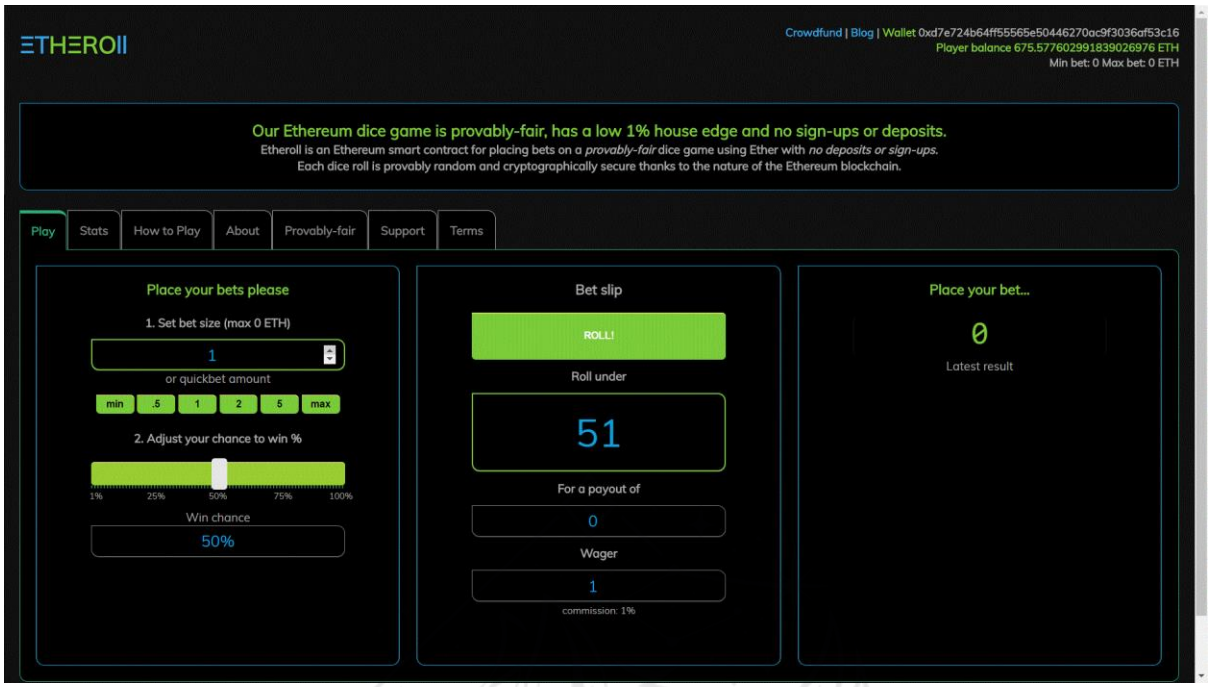
You will find a video demonstration of our UI/UX at youtube.com/watch?v=8moxZOwd39M.

If you would prefer to experience it in full for yourself, please load etheroll.com using the Mist browser available here then follow the instructions under our “How to Play” tab. Alternatively, you can use the Google Chrome extension Metamask to place bets.

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A screenshot of our UI. Note the slider (bottom left) which allows players to adjust their own odds.

Architecture Overview

The structure of the Etheroll application is comprised of 4 smart contracts, each of them handling a different aspect of the platform. Etheroll employs a modular approach in the design of its smart-contract architecture, to ensure integrity and safety of the ecosystem. For example, the Game contract does not have any function during the crowdfunding period, nor does the Crowdfund contract interact with day-to-day game play.

The following outlines the core functionality for each contract, and its current development status:

Game contract
Status: Completed
Security audit available: Yes
Responsible only for accepting and processing all bets via the `playerRollDice(uint rollUnder)` function. This is the smart-contract that a player interacts with. This contract manages things like the house-edge, minimum bet, maximum bet, random number generation, calculation of payouts, calculation of refunds.

Crowdfund contract
Status: Completed
Security audit available: Yes
Responsible only for accepting Ether only during the crowdfunding period. At the end of the crowdfund period 80% of Ether raised will be moved from this contract to the multi-sig

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wallet contract and from there Ether is sent to the Game contract for actual game play. If the funding goal is not reached, Ether raised is available for withdraw by each token holder via the `safeWithdraw()` function.

Token contract
Status: Completed
Security audit available: Yes
Responsible only for distributing tokens during the crowdfunding period and tracking the token balance of an address, this contract allows for token transfers to take place on exchanges except during Reward payout periods, which locks the token for security purposes. The Etheroll Token contract is a standard ERC-20 token with added functionality for use of the token within the Etheroll ecosystem. The DICE token will not be tradeable until 13 weeks after the start of the crowdfund campaign.

Rewards contract
Status: Work in progress
Security audit available: TBC
Responsible only for calculating the amount of Ether rewards available for withdraw by each token holder's address. Only token holders have the special rights to interact with the Rewards contract. Every 12 weeks, profit accumulated from the game is sent to this contract. This contract enables token holders to withdraw Ether rewards proportional to their DICE token ownership for 5 days, every 12 weeks. If a token holder does not withdraw their rewards during the 5-day reward period, their rewards for that phase are forfeit. 100% of any profit the Game contract generates is distributed to token holders, proportional to their ownership of DICE tokens.

Timeline

2016: Development of game code & website – complete
November 2016: In-house game testing - ongoing
January 2017: Security audit of game code – complete
December 2016: Development of crowdfund code – complete
January 2017: Announcement & White Paper release - complete
January 2017: Security audit of crowdfund code – complete
January 2017: Crowdfund public awareness – ongoing
February 2017: Crowdfund opens – February 13th 2017
February 2017: Crowdfund closes – February 27th 2017
May 2017: DICE token listed on exchanges
2017: Continued marketing, research & development into new games and/or random number generation techniques to continue improvement and growth of core offering.

Disclaimer

RISKS ASSOCIATED WITH THE ETHEROLL DICE TOKEN

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DICE (ROL) is a cryptographic token used to represent a % ownership in the initial Etheroll bankroll. Owners of **DICE** are eligible to receive rewards in the form of Ether based on the performance of the bankroll. Owners of **DICE** are exposed to the wins *and* losses.

DICE is not a crypto currency
At the time of this writing, **DICE** (i) cannot be exchanged for goods
or services, (ii) has no known uses outside the Etheroll platform, and (iii) cannot *currently* be traded on any known exchanges.

DICE is not an investment
There is no guarantee that the **DICE** you purchase will increase in value and/or provide any return.

DICE is not evidence of ownership or right to control
Controlling **DICE** does not grant its controller ownership or equity in the Etheroll platform as a whole. **DICE** does not necessarily grant any right to participate in the control, the direction or decision-making of the Etheroll platform.

Risk of losing access to DICE due to loss of credentials
The purchaser's **DICE** can only be accessed with login credentials selected by the purchaser. The loss of these credentials will result in the loss of **DICE**. Best practices dictate that purchasers safely store credentials in one or more backup locations geographically separated from the working location.

Risk of losing Ether, due to lucky players
There is a risk that due to the variance in gambling, the house bankroll could be bankrupted and token holders lose their initial investment.

Risks associated with the Ethereum protocol
DICE and the Etheroll platform are based upon the Ethereum protocol. As such, any malfunction,
unintended function or unexpected functioning of the Ethereum protocol may cause the Etheroll
platform or **DICE** to malfunction or function in an unexpected or unintended manner. Ether, the
native unit of account of the Ethereum Protocol may itself lose value**.**

Risk of unfavorable regulatory action in one or more jurisdictions
Blockchain technologies have been the subject of scrutiny by various regulatory bodies around
the world. The functioning of the Etheroll platform and **DICE** could be impacted by one or more
regulatory inquiries or actions, including but not limited to restrictions on the use or possession

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of digital tokens like **DICE**, which could impede or limit the development of the Etheroll platform.

Risk of competition
Following the token sale and the development of the initial version of the Etheroll platform, it is
possible that alternative Ethereum gambling platforms could be established, which utilize the
same open source code and open source protocol underlying the Etheroll platform. The Etheroll platform may have to compete with these alternative platforms, which could potentially negatively impact the performance of the Etheroll platform and **DICE**.

Risk of insufficient interest in Etheroll or distributed applications
It is possible that the Etheroll platform will not be used by large numbers of individuals, and that there will be limited public interest in the creation and development of distributed applications. Such a lack of interest could impact the development of the Etheroll platform and therefore the potential uses or value of **DICE**.

Risk that the Etheroll platform, as developed, will not meet the expectations of the token holder
The Etheroll platform is presently under development and may undergo significant changes before
its full release. Any expectations regarding the form and functionality of **DICE** or the Etheroll platform held by the purchaser may not be met upon release, for any number of reasons including a change in
the design and implementation plans and execution of the Etheroll platform.

Risk of theft and hacking
Hackers or other groups or organizations may attempt to interfere with the Etheroll platform or the
availability of **DICE** in any number of ways, including without limitation denial of service attacks,
Sybil attacks, spoofing, smurfing, malware attacks, or consensus-based attacks.

Risk of security weaknesses in the Etheroll platform
The Etheroll platform consists of software that is based on open-source software. There is a risk that the Etheroll team, or other third parties may intentionally or unintentionally introduce weaknesses or bugs into the core infrastructural elements of the Etheroll platform, interfering with the use of or causing the loss of **DICE and/or ETH**.

Risk of weaknesses or exploitable breakthroughs in the field of cryptography
Advances in cryptography, or technical advances such as the development of quantum computers, could present risks to crypto currencies and the Etheroll platform, which could result in
the theft or loss of **DICE and/or ETH**.

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Risk of lack of adoption or use of the Etheroll platform
While **DICE** should not be viewed as an investment, it may return value over time. That value may
be limited if the Etheroll platform lacks use and adoption. If this becomes the case, there may be
few or no profits to draw from, or even a loss of your initial investment.

Risk of an unfavorable fluctuation of Ethereum value
The Etheroll team intends to use part of the proceeds of the **DICE** token sale (20%) to fund further development of the Etheroll platform. The proceeds of the **DICE** token sale will be denominated in Ethereum. If the value of Ethereum fluctuates unfavorably during or after the token sale, the Etheroll team may not be able to fund development, or may not be able to develop the platform in the manner that it intended or promised.

Risk of malfunction in the Etheroll platform
It is possible that the Etheroll platform malfunctions in an unfavorable way, including but not
limited to one that results in the loss of **DICE and/or ETH**.

Unanticipated risks
Crypto-currency is a relatively new and untested technology. In addition to the risks set forth here, there are risks that the Etheroll team cannot anticipate. Risks may further materialize as unanticipated combinations or variations of the risks set forth here.

References

1. Source: [https://blockchain.info/charts/market-cap]
2. Source: [http://lsvp.com/2013/08/23/at-least-half-of-all-bitcoin-transactions-are-for-online-gambling/]
3. Source: [https://thebitcoinstrip.com/stats/2015-01-02-to-2016-12-25]
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5. Source: [https://coinmarketcap.com/]
6. Source: [https://www.reddit.com/r/etheroll/comments/4ooyod/crowdsale_now_closed_eth_has_been_refunded/]
7. Source: [http://www.forbes.com/sites/jonmatonis/2013/01/22/bitcoin-casinos-release-2012-earnings/#8039cf650cb2]

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