

# **WeTrust Whitepaper Table of Contents**

[Abstract](#)

[Vision](#)

[Market Review](#)

[ROSCA: A simple reciprocal aid organization:](#)

[WeTrust Products](#)

[App Token](#)

[WeTrust Challenges and Solutions](#)

[Road Map](#)

[Blockchain Benefits](#)

[Potential Market Size](#)

[Technical Aspects](#)

[The first dApp - ROSCA:](#)

[Why start with ROSCA as WeTrust's first dApp?](#)

[Deposits and Withdrawals](#)

[ROSCA dApp walkthrough](#)

[Team](#)

[Glossary](#)

[Appendix](#)

[References](#)



George Li, Patrick Long, Ron Merom, Tom Nash, Mivsam Yekutieli

[www.wetrust.io](http://www.wetrust.io)

## Abstract

WeTrust is a collaborative savings and lending and insurance platform that is autonomous, agnostic, frictionless, and decentralized. WeTrust utilizes the Ethereum blockchain to create a full-stack alternative financial system that leverages existing social capital and trust networks, eliminating the need for a “trusted third party”, allowing for lower fees, improved incentive structures, decentralized risks, and a greater amount of capital to reside among the participants.

WeTrust’s first product is a Rotating and Saving Credit Association (ROSCA) platform, inspired by the ~1 billion people around the world who are using mostly informal organizations to lend/ borrow, and support each other financially within their communities. ROSCAs will bootstrap the community, and WeTrust plans to build future products that include sovereign credit identities, trusted lending, mutual insurance, and more.

## Vision

WeTrust’s vision is to leverage social capital, trust networks, and blockchain technology to create a financial system that has aligned interests with all of its participants. 2 Billion people in this world do not have a bank account and the existing financial system has many contradictions. One cannot get an affordable loan without having well-paying job and good credit, while legitimate insurance claims directly reduce an insurance firm’s profits. The un-banked and un-insured are most hurt from this lack of access and misalignment of interests, and are always in search of alternative financial solutions.

We believe that today's banks and insurance companies play an important role in society. However, in contrast to other industries where undifferentiated products result in low margins, they thrive because of their important role as a "trusted third party". Yet, our research shows that there is an alternative to this dependency on a "trusted third party", one which can help reduce the friction necessitated by centralized intermediaries and result in a world where everyone has access to fair, market-priced credit and insurance.

A fundamental building block we plan to use in creating an alternative already exists via a tradition used globally by over 1 billion people -- Rotating Savings and Credit Associations -- aka ROSCAs (pronounced ROS-Cahh). This grassroots organization leverages personal reputation and social ties -- and draws upon 2,000 years[1] of resilience and effectiveness in offering credit and insurance to communities around the world.

Our first product is a ROSCA platform powered by the blockchain - one which enables the creation of social safety nets that address economic uncertainty and provides opportunity for growth. It is the first of a series of products that include credit identities and scores, lending, mutual insurance, and much more -- all of which leverage the untapped social capital and trust networks that already exist.

In this whitepaper, we propose a plan to implement our vision to amplify the strengths of social capital and reputation based networks, while addressing their weaknesses: scalability, fraud, and lack of innovation.

## Market Review

Social safety nets have functioned among humans for millennia since prehistoric times, starting from hunter gatherer societies[2]. In modern times, there are three primary forms of social safety nets: Government, Commercial, and Reciprocal.

While most people in developing countries already experience this, citizens in developed nations are also starting to realize that relying only upon Government and Commercial Aid may not be viable in the long term. Government aid can come in the form of Social Security, Unemployment, Medicare, etc... Unavailable for most global citizens, government aid is also underfunded where currently offered (US, countries in the EU, Japan, etc...), according to leading economists.

Commercial aid comes in the form of purchased insurance or emergency loans, and is often laden with high operating costs, especially for those who need it the most. More importantly, commercial aid has a shareholder-first mentality, often to the detriment of policyholders/ borrowers, and has a precedent of taking risks that endanger the financial system (see AIG bailouts in 2008[3]). Lastly, this form of safety net is simply inaccessible to two billion adults and their dependents, ~40% of the global population.

The third option is Reciprocal Aid. Simply put, it is any organization where voluntary participants play the role of both aid giver and receiver depending on the circumstance. They exist in many forms around

the world including Rotating Savings and Credit Associations (referred to as ROSCA from here on in this document, also known by different local names globally), mutual insurance groups, fraternal organizations, religious groups, and professional societies. In these organizations, the average participant receives what they contribute over the life of their membership, and self-reliance is a core attribute. Their decline in recent years is due to inability to scale efficiently, lack of transparency relative to Commercial aid, and the increased role of Governmental Aid.

While these organizations play an important role in their respective communities and are currently used by billions of people globally across developing and developed economies, Reciprocal Aid is **not** a panacea. Instead, WeTrust views reciprocal aid as a critical leg to the three legged stool of protection against uncertainty, and serves a complementary role along with Government and Commercial aid. Furthermore, WeTrust believes that the Social Capital and Trust Networks found in traditional Reciprocal Aid organizations can be leveraged and blended with characteristics found in Commercial organizations, to create entities that result in: lower default rates, better rates for both savers and borrowers, lower expense ratios and lower fraudulent claims for insurance.

Lastly, while many countries that rely upon Reciprocal Aid have low rates of financial inclusion, some institutions have attempted to address the lack of financial inclusion by facilitating access to outside capital via peer-to-peer lending (P2P)[4], such as those offered by [Kiva.org](https://www.kiva.org/). Kiva.org is a well known non-profit that has brought P2P loans to developing countries, but it's penetration and usage has been limited and is in some cases controversial[5] due to high fees, multiple transaction steps, and lack of transparency. WeTrust believes there is a way to improve financial inclusion via a reciprocal aid approach that is transparent, requires low fees, and promotes sustainable growth.

## ROSCA: A simple reciprocal aid organization:

Savings and lending is a foundational building block of modern society, serving as both funds in times of financial need and fuel for funding economic growth. Access to capital can have impact of historical proportions. Without access to capital, Columbus's expeditions to the Americas may not have occurred, and perhaps nor would the subsequent explorations of the "New World". Without proper financing mechanisms, neither the Industrial Revolution nor the tech boom in Silicon Valley would have spread at such rapid speed. Both national and local economies are affected by the ease or difficulty to access capital.

For thousands of years, people around the world have created mechanisms within the communities to save money, lend and borrow from each other and create financial safety nets.

One of the most widespread communal financial institutions in the developing world are ROSCAs. A ROSCA is "a group of individuals who agree to meet for a defined period in order to save and borrow together, a form of combined peer-to-peer banking and peer-to-peer lending." [6] ROSCAs are commonly

built along clan, geographical, social, or professional networks. In countries around the world, ROSCAs have a variety of different names such as: *susus* (Ghana/ Caribbean Islands), *tandas* (Latin America), *hui* (China), *chits* (India), *cundinas* (Mexico), etc...[7]

Here is an example of the detailed mechanics of a ROSCA in action:

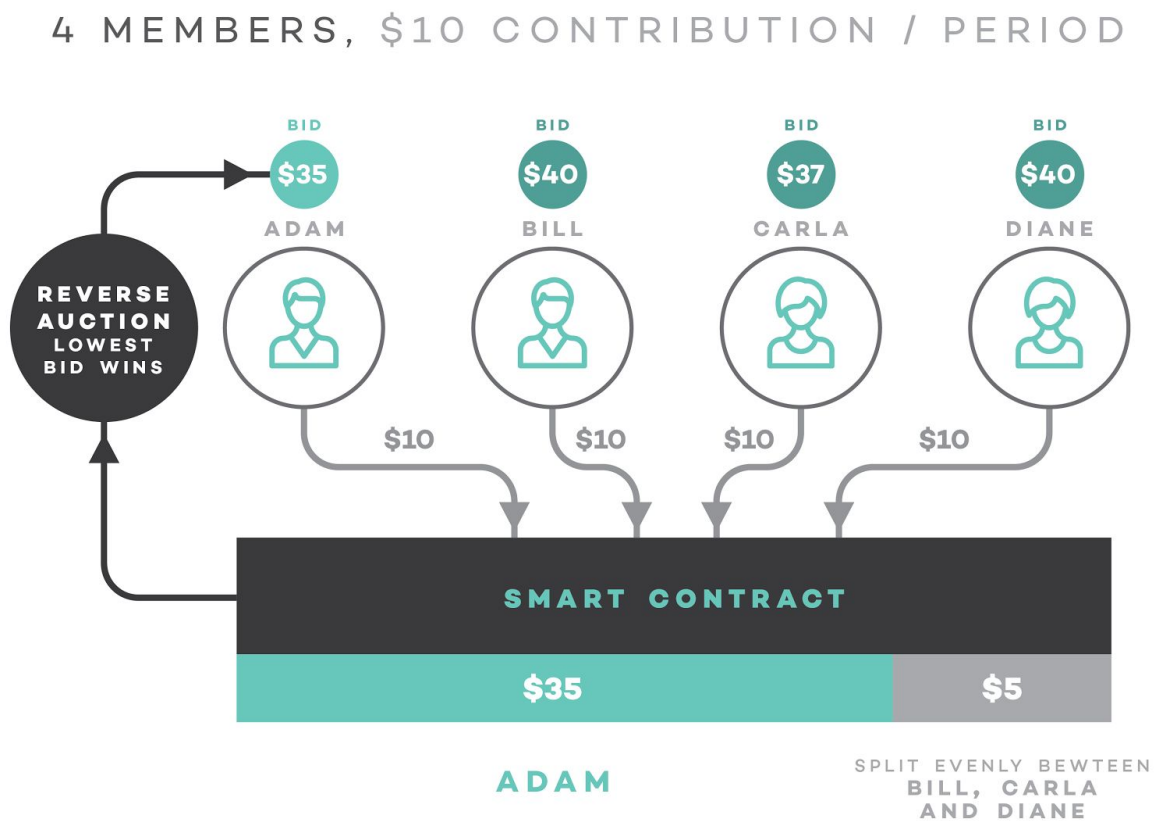


Figure1.1: ROSCA mechanics in a single round

Here is an example of the detailed mechanics of a ROSCA running through a full epoch.

#### EXAMPLE:

4 MEMBERS, \$10 CONTRIBUTION / PERIOD

A PARTICIPANT CAN WIN ONCE EVERY X PERIODS | X = # PARTICIPANTS

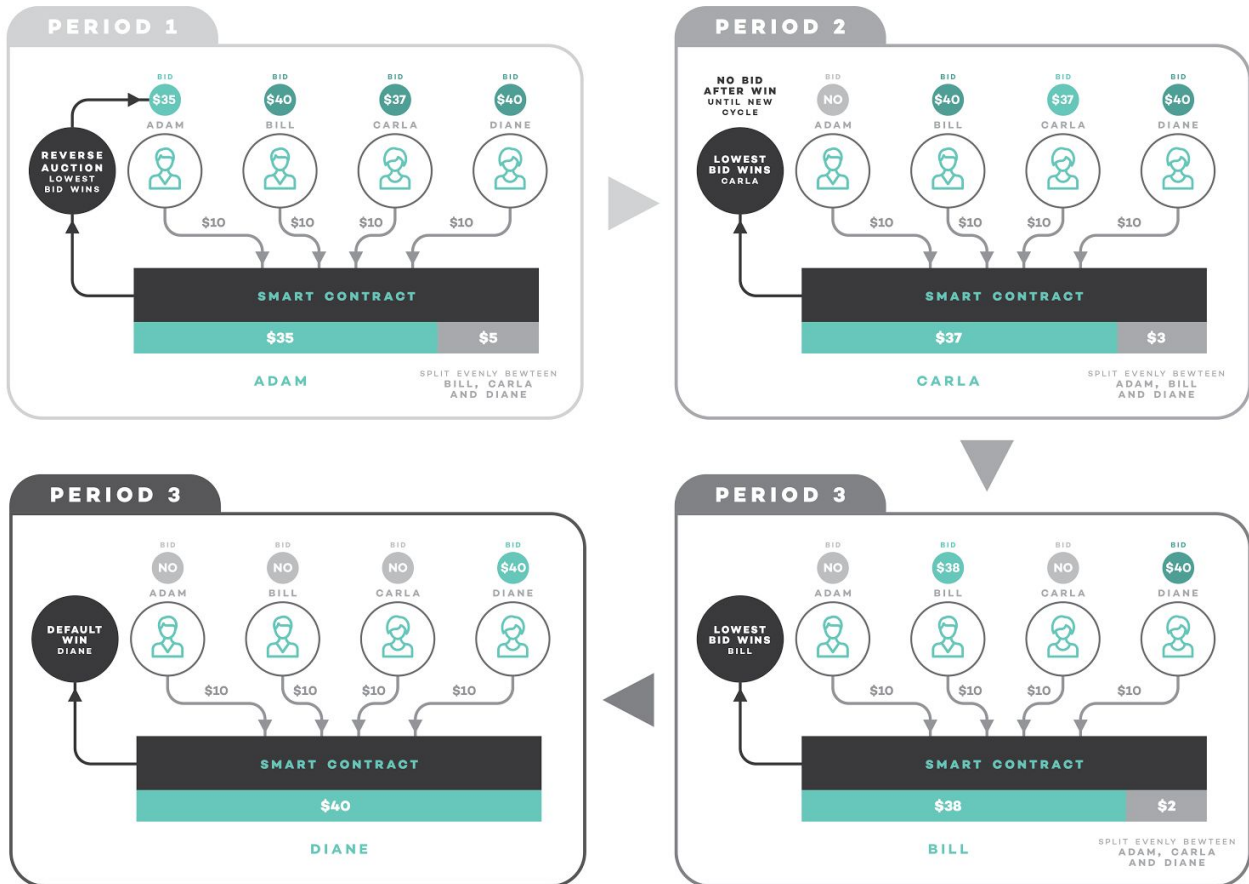


Figure1.2: ROSCA mechanics in a full Epoch

In a ROSCA, individuals contribute a fixed amount for a set duration at regular intervals, and the money is distributed each interval to individuals via a lottery, a bidding process, or other method as decided by participants (the example above shows bidding, whereas a lottery is a random selection). ROSCAs produce results where all participants are individually better off[8] (or no more worse off) than not participating in the group (pareto efficient[9]).

ROSCAs have their own set of pros and cons compared to modern banking institutions.:

Some advantages include:

- Interest rates are fair and based on supply/ demand from savers/ borrowers
- Multiple proprietorship – lies not with one or two persons, but the group as a whole
- Group saving has been shown to be more effective in achieving individual savings goals due to accountability - akin to group exercise programs

- Lack of bureaucracy, less fraud, lower default rates, and non-profit motive for the platform

Community benefits from using ROSCAs:

- Facilitates reciprocation of credit disbursal. The give-and-take interaction helps increase social bonds, as borrowing and returning money is the ultimate sign of trust.
- Avoids exorbitant interest and fees that are funneled towards fragile centralized institutions thousands of miles away, and keeps capital within the community, encouraging growth in the local economy
- Encourages community participation in other fields of development – the participatory approach of informal initiatives is easily replicable to a wide range of community development issues.

Disadvantages of ROSCAs

- Informal ROSCAs are sub-scale and difficult to increase in size due to the need for in-person interaction - resulting in less efficient lending supply/demand matching.
- Informal ROSCAs have zero tracking or credit-building outside the immediate organization, therefore no additional financial products can be built on top of one's successful credit history interacting with a siloed ROSCA.
- High setup and handling fees charged by state-run ROSCAs (e.g., 5% flat fee plus additional interest to access credit is typical in India; Kerala State Company employs thousands and has billions in operational costs[10])

## WeTrust Products

WeTrust is developing a novel financial platform powered by social capital, trust networks, blockchain technology, and includes ROSCAs, Trust lending, mutual insurance and community-based building of credit history.

**WeTrust's first product** is a platform for ROSCAs, which consists of a smart contract which automates the ROSCA process. This encompasses contributions, bidding, assigning funds at the end of each round, and withdrawing funds. We aim to package this within a web application which an individual can use to manage their participation in one or multiple ROSCAs. The product has built-in network effects, and incentivizes users to invite trusted associates, which helps seed the network. We believe group based borrowing and lending provides greater social incentives for all participants[11], and customizable framework allows groups to operate according to their particular needs and circumstances.

WeTrust platform is using technology to *amplify the strengths and address the shortcomings of ROSCAs by enabling scalability, automating record keeping, and reducing the potential for fraud.*

**In parallel** with developing ROSCAs, we will also integrate the use of stablecoins. These tokens have the transactional qualities of cryptocurrencies and are critical for widespread adoption as they are pegged one to one with fiat currencies and resistant to day-to-day volatility. Our end goal is to have users be able to use our platform without having to understand the underlying complexity.

**WeTrust's second product** is distributed, sovereign credit identities. Credit identities will be created based on several factors: adherence to ROSCA terms and the quality of tethered social media accounts. Responsible individuals will be able to build up a strong credit identity, which will enable greater trustworthiness and eventually more powerful features such as the ability to vouch for other members and potentially build trust with individuals formerly outside their social circle. In addition, upon request, credit identities could be shared with external entities (such as traditional banks) to show proof of credit history. Identity is a critical component that enables ROSCAs to scale to become larger savings groups which enables improved credit supply/demand matching and better interest rates for the marketplace.

**WeTrust's third product** is a Trust Network powered Lending and Borrowing platform that connects borrowers and savers and allows for direct loans with minimal fees.

This product is different from existing market solutions due to our ability to leverage the credit identities created previously, the concept of trust inference (social graph), legal contracts and deterrents, and loan guarantees where trusted members can vouch and earn fees for taking on reputation risk and partial responsibility for others' loans. While this concept is in the early stages of development, prior WeTrust products form the foundation that enables a more insightful way to quantify risk and create proper checks/balances that deter against potential fraud, so that lending and borrowing can extend beyond one's immediate social circle in a safe and efficient manner.

**WeTrust's fourth product** is a Mutual Insurance platform which involve smart contracts that evaluate whether or not a set of non-subjective criteria was met (i.e. a drought, or low rainfall) and pay out accordingly. As all criteria for payouts would be public and governed by smart contracts, the process will require minimal fees. However, there are many forms of insurance that do require detailed auditing and reviews. For these, WeTrust plans to create a mechanism that enables a decentralized process flow which incentivizes both policyholders and auditors to arrive at fair outcomes and payouts with significantly reduced friction. Although the insurance platform benefits from the existence of large ROSCAs, participation in ROSCAs will not be required for individuals to join a mutual insurance pool.

## App Token

Trustcoins are a crucial component of the WeTrust platform. The coin is a reward to any actor that *facilitates* trust and is paid by any actor that *uses* the Trust Network. Market forces and Supply and Demand will dictate the amount of "Trustcoin" per transaction.

*There are four essential parties in the WeTrust ecosystem: **General Users, Sponsors, Forepersons, and***



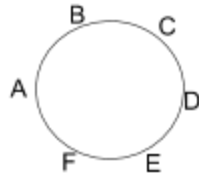
**Referral Partners.** *We want to ensure TrustCoins is used properly to incentivise these actors to behave in a way that fosters growth and integrity on the system. These roles are not mutually exclusive, and one can wear any or all of these hats.*

1. **General Users** use any of our services such as ROSCAs, credit scoring products, borrowing, or insurance services. Users are WeTrust's number one focus, as they determine the success of the platform. They help us understand how people use the product and provide feedback on how to improve it. Users will be able to earn Trustcoin in line with their usage, as one of WeTrust's initiatives to foster platform loyalty.
2. **Sponsors** support the overall development of the platform by participating in bug bounties, programming, and completing other tasks WeTrust will reward with Trustcoin. Future roles may also include Tellers to facilitate on/off-ramp between fiat-crypto exchanges, participating in claims auditing, etc...
3. **Forepersons:** The organizer, evangelist, advocate, and product expert on the ground working with users of the WeTrust Platform. We depend on the Foreperson to educate, recruit, enforce and coordinate groups. In the ROSCA context, forepersons are allowed to set their fee rate for the ROSCAs they organize.
4. **Referral Partners** evangelize the platform and receive Trustcoins from WeTrust for referring users to participate on the platform

*WeTrust plans to generate fees from products such as ROSCAs, Trusted Lending, and Mutual Insurance in order to support development costs. The preliminary ROSCA Fee schedule for Forepersons and WeTrust is as follows:*

- Forepersons set a fee quoted in Trustcoin (equivalent to 0-5% of distributions)
  - Foreperson quotes fee in Trustcoin, their ROSCA members will see the fee as percentage of distribution (how offline ROSCAs are done today)
  - To mitigate fluctuations in Trustcoin price, WeTrust will acquire the Trustcoin fees on the open market for the ROSCA in advance, and will also place the entire WeTrust fee at risk to mitigate any potential decline in Trustcoin value during the Epoch
  - At end of the Epoch, WeTrust distributes the Trustcoin reserved, adjusted for any delinquencies
- WeTrust plans to charge 0% fees for small ROSCA groups of 5 people or less
  - For groups larger than 5 people, a tier-based, fee schedule will be used. Initial fees start at 0.3% and are reduced for a given foreperson's ROSCAs as cumulative transaction volumes increase on the ROSCAs they manage
  - WeTrust is also exploring other fee structures that forepersons can select, such as charging fees on the amount of distribution that is in excess of contributions

## **ROSCA Fee Structure Example**

**Assumptions:**

- 6 participants, \$100/ mo ROSCA
- A is foreperson, and has set a 1% fee for themselves, agreed upon by participants
- Over the course of an epoch,  $\$600 \times 6 = \$3600$  will be distributed
- WeTrust fees:  $0.3\% \text{ in fees} = 0.3\% \times \$3600 = \$10.80$ , distributed to WeTrust in the form of Trustcoins
- Foreperson fees =  $1\% \text{ in fees} = 1\% \times \$3600 = \$36.00$ , distributed by WeTrust to Foreperson in the form of Trustcoins

**Trustcoins allocation:**

Prior to reaching a steady state where platform resources can be supported through fees, a token sale may be utilized to acquire necessary funds to build out the platform. Subsequently, the WeTrust team expects to utilize funds in the following areas:

- **Research.** This includes research in mathematics, game theory, statistical and actuarial models, and computational simulations that will ensure that the proper incentives are in line for all parties.
- **Software Development.** This includes budgets for software development, smart contract development, security reviews and developing a seamless user experience.
- **Business Development:** This includes expenses for building partnerships with NGOs, forming and growing ROSCA communities, and hiring community managers to help evangelize around the world.
- **Marketing:** This includes all expenses related to: Educating the public about our platform, travel and admission expenses to blockchain conventions, sponsoring blockchain events/ conferences/ hackathons, driving users to our platform, developing the WeTrust brand, and relaying our message to ROSCA users.
- **External Costs.** This includes the token sale structure, security audits, tax/ legal advisory, regulatory compliance, bug bounties and other fixed costs (office spaces, telecommuting equipment) associated with technology and development.

## WeTrust Challenges and Solutions

WeTrust offers a novel and innovative product, and faces diverse challenges. WeTrust platform's first product is a ROSCA on the blockchain, and this will help bootstrap the community and social graph. Next, WeTrust's credit scoring algorithm will allow basic ROSCAs to scale and grow/merge with ROSCAs that have common connections/trust circles. As such, a large and growing user base is the foundation for future WeTrust products, such as lending and mutual insurance. **Key challenges to growth include: usability and cryptocurrency volatility, anti-fraud measures, and defensibility of the platform.**

***Addressing usability and cryptocurrency volatility through Stablecoins:*** WeTrust platform currently supports Ethereum as it is the most mature blockchain to implement, but will soon support other coins as well. Stablecoins are crypto-tokens whose value is tied to fiat, which we believe is a requirement for users who do not want to deal with cryptocurrency volatility. Several stablecoins are under development or are in active usage, including [MakerDAI](#), [String Labs Phi](#), and [Tether](#). [Colu](#) and [Waves](#) also are working on projects that enable the support of digital tokens that are linked to fiat value. WeTrust will integrate stablecoins into its platform as it is critical for large scale adoption and is an important step in abstracting blockchain/ cryptocurrency from customers.

***Addressing fraud through formal informal means:*** A critical foundation of security and well-designed incentives are required in any financial ecosystem that intends to deter bad actors. WeTrust will use blockchain technology to weave social reputation, trust networks and personal capital into an efficient and effective incentive system to promote positive behavior and deter bad behavior. Governance tools such as legal contracts, collateral risk, loan guarantees, mediation, and more will be available for each organization to utilize as they see fit. See more information [here](#).

***Addressing defensibility through Open and close source strategy:*** WeTrust operates in an open-source and decentralized economy, where much of the technology stack is public and auditable by the community. In this spirit, advantages developed within businesses and technology will be openly shared with the community. However, in order to ensure sustainability in our ability to continue dedicating resources to improving the platform, we will open-source the smart contract to keep WeTrust products transparent and secure and close-source the frontend to create a barrier to simply forking the project.

## Road Map

Timeline	Features
Feb 2017	<i>Essential ROSCA functions</i>

	<ul style="list-style-type: none"> <li>- create, join a ROSCA</li> <li>- contribute, withdraw funds</li> <li>- bidding logic, safety hatch</li> </ul>
Q2 2017	<i>Intermediate ROSCA functions</i> <ul style="list-style-type: none"> <li>- add support for more tokens</li> <li>- improved UI/ UX</li> <li>- improved dashboarding on group performance</li> <li>- implement fees (for foreperson, referral partners, WeTrust)</li> </ul>
Q4 2017	<i>Advanced ROSCA and Basic Credit Profile</i> <ul style="list-style-type: none"> <li>- built-in legal contracts</li> <li>- enable Account profile details</li> <li>- incentivize tethering off-chain data to account</li> </ul>
Q1 2018	<i>Integrate Stablecoin</i> <ul style="list-style-type: none"> <li>- explore and build partnerships with Stablecoin issuers</li> <li>- enable usage of Dapp without knowledge of crypto currency</li> </ul>
Q1 2018	<i>Credit Score</i> <ul style="list-style-type: none"> <li>- develop and implement algorithm for credit scoring, based on account information, ROSCA participation</li> <li>- users decide whether to keep information private, or share with approval</li> </ul>
Q3 2018	<i>Large scale ROSCAs</i> <ul style="list-style-type: none"> <li>- support merging of ROSCAs composed of weak ties</li> <li>- add features such as co-signing/ guarantees to foster trust</li> <li>- multiple winners per ROSCA round</li> <li>- organization management tools for communications, decision making</li> </ul>
Q1 2019	<i>Direct Borrowing/ Lending platform</i> <ul style="list-style-type: none"> <li>- customized lending/borrowing marketplace</li> <li>- configure and customize safeguard features for lending</li> <li>- build apis and sdks that enable developers to build on our platform</li> </ul>
Q1 2019	<i>Insurance</i> <ul style="list-style-type: none"> <li>- develop initial insurance products</li> <li>- integrate insurance products into ROSCA framework</li> </ul>

## Blockchain Benefits

### Why choose the blockchain as infrastructure?

A blockchain-based financial-social platform reduces the friction (high fees, low liquidity, accounting records, potential fraud from organizers) and automates an existing concept already proven in communities worldwide. We foresee that blockchain technology will impact the financial sectors in the following core areas:

1. **Efficiency and Automation.** Smart contract technology enables end-to-end automation of payments, efficient risk model estimation, and decentralized claims processing. This substantially lowers operating costs.
2. **Greater Access for the Underbanked/Underserved.** A more connected world will enable those in developing markets, low-income businesses, and new product verticals to leapfrog into cutting edge technology. For example, in Kenya, M-PESA[12] has created a simple banking system on feature phones, completely bypassing the need for brick and mortar bank branches.
3. **All-Inclusive Digital Identity.** Digital identities on Blockchains create opportunities for individuals to transact across international borders without the hassles of conflicting governance.
4. **Transparency.** On most blockchains, transparency is a platform-level feature. All data in a smart contract based system is publicly auditable and can be freely analyzed by third parties, while preserving privacy as required.
5. **Experimentation.** With open source code, permission-less usage, wide array of customization options, and ease of accounting, groups of trusted associates can experiment and create unique structures/rules according to their circumstances. Groups with a common cause, ranging from university alumni groups, volunteer groups, veterans associations, social activists, political groups, religious groups, etc... can use a simple app to leverage and engage their respective communities with tangible financial impact.

## **ROSCA projects outside of the blockchain**

Several companies have tried to create ROSCA tools and software, including eMoneyPool, Puddle, Monk, and Savemates. However, these solutions integrate with the traditional banking system, and require the use of bank accounts, which are typically only usable within a single jurisdiction. Some other drawbacks include:

- Most current participants of ROSCAs do not have access to banking services, which are a prerequisite to these tools and software
- Existing software providers prevent savers from earning a return on their deposit. This shortcoming takes away from the spirit of the ROSCA, which thrives on the supply/demand dynamic that benefits both savers and borrowers.
- Smaller markets and jurisdictions suffer from lack of attention and do not benefit from these apps that are being developed.

By building a decentralized application on the blockchain, we are able to eliminate costs associated with transfers to/from bank accounts, and can reach populations who do not have access to bank accounts. The application can be used in any jurisdiction, and ROSCAs can be formed among trusted associates across

borders. This enables the creation of a more accurate social graph and trust inference data that can be used for a safer and rewarding experience for users. Lastly, unlike existing solutions, the WeTrust dApp is decentralized, funds are controlled by the users, and each ROSCA can determine their own rules for distribution, maximum interest rates, and policies according to their local needs and traditions.

## Potential Market Size

To estimate the potential market size for a financial-social platform one needs to take into account the different community-based financial infrastructure in play globally today, and future demands that might arise due to the emergence of WeTrust as an alternative financial solution.

**The global ROSCA** and informal banking industry is responsible for money flows over 10% of GDP in many countries, despite significant handling/transaction costs. An estimated >\$500B flow through ROSCA type groups each year, [as shown in detail below](#).

In addition, social capital powered ROSCAs have potential compete in consumer loans, where the US market represents over \$3.2 Trillion in outstanding consumer credit[13]. Globally, the P2P Lending market is growing rapidly and has a market size of over \$70B/ year (also, [detailed below](#)). Finally, WeTrust plans to deliver insurance services built on the ROSCAs, which can be seen as the foundation for a mutual insurance framework. The insurance industry[14] generated over \$1.1 Trillion in premiums in the United States in 2015.

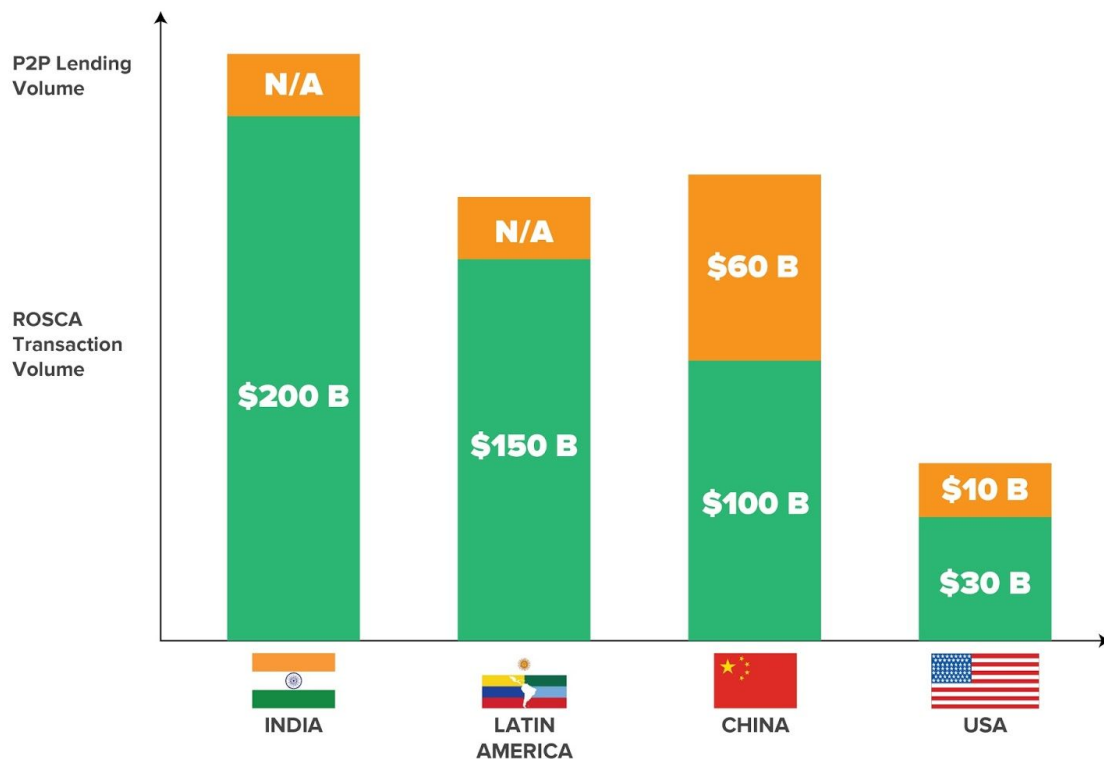


Figure 2: A conservative estimate of the ROSCAs and P2P lending markets size globally.

Figure 2 shows a conservative estimate of the ROSCAs and P2P lending market size in different areas of the world. A detailed account is given below.

**India:** Formal banking institutions reach only ~15% of the population, and over \$200 B is distributed via regulated and unregulated ROSCAs, known as Chit Funds, where over 15,000 are registered entities, with a significantly larger unregulated Chit Fund sector[15]. Fees range from 5-10% of distribution, with thousands employed in the industry[16] and scams costing over \$10B in recent years[17]. P2P lending is still in its infancy with over 30 companies[18] currently offering competing services.

**China:** A vast amount of lending is conducted via informal networks, with tech enabled P2P lending exceeding \$60B/ yr[19] and conservative estimates of overall unregulated lending at over \$2T/ year with at least 5% going through ROSCAs[20].

**Latin America:** ROSCAs are used across Mexico (*cundinas*), Brazil (*pandeiros*), Peru, and Argentina. Estimates of informal bank lending volumes exceed \$150B/ yr[21].

**USA:** while accurate estimates are not available, anecdotal evidence shows 50-80% of recent immigrants from Latin America[22], Asian and West Indies communities participate in some form of informal

lending and ROSCA type arrangements[23]. ROSCAs have transaction volume exceeding \$30 B/ yr and online P2P lending exceeds ~\$10 B / yr[24].

According to the 2015 FDIC National Survey of Unbanked and Underbanked Households,[25] 7.0% of households in the United States were unbanked in 2015. This proportion represents approximately 9.0 million households. An additional 19.9% of U.S. households (24.5 million) were underbanked, meaning that the household had a checking or savings account but also obtained financial products and services outside of the banking system.

In general, there is increasing interest in alternative financial companies in the United States, as evidenced by Lemonade Insurance company in New York City ([lemonade.com](http://lemonade.com)), a P2P insurance company that recently raised \$13m in Aug 2016 and an additional \$34m in Dec 2016[26].

## Technical Aspects

WeTrust is characterized by three key operational pillars: *autonomous, frictionless and decentralized*.

**Autonomous:** Smart contracts run the business logic autonomously, and we will utilize these features for fast, secure and reliable processing of the detailed product processes. This will reduce the friction currently observed due to the numerous fees and operation costs imposed by middlemen, such as financial institutions.

Unlike existing centralized platforms and services, WeTrust's transactions are publicly verifiable, viewable, self-operated, and not subject to the risk of mishandling by organizers. Our system is a finite-state machine. Each transaction (i.e. create a fund, contribute, bid, and disburse...) will transform the system to a defined and predictable state. Our smart contract functions do not produce non-deterministic behaviors.

**Frictionless:** Traditional ROSCA processes have been cumbersome and manual, resulting in high fees, and occasional fraud in the ROSCA industry. The WeTrust platform focuses on delivering good and friendly experiences to our end-users and developers. We design and build an abstraction layer on top of the underlying blockchain so that developers and customers do not even know they are running on decentralized servers and blockchain technology. Furthermore, we introduce SDK's in different programming languages to help users integrate with our platform, create and manage funds easily. Here is an example of how one could create a ROSCA fund in JavaScript:

```
var ROSCA = require('ROSCA');
var options = {
  name: 'example1',
  startDate: 2016-10-10,
  endDate: 2016-11-10
```



```

};
var fund = ROSCA.initFund(options);
fund.addUser(ROSCA.findUser('#abc')); // User #abc is a member of ROSCA platform
fund.addForeperson(ROSCA.findUser('#xyz')); // User #xyz is a member of ROSCA platform
fund.start();

```

**Decentralized:** Traditional online businesses with centralized structures are subject to hacking and onerous overhead costs. Decentralized fund management, auction arbitration, contribution tracking, and distribution of funds enables elimination of reliance on payment processors, reduces costs associated with fees and bureaucracy, and protects against fraud. Building on top of an Ethereum platform, our entities are based on ‘Smart Contract’. The detailed architecture of the platform is further described in the diagram below.

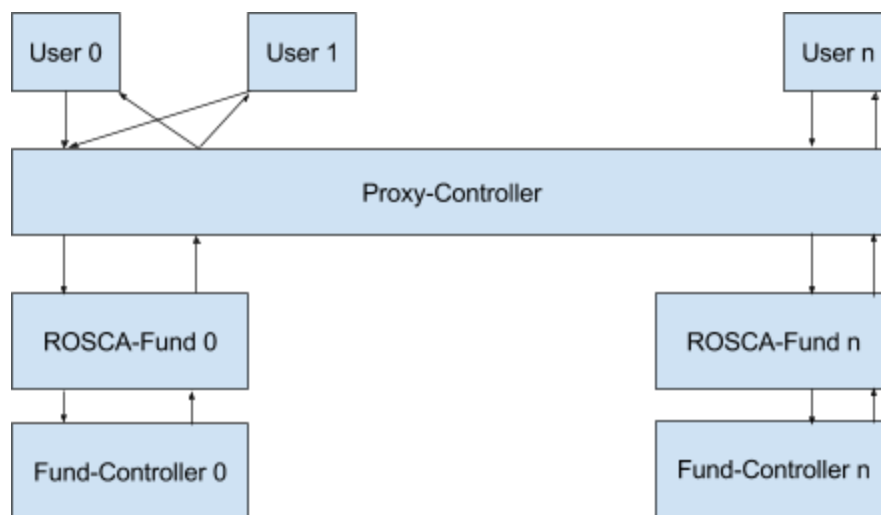


Figure 3: ROSCA dAap Architecture

**User:** A smart contract that stores the user’s information and history of ROSCA the user participates in. These records will help determine the credit score of the user and/or match him/her with available public ROSCA funds. **Proxy-Controller:** A smart contract to manage users of the ROSCA platform and their interactions with the Funds. This contract mostly contains authentication and authorization logic as well as permissions management. **ROSCA-Fund:** A smart contract that store all the states of a ROSCA fund (e.g., Foreperson, members, term, conditions, status, contributions) **Fund-Controller:** A smart contract that contains business logic to operate the fund (e.g., manage the contribution, bidding and disbursement process for each ROSCA-Fund)

## Security

Security is treated with the highest priority at WeTrust. In order to ensure that underlying smart contracts that move funds are secure and working as intended, the WeTrust team commits to subjecting its platform to a comprehensive security audit and bounty programs prior to launching the platform to the public. We will hire the most reputable security experts to conduct security audits prior to our public launch, and release all results of the audit and fix any flaws that are identified.

In addition, WeTrust will build a dedicated server to monitor all transactions on our platform anonymously. This server will detect and prevent suspect behaviors and fraudulent activities. Alert notifications will be automatically set up and will alert developers around the world to fix any known incidents.

### **Sybil Attack Prevention**

Because WeTrust is a community-based platform that relies on its users' performance in products such as ROSCAs and P2P lending to generate credit scores, it is important for us to preserve the integrity of the scores by thwarting Sybil Attacks from automatically created fraudulent accounts. It would be detrimental to our platform if one person created fake profiles and ROSCAs to generate a legitimate credit score.

WeTrust offers some potential solutions:

1. Require users to provide identity information from off-blockchain sources such as: Facebook, Twitter, or Cell Phone (activated through two-factor authentication).
2. For each account, we will allow a limited number of “free” ROSCA funds. Any additional ROSCAs will require a small fee. Further, ROSCAs will be required to be of a minimum size. This would require individuals with malicious intent to actually contribute into a fund and pay the service fees.

## **The first dApp - ROSCA:**

The WeTrust ROSCA is powered by smart contracts and blockchain technology. This savings and credit platform allows users to lend and borrow from each other at self-determined interest rates with minimal friction. The immediate purposes that the WeTrust ROSCA will serve:

- *As an affordable path for the two billion “unbanked” to obtain and track savings & credit*
- *Create a competitive alternative asset class for savers*
- *Facilitate group savings as a more effective way to reach individual saving goals[27]*

This product will serve multiple audiences. The main audiences are a) the unbanked who need access to credit and b) those who do have access to formal financial institutions, but desire alternative solutions to saving and credit.

### ***Why start with ROSCA as WeTrust’s first dApp?***

Marketplaces can succeed if there is a balance between supply and demand and critical mass is required from day one if users are to find usefulness in the WeTrust Platform. This begs the inevitable “chicken and egg problem” in which a strong network is essential before users join and vice versa. To overcome

this problem, we believe a ROSCA product is the ideal vanguard dApp as it facilitates network effects and leverages existing networks/ behavior norms.

### ***Product design: high level summary***

When users first visit the ROSCA dApp, they would be prompted to create an account. After this they can create a ROSCA in which they are the foreperson and invite participants via email, or join a ROSCA they were invited to. Invitees are also required to create an account before they can join a ROSCA and become active participants. It should be noted that both parties (forepersons and participants), must access the dApp using a compatible browser, which is connected to funded Ethereum accounts.

Once a ROSCA has been created, and participants have joined, the foreperson can deploy the ROSCA smart contract onto the blockchain. This action solidifies the details of the ROSCA, and no further edits can be made after this point. Once the smart contract has been deployed, the foreperson can begin the ROSCA on or after the predefined start date.

Both participants and foreperson participate in the ROSCA by submitting transactions to the contract. These transactions take the form of starting the round (foreperson only), contributions, bids and withdrawals. Each transaction must originate from the address with which the user joined or created the ROSCA. ROSCA participants are able to see a complete list of these transactions, up to and after the end of the ROSCA epoch.

### ***Deposits and Withdrawals***

Users will deposit from their own wallet to the unique address of the ROSCA smart contract during each round. Any withdrawals are initiated with a transaction, and sent to the address which originated said transaction.

## **ROSCA dApp walkthrough**

The following is a walkthrough of the ROSCA MVP as of whitepaper publication date, and will be updated in the future. This represents a proof of concept, and the UI/ UX will undergo continuous improvement based on community feedback and input.

The current ROSCA product will be accessible through the web. It will be basic and barebone, so it will not require intensive hardware, and thus will be accessible to anybody with a working PC. Upon visiting the site, users will be presented with an explanation about what a ROSCA is, and how the blockchain brings advantages to traditional ROSCAs. Once logged in, users are presented with their dashboard, which consists of three lists of ROSCAs: ROSCAs they have created; ROSCAs they have joined as a participant; and ROSCAs they have been invited to.

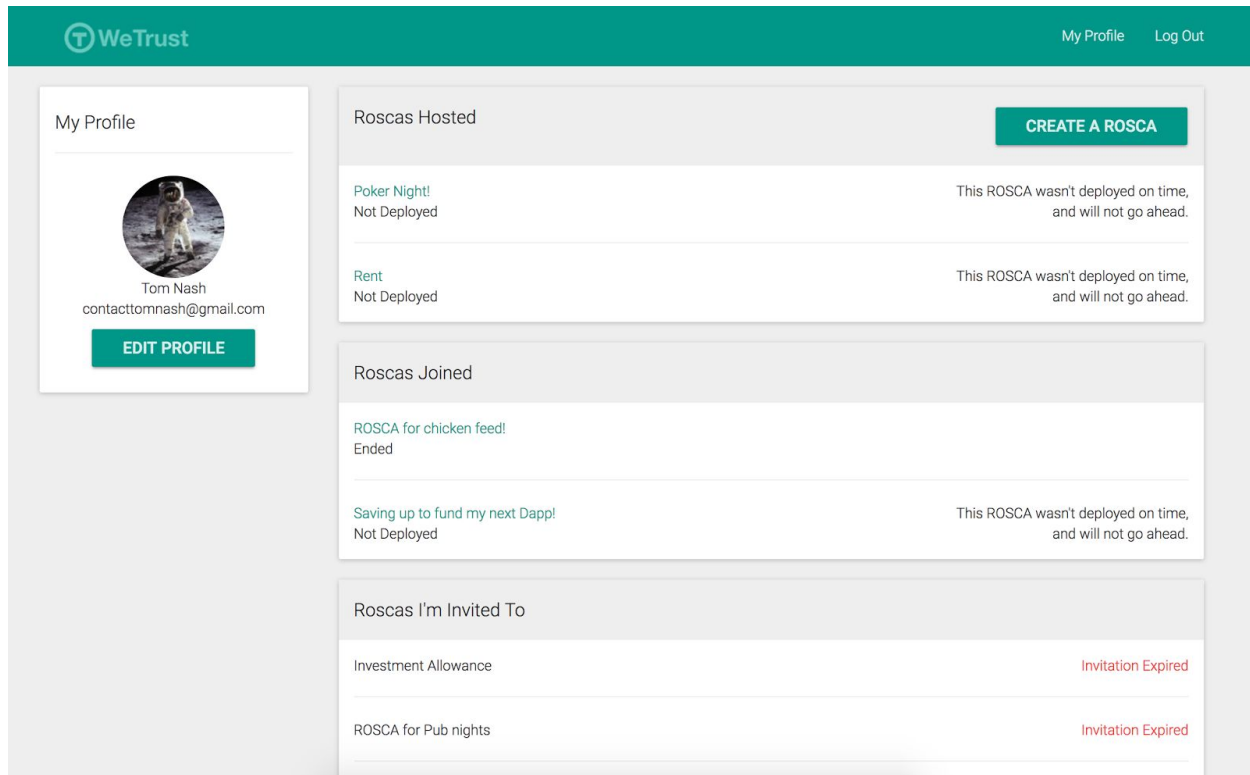



Figure 4: ROSCA Dashboard

**‘Create a ROSCA’:** If you want to organize and create a ROSCA for you and your friends, start here. We will call the initiator the ‘foreperson’. Creating a new ROSCA allows the foreperson to specify the terms of the ROSCA, detailed as follows:

1. **ROSCA Name:** This is a name given to identify the ROSCA, for ease of use.
2. **Number of Participants:** The number of other participants that the foreperson is going to invite. After entering this number, fields appear where the user can enter the email addresses of the other participants.
3. **Payment Frequency:** The frequency of the payments made by all participants. In the future we plan to open this up to be more flexible. Each round lasts for the amount of time specified here (e.g. a weekly payment frequency would result in week-long rounds).
4. **Payment Amount:** The amount in Ether which all participants must contribute each round. The MVP supports only Ether, WeTrust is planning to enable use of other tokens in the future
5. **Start Date:** The date on and after which the ROSCA can be started. It should be noted the ROSCA must be deployed at least three full days before this date, to protect against blockchain timestamp discrepancies.

Enter ROSCA Name

Savings for Upcoming Gigs 

---

Enter Number of Other Participants

2

---

myfriend@gmail.com

---

Please enter the user's email address

---

Payment Frequency:

☐ Daily

☒ Weekly

☐ Monthly

Enter Payment Amount (ETH)

5

---

Enter Start Date (mm/dd/yyyy)

01/03/2017

---

BACK TO MY PROFILE

CREATE

Figure 5: ROSCA Creation Form.

After clicking ‘Create’, the user is prompted to select one of their connected Ethereum accounts with which they will participate in the ROSCA.

## Account Select



Please note, upon selecting an address you will bind that address to your participation in this ROSCA.

You will only be permitted to contribute, bid and withdraw from the selected address.

If you can't see the correct address here, try switching accounts in MetaMask, or authorising them in Mist.

0X388686DD3A10B6074942D5C574DFBC9C0E98FF1E

0XFB9F0320BAE28BD4ED9139CA8AD36FE2D65AF38D

0X33F899C4F379193826E6E8196BCB43F0182289F0

0X43F88F209589B1B90427CC2D33F5F52B65103ECC

0X935924207C36D85EDBC63D5BA702BC7BE013004D

CANCEL

Figure 6: Account Select

**Viewing a ROSCA:** Clicking on the name of a ROSCA that a user is either hosting or a participant in will show the detailed view of that ROSCA.

**Joining a ROSCA:** Clicking on a ROSCA that you have been invited to will bring you to a similar view to Figure 7 below. Users will be presented with an option to join the ROSCA, and prompted to select an account with which to participate, similar to Figure 6.

This contract is not yet on the blockchain. You can deploy it whenever you are happy with the details, but once deployed you will not be able to update any details or add/remove participants. You must deploy this ROSCA at the latest by 2017-2-27

DEPLOY

Name: Savings for Upcoming Gigs


Not Deployed


Foreperson: contacttomnash@gmail.com

Invites Sent:

- shine@wetrust.io

Participants:

contacttomnash@gmail.com  
[Copy ETH Address](#)

tom@wetrust.io  
[Copy ETH Address](#)

Payment: 5 ETH, weekly

Start Date: 2017-03-01

EDIT THIS ROSCA


BACK TO MY ROSCAS

Figure 7: ROSCA View

1. **‘Deploy’**: Deploys the ROSCA to the blockchain. This action is only available to the foreperson, and will prompt a transaction which creates the ROSCA smart contract.
2. **‘Edit this ROSCA’**: Allows the foreperson to change any details of the ROSCA, including inviting extra users and removing existing participants. This option is only available prior to the user deploying the ROSCA.

After deploying the ROSCA and reaching the defined start date, the foreperson is given an extra option **‘Start ROSCA’** which will begin the first round of the ROSCA.


After the ROSCA has been deployed and at least one round has been started, another view is presented which aims to summarise as much necessary information as possible.




My Profile Log Out

You must start each round of this ROSCA manually. The next round can be started after 2017-3-17.

Name: Savings for Upcoming Gigs

Contract: `0xcd782e0bf3b714bb4db22e32a5d7c65c55d85388`  
 This contract has been verified by WeTrust


Foreperson: `contacttomnash@gmail.com`   
 Copy ETH Address


Participants: `contacttomnash@gmail.com`   
 Copy ETH Address  
`tom@wetrust.io`   
 Copy ETH Address


Contribution: 5 ETH, weekly

Current Round: 1

Round Began: 2017-3-10

Participants Up to Date: 

Lowest Bid: `contacttomnash@gmail.com`   
 9 ETH

Participants Not Up to Date: 

Round Due to End: 2017-3-17

CONTRIBUTE

WITHDRAW

BID

NEXT ROUND

Figure 8: Active ROSCA View

1. **‘Contract’**: The address of the deployed ROSCA contract. This is a link to the relevant contract page on Etherscan.io.
2. **‘Participants Up to Date’**: A list of participants who have contributed their share to the ROSCA to date.
3. **‘Lowest Bid’**: The user who currently holds the lowest bid, and the amount of their bid.
4. **‘Participants Not Up to Date’**: A list of participants who have not contributed their share to the ROSCA to date.
5. **‘Contribute’**: Opens a popup, which details how much the user has left to contribute this round, and allows the user to enter an amount to contribute. Multiple contributions can be made per round.
6. **‘Withdraw’**: Allows the user to withdraw any positive balance they have in the contract. Positive balance can come from many things, including but not limited to: over-contributing, winning a round and receiving a round discount.
7. **‘Bid’**: Opens a popup, which details the current lowest bid (if any), how much the user is allowed to bid at the current time, and which allows the user to enter an amount to bid. Multiple bids can be made per round.
8. **‘Next Round’**: Foreperson only. Allows the foreperson to advance the ROSCA to the next round. Only visible when the next round is ready to start.



As well as the summary of the current round at the top of the page, each user is able to see the ROSCA history, which details most events, including contributions, bids, withdrawals, and who won the ROSCA round.

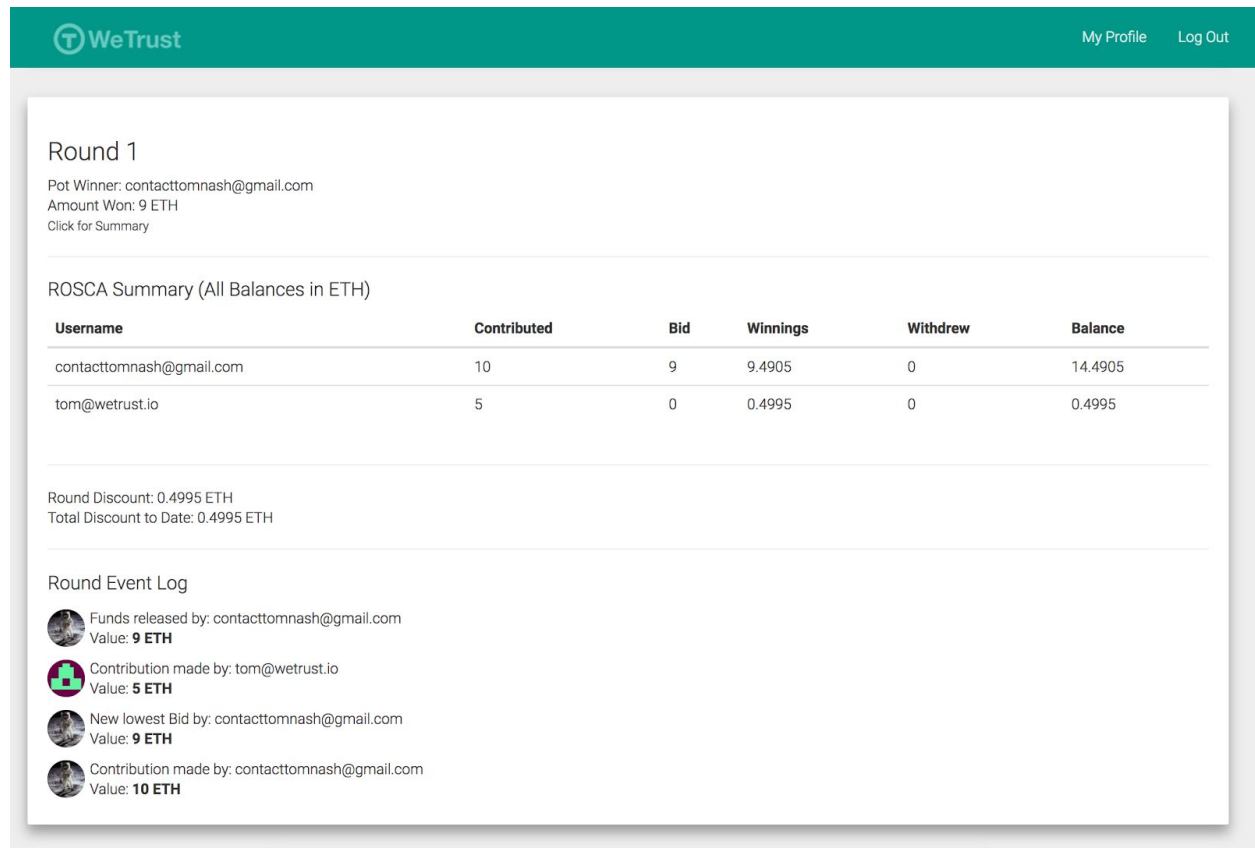


Figure 9: ROSCA History

## Team

*Core members have deep expertise in entrepreneurship, engineering, business development, finance, compliance, and marketing.*

### Core Members

[George Li](#) | co-founder, Product

George is an ex-Gogler who previously co-founded CottonBrew, a Stanford StartX computer vision and ecommerce company. Prior, he held roles in Corporate Strategy and Infrastructure at Google, and was a consultant at McKinsey. He holds a M.S in Management Science Engineering from Stanford and B.S. in Electrical and Computer Engineering from Rutgers University.

[Patrick Long, CPA](#) | co-founder, Strategy & Operations

Patrick previously worked in Finance at RMS, and Ernst and Young in Assurance Services where he earned his CPA. In his spare time, he manages a crypto-currency fund raised from friends and family and is always scouting for new opportunities. He holds a B.A. in Economics from UC Berkeley.

**[Ron Merom](#)** | *co-founder, CTO*

Ron previously worked at Google as a Software Engineer, where he specialized in voice recognition, emerging markets and social interactions. Ron is passionate about blockchain technology and wants to use his technical expertise to make a social impact on the lives of those less fortunate. He holds a M.Sc. in Computer Science from the Weizmann Institute of Science and a B.Sc. in Computer Science and Environmental Science from The Hebrew University.

**An Zheng** | *Principal Engineer*

An previously worked at Sandora as a Senior Software Engineer. An holds a M.S. and B.S. in Systems Engineering from a highly ranked, world renowned university.

**[Tom Nash](#)** | *Front-end Developer*

Tom previously worked at Hydrant as a Web Developer, but recently has taken a sabbatical to travel the world and work on freelancing. He is a quick learner, an ambitious individual who is passionate about blockchain, capable of taking on any task thrown at him, and wants to create social impact through technology. He holds a B.S. in Computer Science from Lancaster University.

**Shine Lee** | *Smart Contract Developer*

Shine is a entrepreneur at heart. After graduating from UC Davis about a year ago, he created his own Ethereum mining farm which generates enough passive income for him to be self-employed. He joins WeTrust as a developer working on Solidity smart contracts and brings his cryptocurrency domain experience. He holds a B.S. in Computer Science from UC Davis.

**[Mivsam Yekutieli, Ph.D](#)** | *Research and Global Partnerships Manager*

Mivsam has Ph.D. in Quantum Chemistry from the Otago University in New Zealand and did some post-doc work in renewable energy at Tel Aviv University. In the last 20 years, teaching and volunteering has always been a part of Mivsam's life and she cares deeply about the social impact she has as a person.

**Leon Di** | *Product Marketing Manager*

Leon Di has 9 years of experience in Silicon Valley technology firms in Hardware Engineering and Technology Marketing roles. As a Product Manager, he has managed accounts with Intel, Apple, and other major tech companies. He holds MS and BS degrees in Electrical Engineering.

**[Maggie Deng](#)** | *Head of Business Development*

Maggie is a Statistical Programmer (8 years at Amgen and Novartis) with a love for entrepreneurship. While working full time at Amgen, she founded a Precious Metals Trading company which provided wholesale services for banks in China. Maggie holds a B.A. in Finance and M.S. in Economics from the State University of New York at Buffalo.

**[Justin Zheng](#)** | *Marketing Associate*

Justin is a marketing guru. He was one of the marketing masterminds behind FirstBlood.io's record breaking \$6 million crowdfunding campaign that was completed in less than 15 minutes. We welcome him as part of our marketing machine to bring WeTrust known to the greater public.

[Jessica Aharonov](#) | *Graphic Designer*

Jessica is a graphic designer with extensive experience in branding, editorial design, and motion graphics. She created Arodesign Studio, an international graphic design agency that has worked on projects spanning the globe, including United States, Singapore, UK and New Zealand.

## Advisors

[Benedict Chan](#) | *Blockchain Advisor*

Benedict is the Platform Lead at BitGo and has vast experience in creating blockchain and wallet platforms. He created Ether.Li - first multi-signature web wallet. Ben advises the team on smart contracts, wallets, and security matters. He holds a B.S. in Computer Science from University of New South Wales, Australia.

[Fennie Wang](#) | *Legal Advisor*

Fennie works at MONI Limited as General Counsel and was previously an associate at Wilmer Hale. She is passionate about microfinance and tools that address financial inclusion. She holds a B.S. in Business Administration and Legal Studies from UC Berkeley and a J.D. from Columbia University.

[Emin Gün Sirer](#) | *Security Advisor*

Emin Gun is an Associate Professor in Cornell whose research spans operating systems, networking and distributed systems. He is an outspoken member of the hacker community ([@el33th4xor](#)), runs a technology blog called [Hacking Distributed](#) that questions current practices, and is a co-director at [IC3](#), The Initiative for Crypto-currencies and Contracts. He holds a B.S.E. in Computer Science from Princeton University and a Ph.D. in Computer Science from the University of Washington.

[Michael Hexner](#) | *Business Strategy Advisor*

Michael is a seasoned entrepreneur and investor with over 40+ years of experience running companies in both the retail and technology space (Wheel Works, SmartPillars, Fundamental Capital, etc.). He is an expert in creating businesses from scratch by identifying real world problems and creating a crystal clear vision to lead his organization. He holds a B.S. in Political Theory from Williams College and a M.S. in Conflict and Dispute Resolution from Creighton University.

[Daniel Cawrey](#) | *Marketing Advisor*

Daniel previously worked at Velocity as Chief Communications Officer and ZapChain as Chief Operating Officer. He brings marketing and strategy expertise from years of experience running crypto-currency projects. He holds a B.S. in Information Science from Central Michigan University.

## Glossary

- **Rotating Credit and Savings Association (ROSCA):** A group of individuals who act as an alternative financing institution through regular contributions and withdrawals from a common fund. The name Rotating Credit and Savings Association or ROSCA, comes from the type of

transactions that occur in these associations in which members contribute on a regular basis (e.g., once a month) and are allowed a chance at the pot each contribution period.

- **Epoch:** A full cycle of contributions, where the Epoch timeframe is equal to the # of participants \* regular contribution interval. For example, if there are 6 members, and the contribution is weekly, than one Epoch is equal to 6 weeks. Typically a member can only win the pot once in one Epoch.
- **Foreperson:** The Foreperson is the individual who initiates the ‘ROSCA Fund’. It is this person who will input the fund’s specifications, input contact information, and be responsible for educating participants about the process.
- **Foreperson Fee:** This is the agreed upon rate that the group wants to pay the Foreperson for organizing the group.
- **Platform Fee:** This is the fee that will be collected by the platform to cover operational costs and development costs, with excess fees going to grants, scholarships, and other non-profit pursuits.

## Appendix

### ROSCAs Around the World

ROSCAs have existed for many years now. In Japan, the earliest records of ROSCA - with contributions in money - date back as far as 1275[28], in Korea they may even go back to the 9th century[29].

ROSCAs are currently popular in regions where there are a lack of sophisticated investment options and where there is difficulty in accessing loans through formal institutions -- typically because credit scores either do not exist or do not play a meaningful role in an individual’s financial health. In India and China for example, it is common for alumni from a common university, colleagues from the same company, or simply friends from the same city to create informal ROSCAs as a way to save and invest. Research indicates that informal ROSCAs have similar or lower default rates for loans when compared to formal institutions, and offer competitive returns on investment for savers. ROSCAs are increasingly also being used to address the continuing phenomenon of low interest rates and uncertain strength of centralized institutions.

ROSCAs exist in various incarnations around the world. Here are some examples:

- As “*Chit Funds*”: In **India**, each State has a regulatory agency for “*Chit Funds*” that are responsible for setting rules such as: maximum fees, capital reserve requirements, fund registration, insurance/ bonded requirements, etc. [Kerala State Financial Enterprise](#) is a government-owned ROSCA fund of Kerala State and is one of the largest funds in India. They employ over 6,000 employees and in fiscal 2015, have substantial operational costs. Currently, financial enterprises in India are large and sophisticated; however, WeTrust believes our technology can reduce costs, yet still preserve transparency, compliance with regulators, and safety. [5,10]
- As “*Tanda*”: In Latin America and **United States**, particularly amongst the migrant worker community from Latin America, workers are employing this group saving concept to help save for their retirement. According to Jeffrey Cheung, President and CEO of OneCalifornia Bank,

“[*Tandas*] really does hit on the fundamental of lending. Is the person you are lending money to someone you can trust? Someone who is honorable, someone who you think will pay you back?”[30] “[*Tandas*] are a worldwide phenomenon for poor people whose access to capital is limited. [It] easiest way to do it is to pool your resources,” said Carlos Vélez-Ibáñez, Anthropologist at Arizona State University[31].

- As “*Hui*” or “*Shadow Banks*”: Earliest mention of Hui is found in the Han Dynasty[1]. Since the Tang Dynasty in **China**, during the spread of Buddhism, the Chit fund tradition also spread from India. Currently, there is a booming “shadow banking” sector in which over \$14.5 trillion yuan (\$2.2 trillion dollars) are managed informally. This equates to roughly a quarter of all total loans originating in China and is worrying regulators because these loans are often highly leveraged and borrowers are typically less credit-worthy. Again, similar to the case in India, China is another huge market that will benefit from the transparency, auditability and safety the Blockchain can provide[32,33].

## References

- [1] Simon, W. K. “Civil Society in China: The Legal Framework from Ancient Times to the “New Reform Era””, *Oxford University Press* (2013), p 62.
- [2] Harari, Y. N. “Sapiens: A Brief History of Humankind.” *Harper: New York* (2015).
- [3] Amadeo, K. “AIG Bailout: Cost, Timeline, Bonuses, Causes, Effects”. *The Balance* (2016).
- [4] Mateescu, A. “Peer to Peer Lending” *Data&Society* (2015).
- [5] TwoSolitudes “The Joys of Pretending to Help the Poor: The Kiva Story”. *Dailykos* (2014).
- [6] “Rotating Credit And Savings Association (ROSCA).” Investopedia.
- [7] Bouman, F.A.J., “ROSCA: On the Origin of the Species” *Savings and Development* (1995) **19**, 117-148.
- [8] IFMR LEAD “Chit Funds: Financial Inclusion Tool in India” Video: <https://www.youtube.com/watch?v=SG9BwGmQyRs> (2015).
- [9] Pareto efficiency, also known as “Pareto optimality,” is an economic state where resources are allocated in the most efficient manner, and it is obtained when a distribution strategy exists where one party's situation cannot be improved without making another party's situation worse. Pareto efficiency does not imply equality or fairness. (Investopedia)
- [10] The Kerala State Financial Enterprises Limited, Annual Report (2015).
- [11] Cohan, P. “SoFi New Take on \$1 Trillion Student Loan Market”. *Forbes* (2012).
- [12] Runde, D. “M-Pesa And The Rise Of The Global Mobile Money Market”. *Forbes* (2015).
- [13] LendingClub Corporation, S-1 Registration Statement. United States Securities and Exchange Commission (2014). See here: <http://www.nasdaq.com/markets/ipos/filing.ashx?filingid=9727645>
- [14] Industry Overview. Insurance Information Institute (2015).
- [15] Kashyap, K. “Disruption of Chit Funds and the Role of the India Stack”. *Productnation* (2017).
- [16] Kapoor, M., Schoar, A., Roa, P., and Buteau, S. “Chit Funds as an Innovative Access to Finance for Low-Income Households” *IFMR Research*.
- [17] “Chit fund scams: Rs 80,000 crore and counting”. *Times of India* (2016).
- [18] Antony, A. “India’s P2P Lenders Push Back on Proposed Central Bank Rules”. *Bloomberg* (2016).

- [19] Chorzempa, M. “P2P Series Part 2: Regulating China’s Plethora of P2P Players”. *Peterson Institute for International Economics* (2016).
- [20] Elliot, D., Kroeber, A., and Qia, Y. “Shadow Banking in China: Primer” *Economic Studies at Brookings* (2015).
- [21] To estimate this value we compared the summed GDP in the following Latin America countries: Brazil (\$2.2T), Mexico (\$1.3T), Argentina (\$0.6T), Chile (\$0.3T), Columbia (\$0.4T), and Venezuela (\$0.4T) (total \$5.2T), to India’s GDP (\$1.9T). Taking into account the conservative evaluation of the ROSCA market in India (\$200B) and based on anecdotal figures on participation rate and shadow banking, Latin America market size is estimated at 3% of GDP (\$150B) vs 10-25% for India (\$200-500B). Anecdotal evidence on popularity of Tandas and Cundinas: Vélez-Ibáñez, C. “An Impossible Living in a Transborder World: Culture, Confianza, and Economy of Mexican-Origin Populations”. *University of Arizona Press* (2010).
- [22] Meraji, S. H. “Lending Circles Help Latinas Pay Bills And Invest”. *NPR* (2014).
- [23] Hevener, C. C. “Alternative Financial Vehicles: Rotating Savings and Credit Associations (ROSCAs)”. *Discussion Papers, Federal Reserve Bank of Philadelphia* (2006).
- [24] Rudegeair, P. “LendingClub to Cut 12% of Its Workforce, as Loan Volumes Fall”. *The Wall Street Journal* (2016).
- [25] “2015 FDIC National Survey of Unbanked and Underbanked Households”. *Federal Deposit Insurance Corporation* (2015).
- [26] Lemonade Overview on Crunchbase. See here:  
<https://www.crunchbase.com/organization/lemonade#/entity>
- [27] Reyes, B., Lopex, E., Phillips, S., & Schroeder, K. “Building Credit for the Unbanked: Social Lending as a Tool for Credit Improvement”. César E. Chávez Institute: San Francisco State University (2013).
- [28] Izumida, Y. “The Kou in Japan: A Precursor of Modern Finance”. In Adams and Fitchett (eds), *Informal Finance in Low-Income Countries*. Boulder: Westview Press (1992), 165-180.
- [29] Kennedy, G. F. “The Korean Kye: Maintaining Human Scale in a Modernizing Society”. *Korean Studies* (1977) **1**, 197-222.
- [30] Gaynor, T. “U.S. migrant money pools thrive in the recession”. *Reuters* (2009).
- [31] Vélez-Ibáñez, C. (2010). “An Impossible Living in a Transborder World: Culture, Confianza, and Economy of Mexican-Origin Populations”. *University of Arizona Press* (2010).
- [32] Boesler, M. “Should we be worried about China’s \$2.2-trillion shadow banking system?”. *Business Insider* (2012).
- [33] Forney, M. “China's Shadow Banks”. *Free China Movement* (2004).