ELIX

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Abstract

Due to its trustless nature, blockchain technology will come to dominate many interconnected systems as its rate of adoption grows. When cryptocurrencies first became available to the public, initial methods of mining blocks used tremendous amounts of hashing power. However, Elixir proposes and implements a new mining system based on proof of time and batch creation with genesis transfers.

Elixir aims to provide a lending, payments, and crowdfunding platform that will allow the mainstream and non-cryptocurrency-adept user to utilize blockchain technology and easily take control of their financial assets. In the pages below, the mining system which Elixir is built on will be explained in detail, as well as the initial market that Elixir intends to pursue to introduce cryptocurrencies to the mainstream and provide real world use-cases of this new blockchain technology.

Summary

Elixir is an Ethereum-based token, that will allow users to make payments, create/request loans, and crowdfund projects using our platform and Ethereum's smart contract technology. Elixir is superior to traditional payments, lending, and crowdfunding systems due to its trustless and immutable nature. Unlike non-blockchain solutions, Elixir is built on the decentralized Ethereum network. Blockchain implementations prevent any entity from changing users' financial information, eliminating the need for a user to trust an unknown entity with their personal assets.

Our business plan contains three parts:

1. Build a payment ledger as a foundation for our platform.
2. Build a crowdfunding platform to bring more clarity and transparency to the world of blockchain projects.
3. Apply our innovative technologies in the peer to peer lending space.

To reach as large of an audience as possible and introduce the need for blockchain technology to the general public, the Elix platform will be provided in the form of a mobile application. This mobile application will be run and maintained by ELIX, LLC; however, because Elixir is built upon the Ethereum network, users may call upon Elixir's smart contract functionalities without using the mobile application. Further information on each of these platforms is provided below.

Lending Platform

The ELIX lending service will provide a true P2P lending experience, without the need of a middle man. Unlike other lending services that claim to utilize blockchain technology to provide a lending experience, the ELIX lending platform requires no escrow service or membership token. These loans include an incentive to encourage borrowers to pay back their loans on time, and for lenders to provide these loans to borrowers. Both the borrower AND lender are

rewarded for their successful loan participation. In addition to parameters like amount and duration, loans will also include interest, whether to generate rewards upon the loan's completion, and an optional message to describe the reason for the loan. Every loan transaction, whether it has been approved or canceled, will be shown in each user's ledger in order to help them keep track of their financial activity. A future global lending platform is planned which will allow users to participate in worldwide lending, and will incorporate the requirement of providing collateral to ensure that loans are paid back.

Crowdfunding Platform

With the Elix crowdfunding platform, we developed our smart contracts in mind to fulfill every crowdfunding project possible and ensure that we can provide the complete set of tools a group or person would need to leverage crowdfunding to create a business or idea. All users will have the ability to set up crowdfunding projects on the Elix platform; however, to ensure that the project proposals remain of the highest quality, we will require that each proposal be verified by ourselves. This platform's functionality and features will also be offered directly within the Elix mobile application. The platform will run using the Elixir token to help keep our ecosystem unified and simple to use. To help provide revenue for ELIX, LLC, the crowdfunding campaigns that are created within the app will be "hosted" by ELIX, LLC, which will provide us with a small cut of the amount that has been crowdfunded.

Payments Ledger

The payments ledger aspect of the mobile application aims to provide users with an incredibly simple user interface - and experience - to keep track of the payments they have made and recent financial activity. Elixir and Ethereum will be the first currencies shown in the payment ledger, but the ledger can easily be expanded to show other currencies and tokens in the future. This will allow users to make the Elix application their go-to method for making payments and tracking their financial activity and digital assets.

Users can send "quick payments" to their contacts from within the application as well, without having to go through the process of typing in that user's wallet address each time they wish to make a transaction.

Elixir Token

Every platform within the Elix mobile application and future web application will run initially on the Elixir token. Unlike other platforms which simply have a token for the sake of pre-mines and ICOs, the Elixir token's value is linked directly with its ability to provide a means of payment and financial value. We have plans to include fiat currency integration to allow users to quickly, and easily, exchange their tokens for fiat currency. This requires additional legal work, and we will keep the community updated in this area.

Purpose

Ethereum smart contracts are revolutionizing the way information is distributed across the world. The Ethereum blockchain can include these contracts, allowing new tokens and services to be created for all manner of applications. The financial industry is incredibly large and centralized, and has often been regarded as an unfriendly and profiteering market that does not have the best interest of its clients in mind. With the creation and mass adoption of blockchain technology, it is now possible to move towards a decentralized and more trustworthy system.

The primary focus of the Elix platform is ease-of-use: to make the idea of blockchain technology and interacting with cryptocurrencies become something simple for a person who does not yet understand how this technology works. One of our goals is to make cryptocurrencies feel exactly like sending typical payments to people, but with the benefits of a trustless, immutable ledger to keep track of a user's transactions. Each aspect of the application will be thoroughly tested before the launch of our MVP, and may go through significant changes many times in order to ensure that each functionality provides an intuitive experience. In order to bring cryptocurrencies to the masses, it is vital to build a streamlined, intuitive interface.

Security

Security has increasingly become an issue in the financial sector. Just recently, a security breach in the company Equifax affected the personal data of an estimated 145.5 million American customers.[1] Having sensitive financial data on a central server, especially data used to authenticate financial transactions, is not ideal. Another primary issue with credit cards is the linking of personal data like social security numbers and names to financial history. Ethereum provides a way around this by using addresses to make transactions. This also increases user privacy. Fraud is also easier to combat with decentralized systems, since there is no centralized authority required to execute transactions.

In order to ensure the highest security for every user within the mobile application, users will be provided with a seed phrase upon downloading the mobile application, and asked to safely secure that seed phrase. Users will be prompted to secure their application with a pin, and will be required to enter this pin any time they wish to submit a transaction to the blockchain.

Before publishing our smart contracts to the Ethereum blockchain, ELIX, LLC will ensure that each smart contract is audited by a third-party security expert and that our systems are thoroughly checked and protected against any kind of external attacks or penetrations. Our users' privacy and security are our top priorities at all times.

[1] Holodny, Elena. "Equifax says 2.5 million more people might have been affected by the hack than previously thought." *Businessinsider.com*, Business Insider, 2 Oct. 2017, www.businessinsider.com/equifax-hack-millions-more-affected-2017-10.

Mining

The method used to mine Elixir is unique and unlike any other cryptocurrency. Elixir uses a method of mining called “proof-of-time”. Proof-of-time in Elixir is used when a genesis miner wishes to mine a batch from their genesis address pair. In order to mine, they send a fractional amount of Elixor (described below) from their parent address to their child address. The number of tokens they received from the batch is correlated to the amount of time since the smart contracts were published to the Ethereum blockchain. This number grows linearly with time and begins at 1250 token (from the moment the contracts were published), until it reaches a size of 5000, which is attained after a length of 10 years. The method of mining requires no proof of work, and is dependent entirely on when a miner decides to mine his/her batches.

Genesis

At the creation of Elixir, users were asked to provide a parent and child Ethereum addresses, which were then saved in the smart contract and published onto the blockchain. These address pairs are referred to as the Elixir Genesis Addresses. Each parent address provided was given 1 Elixor. Elixir can be mined by transferring any amount of Elixor (the base layer of ELIX) from a child to parent genesis address. There are three types of addresses that exist in EXOR, the base layer of ELIX: parent addresses, child addresses, and normal Ethereum addresses. Each parent address has an associated child address. Each child address begins with one unit of currency. Every other type of address begins with zero balance. When the owner of a parent-child pair wishes to generate currency, they move a nonzero amount of currency into the parent from its child. The first ten transactions from a child to its parent trigger the generation of currency in the child. To elaborate, each owner of a parent-child pair can only create ten batches of tokens. The longer the owner waits to create batches, the more tokens they will receive. Specifically, the tokens per batch created is a linear function that allows 25% of maximum token generation when the system goes online, and 100% after 10 years. The maximum number of tokens per batch is 5000 tokens. Therefore, the theoretical maximum number of tokens per parent-child pair is 50000. The increased batch return over time is meant to incentivize long term interest in the token. Only the aforementioned interaction between parent-child pairs produces batches. All other interactions occur as expected. The number of tokens given per batch mined can be represented by:

$$\begin{cases} 375t + 1250 & t < 10 \\ 5000 & t \geq 10 \end{cases}$$

where *t* is the time since the contract deployment, represented in years.

Scenarios

To help better understand the benefits of waiting to mine a batch between a genesis address, a list of several possible scenarios is shown below:

Scenario 1:

You deploy all batches when the contract goes online. For each batch, you get the minimum batch reward: 1250 EXOR. In total, you get 12500 EXOR. This is summarized in the following table:

Batch Number	Year Created	Reward (Tokens)	Total Tokens Created
1	0	1250	1,250
2	0	1250	2,500
3	0	1250	3,750
4	0	1250	5,000
5	0	1250	6,250
6	0	1250	7,500
7	0	1250	8,750
8	0	1250	10,000
9	0	1250	11,250
10	0	1250	12,500

Scenario 2:

You deploy all batches 10 years after the contract goes online. For each batch, you get the maximum batch reward: 5000 tokens. In total, you get 50000 EXOR. This is illustrated in the following table:

Batch Number	Year Created	Reward (Tokens)	Total Tokens Created
1	10	5000	5,000
2	10	5000	10,000
3	10	5000	15,000
4	10	5000	20,000
5	10	5000	25,000
6	10	5000	30,000
7	10	5000	35,000
8	10	5000	40,000
9	10	5000	45,000
10	10	5000	50,000

Scenario 3:

You deploy 4 batches when the contract goes online, 2 batches after waiting 5 years after the contract goes online, and the remaining 4 batches 10 years after the contract goes online. In total, you get 31,250 EXOR. This is shown in the following table:

Batch Number	Year Created	Reward (Tokens)	Total Tokens Created
1	0	1250	1,250
2	0	1250	2,500
3	0	1250	3,750
4	0	1250	5,000
5	5	3125	8,125
6	5	3125	11,250
7	10	5000	16,250
8	10	5000	21,250
9	10	5000	26,250
10	10	5000	31,250

Scenario 4:

You create 1 batch every year starting 1 year after the contract goes online, and continue until you have created 10 batches. In total, you get 33,125 EXOR. This is summarized in the following table:

Batch Number	Year Created	Reward (Tokens)	Total Tokens Created
1	1	1625	1,625
2	2	2000	3,625
3	3	2375	6,000
4	4	2750	8,750
5	5	3125	11,875
6	6	3500	15,375
7	7	3875	19,250
8	8	4250	23,500
9	9	4625	28,125
10	10	5000	33,125

Because Elixir relies on a proof of time mining system, the total supply of the Elixir token cannot be determined at this moment, but a range value can be calculated by finding the minimum total supply count and the maximum total supply count. It is assumed here that all batches will be created, which probably will not be the case. The minimum total supply count can be calculated by taking the total number of genesis address pairs (4,113) and multiplying by the minimum batch size of every batch (12,500). The resulting minimum total supply would therefore be 51,412,500. In contrast, the maximum total supply count with the maximum batch size of every batch (50,000) would result in a total of 205,650,000. However, at the time of revising this whitepaper, the current maximum total supply size is 112,240,479 and the minimum total supply size is 54,702,765. It should be noted that because of this mining model, the total supply count will follow a pattern of convergence; the sooner genesis pair address holders mine their batches, the lower the maximum total supply will be. However, the longer they hold, the higher the minimum total supply will rise. Early creation of batches will cause low inflation in the long term. As of the time of this whitepaper revision, 60.8% of batches have been mined. Eventually, these values will converge and ELIX will reach a final total supply count. We estimate that this value will most likely be around 60-70 million tokens.

Lending Platform

According to a report by the United States Department of the Treasury, "Market analysts identify a $1.0 trillion addressable market for online marketplace lenders (excluding mortgages), and estimate loan origination volumes could reach $90.0 billion by 2020."[2] Loan issuance has been growing steadily over the past decade. Figure 1 shows that total centralized

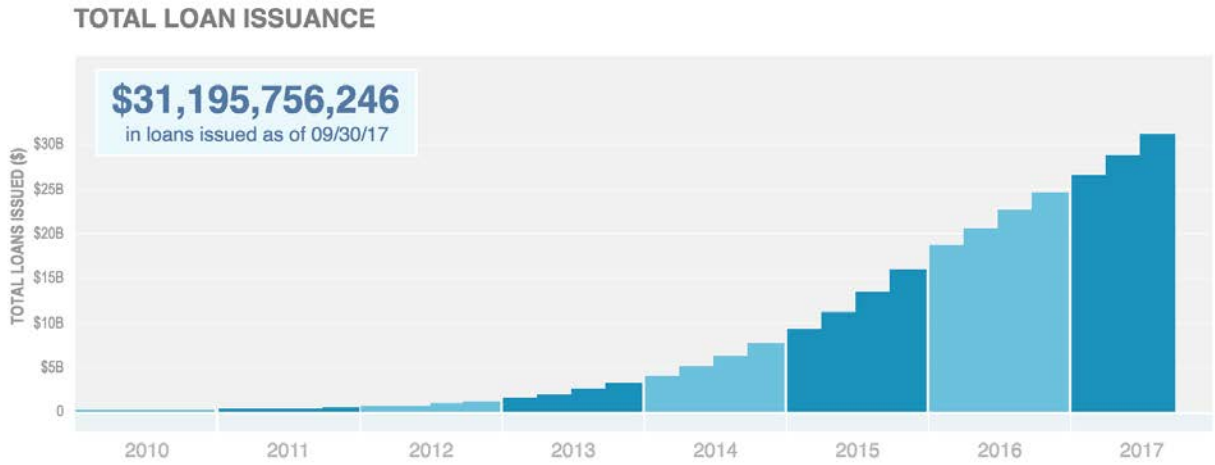

Figure 1: Total Lending Club Loans Issued Versus Time (years)

[2] "Opportunities and Challenges in Online Marketplace Lending." *U . S . DEPARTMENT OF THE TREASURY*, 10 May 2017, www.treasury.gov/connect/blog/Documents/Opportunities%20and%20Challenges%20in%20Online%20Marketplace%20Lending%20vRevised.pdf.

loans facilitated by the American company Lending Club exceeded $31 billion by the end of 2017.[3] Elixir aims to revolutionize the way lenders and borrowers make and receive loans through a decentralized model. In a traditional model, a borrower will request an amount of money from a lender, usually a bank or a credit union, and pay it back through installments over a specified amount of time with interest in addition to the principal sum. This results in a

lender being rewarded via interest, while the borrower has received a suitable loan they have paid back in time. However, the borrower is left unrewarded for completing their part of the deal. The Elixir lending platform intends to reward both lender and borrower for completing a loan successfully and uses rewards to incentivize each borrowing participant to pay back their loans in their agreed installments and on time. To help financial applications of cryptocurrencies become mainstream (in a way other than simply functioning as a currency, such as Bitcoin), the initial lending service will be provided in the form of a mobile application. This application will serve as a kind of social payment network between friends and family. In addition, this initial lending service will include zero collateral and interest, providing a purely incentivized reward system for borrowers and lenders to partake.

Global Platform

In the long term, this lending service will expand to a global scale, allowing participants to create loans and borrow from others in a decentralized manner. This system will track the credibility of a borrower to show how trustworthy they are, and give the lender an idea of any potential risk a loan being made to a borrower would have. Unlike the lending service that we will release in the MVP of our mobile application, the global platform will incorporate collateral to prevent borrowers from defaulting or paying back their loan later than the due date. We also hope to provide this global lending system for institutional usage as well. While the advocation and calling for all financial institutions to be decentralized is growing, it is unrealistic to think that they will go away in a short period of time. Therefore, Elixir will be at the forefront in providing both decentralized platforms for P2P lending, as well as allowing larger institutions to utilize the technology we have created, as well as allow people to lend and borrow using decentralized technology.

The launch of this global platform will abide by all governmental regulations. Although cryptocurrencies sometimes aim to push back from governmental and centralized control, the Elixir lending platform recognizes the importance of following regulations and standards in the lending and credit market.

Credit System

One of the long-term goals of ELIX is to build a credit score system backed by tokens. A credit score can be represented by a tally of token rewards. In a general sense, rewards are generated when users behave in a positive manner, such as successfully paying off loans in the number of installments specified over a period of time. These factors are read and analyzed by a smart contract, and do not require any information to be saved on a database other than the blockchain.

[3] Ibid.

This credit scoring system could be adapted to the global lending platform, and will allow users to be rewarded for behaving well and building their blockchain credit score. Users without any credit will need to develop their credit history prior to making large loan requests in order to prevent any abuse of the lending system.

Implementation

A sample loan is stored in smart contract storage as follows:

```
struct Loan   {
    address borrower;
    address lender;
    uint256 startBlock;
    uint256 amount;
    uint256 paidBackBlock;
    uint256 status;
    uint256 amountPaidBackSoFar;
    uint256 loanLength;
    uint256 borrowerReward;
    uint256 lenderReward;
    uint256 interest;
    bool willMine;
    bool borrowerPaidLate;
    string message;
}
```

The loan is constructed in as general a fashion as possible. There are no restrictions on loan amount. As a loan progresses, the status and amount paid paid back, as well as other relevant information are stored in the Ethereum blockchain. Smart contracts also provide a record of pseudo anonymous loans, thereby providing immutable evidence in the event of any dispute between parties. This contrasts with the commonly used current method of centralized data storage, which can be altered or erased by malicious parties. Credit protocols like Bloom seek to link Ethereum addresses to user identities when desired, allowing lenders to use KYC tools to reduce default rates. The ELIX platform could be used anywhere in the world as a general lending protocol, where smart contracts could be constructed and legally linked to our lending system. Universal access to finance and eliminating barriers to transfer of value between countries is yet another benefit of cryptocurrencies.

Crowdfunding

So much of the cryptocurrency world requires crowdfunding to jumpstart projects. There are also many non-cryptocurrency projects and businesses that need to raise funds. Our goal is to help bring blockchain projects to life.

We are developing smart contracts to facilitate decentralized crowdfunding. We'll help establish the legitimacy of projects supported on our platform, so that users have clear information about who and what they're supporting. With millions of dollars raised for single blockchain projects, taking a cut of crowdfunding earnings provides one possible revenue stream for ELIX.

Individual projects often raise large amounts of capital to bootstrap businesses and ideas. According to Business Insider, the top 20 highest non-cryptocurrency crowdfunding events of 2017 raised anywhere from nearly 3 million dollars to over 8 million dollars each.[4] Fundraising in the cryptocurrency world, however, has led to funding a full order of magnitude higher in some cases. For example, in 2017 during the highest ever ICO, Filecoin raised the equivalent of 217 million dollars.[5] The massive growth in the total market capitalization of cryptocurrencies in the past year from 15.5 billion to over 700 billion dollars[6] has led to an explosion in blockchain projects and attention.

Our crowdfunding platform—dubbed "Boost"—seeks to provide a complete platform for raising funds through cryptocurrency. These funds do not represent an equity stake in any company—rather, they are funds for planned projects made by creators across the world. Using our payment ledger and Boost interface, users can support projects from various categories. Using ELIX as a crowdfunding token will also further drive demand for the token. Businesses and users with ideas can use our platform to acquire funding from anywhere in the world and anonymously support projects. This eliminates the need for users to waste time looking through Bitcointalk threads, Reddit threads or Facebook pages where this information is not provided in a streamlined, reliable, or trustworthy process.

Implementation

A crowdfunding Idea exists in smart contract storage as follows:

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[4] Williams-Grut, Oscar. "The 20 biggest crowdfunding campaigns of 2017." *Businessinsider.com*, Business Insider, 31 Dec. 2017, www.businessinsider.com/20-biggest-crowdfunding-campaigns-of-2017-2017-12.

[5] Higgins, Stan. "$257 Million: Filecoin Breaks All-Time Record for ICO Funding." *Coindesk.com*, Coindesk, 7 Sept. 2017, www.coindesk.com/257-million-filecoin-breaks-time-record-ico-funding/.

[6] Global Charts (Total Market Capitalization): https://coinmarketcap.com/charts/

```
struct Idea   {
   bytes32 title;
   string description;
   uint256 minGoal;
   uint256 maxGoal;
   uint256 hostCut;
   uint256 duration;
   uint256 startTime;
   uint256 status;
   uint256 amountRaisedSoFar;
   address host;
   address tokenAddress;
   address creator;
   mapping(address=>uint256) amountPledged;
   mapping(address=>bool) reclaimed;
}
```

Each crowdfunding event can contain a title and description to provide more information about the event. We have included them for those who wish to pass information on a blockchain level. There is a minimum threshold that must be reached, and the funding amount is not to exceed the maximum amount. For crowdfunding events where a maximum funding amount is not desirable, one can set the maximum goal greater than the theoretical maximum supply of ELIX. The host cut determines the percentage of tokens distributed to the host (with resolution of 10^-18 percent). On our platform, the host is ELIX, LLC. The duration is the maximum block length of the crowdfunding event. If a sufficient minimum goal is not reached during this period, users can reclaim their funds via interaction with the smart contracts. Start time is the block number in which the Idea was created, and status determines the current state of the Idea as it progresses. The Idea struct also keeps track of the amount raised so far. Since a token address parameter is specified when a proposal is created, our smart contracts can be used generally with any Ethereum token. On our platform, we will likely use ELIX and require creators to use ELIX to drive demand. We may also use our upcoming new rewards token during crowdfunding events (see the *Rewards* section for more information).

Payments Ledger

Our payment ledger can be used to send and receive payments using our digital tokens. You can use the payment ledger to request, borrow, and send funds. Your payments can be tracked through an intuitive user interface. The ledger shows upcoming inbound and outbound payments, as well as loans and detailed information regarding the state of each loan. The ledger serves as a way to remind users that payments are due. Each user can opt to keep their account linked locally to an address, or alternatively sync their contacts locally to the ELIX app, allowing payments to be sent to friends using contacts. An optional QR scanner allows other

addresses to be easily imported as well. Each payment ledger is linked to a wallet, which is protected by a passphrase known only to each user. Even if the app is uninstalled, all tokens and Ether in the wallet can still be recovered by reinstalling the app and unlocking the wallet using the passphrase. This also allows each user to control their own finances, preventing freezing or unwanted borrowing of financial assets, which occurs commonly in the traditional financial world.

Rewards

One of the differentiating features between our lending platform and other options is a unique mining model created to reward both borrowers and lenders for successfully paying back loans. When creating a loan, lenders and borrowers can choose whether to set up a mining period once the loan is returned. The mining feature enabled by smart contracts allows the lender to lock their ELIX in their wallet for a holding period, after which the lender and borrower both receive rewards. This reward is received in the form of a new, upcoming token—dubbed "Token P." The name will be revealed at a later time. This rewards system is currently operational via our testnet demo here. Currently, 65% of the reward goes to the lender for assuming risk, and 35% to the borrower for paying back the loan on time. If a borrower pays back a loan late, the lender receives all the reward. The new mining algorithm has several purposes:

1. Allow non-genesis holders to mine, providing a straightforward way for people not familiar with cryptocurrencies to mine tokens (mining using hashing power is difficult for newcomers to understand). This is an additional onboarding incentive for new users and buyers.
2. Provide additional incentives for borrowers to pay back loans, as well as incentivize lenders to use our platform.
3. Reward early adopters and holders by giving them an opportunity to use their Elixir to mine Token P. Early adopters are likely to hold more Elixir and therefore can lock more in holding periods, producing more Token P over a given amount of time. This also rewards adopters who have long term faith in our platform and therefore are willing to lock their Elixir in holding periods.
4. Limit the circulating supply of Elixir, since Elixir will be locked in holding periods while Token P is mined.

Holding periods are implemented on a blockchain level and do not require an escrow service. The final supply of Token P will be capped. Mining the new token is expected to happen over a period of at least (if not several) decades. This will reduce the circulating supply of Elixir during that time period, driving up prices as demand increases to use Elixir on our platform. Token P will be created only through mining and vested developer tokens. Vested developer tokens will

be used to fund further development of the platform. We will release specifications regarding supply and vested amounts as we move closer toward the app release.

Roadmap

Q3 2017:

- Elixir Smart Contracts Published
    - Mobile Crowdfunding, payments, and lending platform announced
    - Elix, LLC established with trademarks submitted

Q1 2018:

- Team
    - Team reveal and additional recruitment
    - New website with revamped whitepaper
- Elixir Mobile App Alpha Test
    - In house testing of functional prototype
    - Prototype published and linked to Ethereum blockchain with real-time scanning, and information transmitting through sockets to mobile devices
- Crowdfunding Integration
    - Ability to propose specific ideas with function requirements
    - Ability to choose projects and support them anonymously
    - Supports creators, hosts, and any Ethereum tokens

Q2 2018:

- Elixir Mobile App Beta Test
    - Private closed beta
    - Open beta launched to public, thousands of users will be able to test the application on their mobile devices
    - Integration of feedback and improvements
- Elixir Mobile App Public Release
    - Public release to the iOS App Store
    - Public release to the Google Play Store
    - Continuous Integration of feedback
    - Explore further feature additions

Q3 2018:

- Elixir Web App Public Release
    - Web application release for desktop interface
    - Easy linking between desktop and mobile apps

Q4 2018:

- Begin Development of Collateral and Reputation-based Lending Platform
    - Continued development of crowdfunding and lending platform

Team

David Jackson, Co-Founder:

Jackson is a graduate of Stanford University with interests and experience in entrepreneurship, technology and finance. Prior to ELIX, Jackson worked in the Stanford Intelligent Systems Laboratory (SISL), Stanford Space Rendezvous Lab (SLAB), and a nanoparticle laboratory at Duke University. Jackson holds a Bachelor's degree in Engineering from Stanford University.

Melanie Plaza, Co-Founder:

Plaza is a graduate of Yale University and a full stack developer with experience in consulting, Solidity, and early stage startups. Prior to Elix, Plaza was a CTO at To the Tens, Cofounder at Crunchbutton, full stack developer at Vyu and AE Studio and has done research at Mt. Sinai and Yale University. Plaza holds a B.S. from Yale University, focused on statistical analysis of ecological systems.