

SWAPY NETWORK, GMBH

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# SWAPY NETWORK

THE SOLUTION FOR UNIVERSAL ACCESS TO CREDIT

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# 1 A Brief Introduction to Swapy Network

Swapy Network is a decentralized protocol providing **Universal Access to Credit**. On top of it, we are creating three decentralized applications with the following goals: (1) to connect money markets; (2) to create a financial identity for individuals and organizations, valid worldwide; and (3) to provide a huge financial data pool, open to anyone, where individuals have the rights and reap the value of their own data. The (1) Swapy Exchange connects smart money to emerging economies. It put together international investors from countries where the interest rates are lower and credit companies in countries where the interest rates are higher, providing better returns to the first and lower cost capital for the latter. Challenging the status quo of companies holding and selling users' data, the (2) Swapy Financial ID empowers people, giving them the right to a financial identity that is valid anywhere in the world. The combination of this system to the (3) Swapy Data Market transforms users' financial data into value for themselves. Now, individuals hold their own data and choose how much tokens they receive in exchange for it, when, and for whom they want to share. This also reduces the entrance barriers for new players since huge pools of data are not anymore big corporations' exclusivity, but an opportunity for the new entrants. **This is our dream for a future enabled by Swapy Network: A world of efficient credit markets, with no barriers to entry for new players, where consumers have the power and reap the benefits of Universal Access to Credit.**

## 2 Background

In this section we discuss the high interest rates in some emerging economies, highlighting the discrepancies between the developed and the underdeveloped nations, such as: (1) the information asymmetry; (2) the cost of capital; and (3) the cost of banking conglomerates. We provide an overview of the cost of credit in some world and G20 economies. Then, we detail the Brazilian scenario, a G20 and BRICS country with one of the highest interest rates in the world.

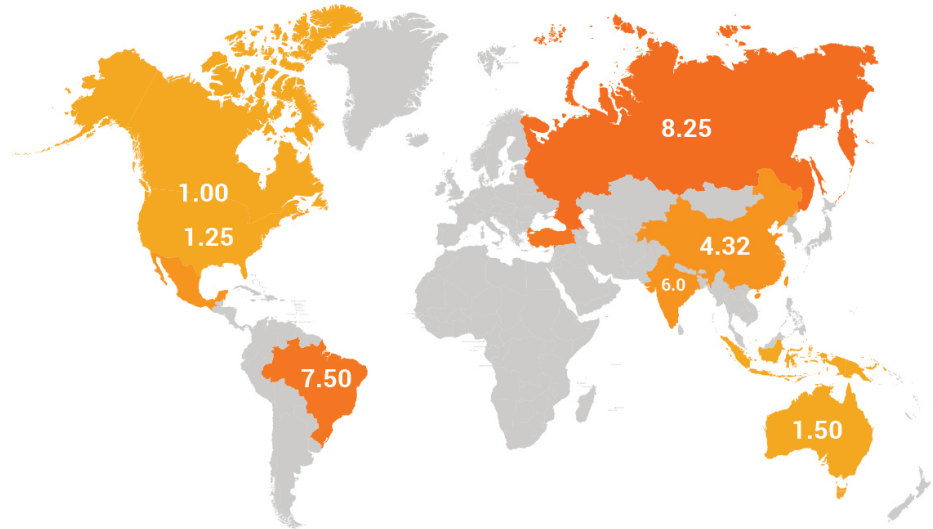
### 2.1 Overview

According to the Global Findex report [1], **2.0 Billion people around the world do not have access to financial services**, including access to credit. The existing banking infrastructure is expensive, therefore it is usually not available to the poorest or those living in remote areas, especially on the emerging economies. We divided the problem of access to credit into three key subproblems. They are: (1) the high cost of capital; (2) the information asymmetry; (3) the high cost of banking conglomerates.

If compared to developed countries, the underdeveloped have a lower credit offering's ratio and a higher interest rates' spread, making credit more expensive and lowering the savings' net remuneration. Given the inefficiency and market power of the banking sector, the risks generated by defaults, lack of liquidity, exchange rate volatility, complexity of banking operations, and tax regulation contributes to an unfavorable scenario composed by high implicit and explicit fees. In Latin America and the Caribbean, a higher spread of funds to banks considerably increases the final spread.

In respect to Trading Economics data [2] about nominal interest rates<sup>1</sup>, Argentina occupies the first position in the world with 28.75% as of October 2017, followed by Suriname, Venezuela, Mozambique, Congo, Ghana, and other underdeveloped countries. Brazil ranks 43rd in the globe and holds a 7.50% basic interest rate (Selic Meta). Among the G20, the top five countries with the highest nominal interest rates are Russia, Turkey, Brazil, Mexico, and India, respectively. It is important to notice that Russia, Brazil, and India also compose the BRICS, an association of the five major emerging country's economy in the world. The Figure 1 illustrates the highest nominal interest rates among the G20.

Figure 1: G20 - Highest nominal interest rates



Countries with interest rates above 1%. Source: Trading Economics [2].

From data compiled by MoneYou and Infinity Asset Management for October 2017 [3], when considering the real interest rates<sup>2</sup> in the G8 countries' market, only Russia shows positive real rates, the second highest rate in the world. Brazil ranks third in the world while Argentina occupies the eleventh position. On the other hand, most developed nations have zero or negative real interest rates. The exceptions are United States and Canada.

In Brazil, the structure of bank spread is formed by net margin, direct and indirect taxes, costs related to the Brazilian credit guarantee fund (FGC)<sup>3</sup>, administrative costs and credit default. Historically, high interest rates, inflation and the lack of financial education among the population took millions to default. Currently, the households indebtedness of the Brazilian financial system is 23.11%<sup>4</sup>. For those who have access to bank accounts and credit, the cost can be absurdly high. The average cost of unsecured loan in Brazil for households is 125% interest per year. In addition, the average interest rates hit a new record high in March 2017. The credit card rate was 490% per year and the overdraft rate was 328% per year. This is detailed in the Figure 2.

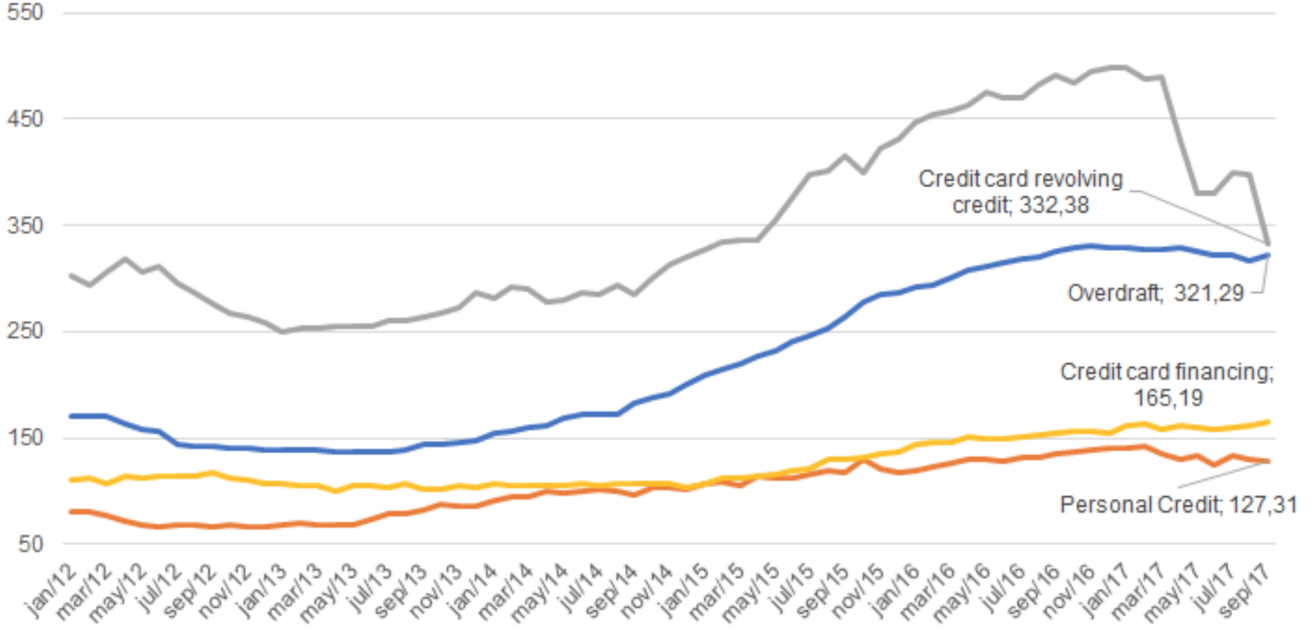
<sup>1</sup>We refer to "nominal interest rate" as the interest rates considering the inflation effect.

<sup>2</sup>We refer to "real interest rates" as the interest rates discounted of inflation.

<sup>3</sup>The Credit Guarantee Fund (FGC) is a private, non-profit entity that manages a mechanism to protect account holders, savers and investors. It allows the recovery of deposits or credits held by a financial institution up to a certain amount in case of intervention, liquidation or bankruptcy. Resolution CMN 4.222, 2013 [4].

<sup>4</sup>Brazil's Central Bank - Time Series Management System [5] - Credit Indicators. Series 20400, Sep 2017.

Figure 2: Personal loan’s annual average interest rates



Source: Brazil’s Central Bank - Time Series Management System [5] - Credit Indicators. Series with code 20741, 20742, 20743, 22022, 22023 - June 2017. This chart illustrates the percentages for interest rate over time.

## 2.2 Information Asymmetry

In a world where the most assertive decisions are the result of a combination of diverse algorithms and data, the access to information is essential for companies to improve their operations. Also, regarding individual’s data, there are a couple issues that are still not addressed. For instance, many systems rely on complex and expensive infrastructures to guarantee the individual’s data security and privacy, while fines still may apply [6] [7] [8]. To deal with data integrity, companies maintain several algorithms to find, fix and prevent problems such as undesired data modification, data falsification or data loss [9]. Also, to improve data veracity, many of the players are querying different data sources with sophisticated algorithms to co-validate information since the techniques rely preferably on several data sources to accept the claims as truth [10, p. 37]. All those issues increase the cost of information and contribute to the problem of information asymmetry.

Take Brazil, as an example. The country counts with four credit bureaus agencies called SPC<sup>5</sup>, Boa Vista SCPC<sup>6</sup>, Serasa Experian<sup>7</sup> and CCF (Cadastro de Cheques sem Fundo)<sup>8</sup> that refers to a check book with no balance. The cost to query a single name in each of these databases is R\$15 (USD\$5) in average for low volumes [11] [12] [13], except CCF. If the company wants to report a default, it has to pay an additional fee. This cost is transferred to the client in the form of higher interest rates and origination fees.

<sup>5</sup><https://servicos.spc.org.br/>

<sup>6</sup><http://www.boavistaservicos.com.br>

<sup>7</sup><https://www.serasaexperian.com.br/>

<sup>8</sup>CCF is a data system managed for Central Bank of Brazil.

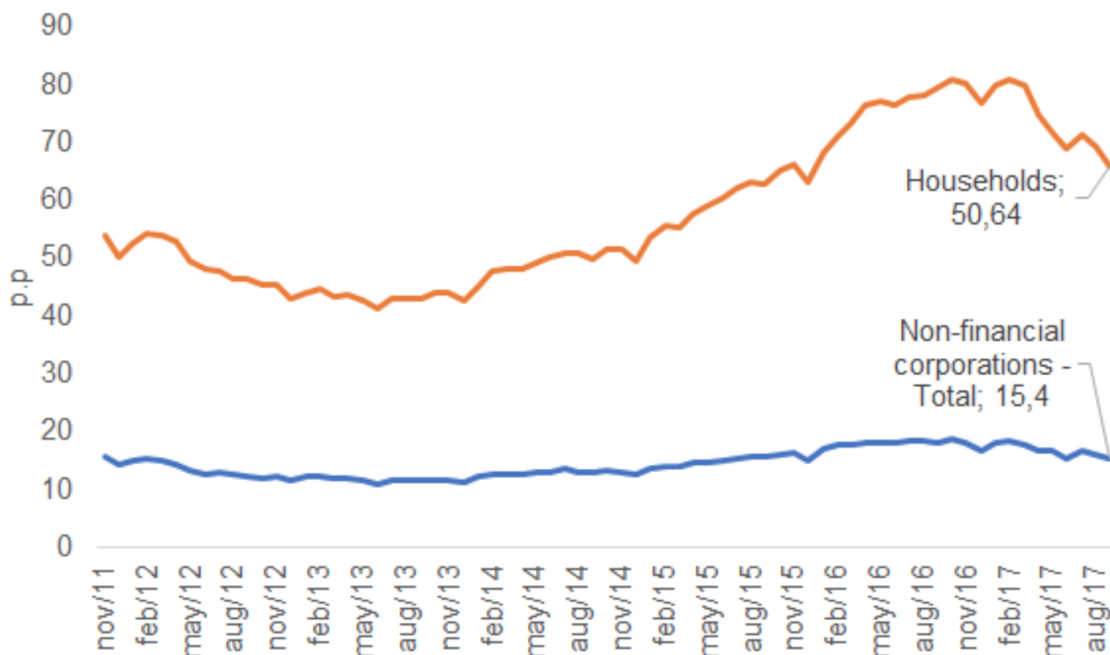
Also, some companies keep detailed records regarding the financial behaviors of their clients and sell them for big corporations. One such example is Grupo Abril, that has a company division called Abril Big Data<sup>9</sup>. According to [14], the company sources more than 3000 databases and counts on hundred of millions of points of contact with the clients. However, no value is reverted to benefit the client.

Trying to alleviate the information asymmetry problem, the Brazilian Central Bank created an initiative for a shared database among financial institutions. The problem is that not all credit agents have access to that database. Therefore, the information is fragmented among different databases, that are not available for all players. In those databases, it is very expensive to read and write information. So, that cost is paid indirectly by the end user and contribute to the final cost of credit. It is imperative that we eliminate the information asymmetry problem in order to allow new entrants to prosper, to increase the competition among the players and to lower the costs for the consumers.

## 2.3 The High Cost of Capital

The risk-adjusted cost of capital to lend in developing nations is very expensive. In Brazil, the main instrument to determine the prices charged is the Selic Rate. The Central Bank has been gradually cutting the basic interest rate. As of August 2017, it is at the level of 9.25% per year. Additionally, because it is an extremely concentrated market, the spread charged by banks reached 62.6% in January 2017 as illustrated by the Figure 3.

Figure 3: Average spread bank in Brazil over time



<sup>10</sup>Brazil's Central Bank - Time Series Management System [5] - Credit Indicators. Series with code 20787, 20809, 1178, August 2017.

<sup>9</sup><http://publiabril.abril.com.br/marcas/abd-abril-big-data>

In June, the ICC (Cost of Credit Index), a central bank indicator which measures the average cost of loan operations, registered 22.2% for the total operations. The unsecured loan households registered 37.1%.

## 2.4 The High Cost of Conglomerates

A strong reason why 2 billion individuals lack access to financial services is the fact that traditional banks can not effectively onboard and provide services for people at the bottom of the pyramid. Possibly, it is due to the fact that they live too far away from any bank branch, or because they do not earn enough money for the banks to have them as clients. The bottom 2 billion individuals in societal pyramid are excluded from the global credit ecosystem. This problem might be solved through startups with a lower-cost structure and more efficient approaches to reach the unbanked. Instead of expecting that existing financial institutions to perceive them as potential customers, a leaner solution might be to provide the services that these currently unreachable customers deserve.

In Brazil, based on data that relate the number of clients per institution of the active loan portfolio, the five largest banks have, in proportion to the total number of clients, a percentage of 93.35%. The Table 1 shows this data.

Table 1: Bank institutions in Brazil

Banks	Total for Institution - CCS	%
CAIXA ECONÔMICA FEDERAL (conglomerate)	82,418,020	25,83%
BRABESCO (conglomerate)	77,385,228	24,25%
BANCO DO BRASIL (conglomerate)	55,937,964	17,53%
ITAU (conglomerate)	49,486,744	15,51%
SANTANDER (conglomerate)	32,601,338	10,22%
Other financial institutions	21,223,086	6,65%
Total	319,052,380	100%

This information was collected from IFData, a system for the registration of information related to account holders and customers of financial institutions, as well as to their legal or conventional representatives. Account holders and customers are those individuals or legal entities resident, domiciled in the country or abroad who hold ownership of deposit accounts or financial assets in the form of assets, rights and securities held or managed in said institutions. The register contains data of individuals and legal entities with assets, rights and values in force on 1.1.2001, as well as any relationship initiated as of this date, created by Law 10,701/2003. IF-Data [15] - Month/Year: March 2017, Report: Credit - Number of Clients and Operations, Segments: b1,b2,b4. Based on Brazil's Central Bank - Time Series Management System [5] - Credit Indicators. Series with code 3040.

## 2.5 Consumer Behavior

Brazilian consumer behaviour regarding the consumption of financial services is aligned with the international trend. Between 2010 and 2015, the number of non-in-person loan operations jumped from 28 million operations to 236 million compared to 557 million for face-to-face channels. This represents 29.7% of all transactions. Among non-in-person loan transactions, only 5% were made in telemarketing channels. Tablets and smartphones have been increasingly present in the everyday of the Brazilian people. This data is summarized in Table 2.



Table 2: Loan operations by channel (millions of transactions)

	2010	2011	2012	2013	2014	2015	Average annual rate (2010-2015)
Face-to-face	316	548	625	837	606	557	14%
Bank branch	239	459	483	493	459	397	13%
Cash machine	68	76	127	328	126	142	31%
Correspondent	9	13	15	16	21	18	14%
Non-in-person	27	41	124	144	153	236	55%
Call centers	6	7	9	9	8	11	12%
Home banking	21	34	115	134	141	166	57%
Mobile devices	0	0	0	1	4	59	558%
Total	343	589	749	981	759	793	19%

Brazil's Central Bank - Time Series Management System [5] - Credit Indicators. Series with code 25208, 25209, 25210, 25181, 25182, 25183.

This is excellent for Financial technologies startups (Fintechs). The way clients consume credit products is becoming increasingly digital. From this perspective, innovative startups with new client relationship methods can be an excellent alternative to promote the financial inclusion.

### 3 The Solution: Swapy Network

Swapy Network is a decentralized protocol that connects the players in the financial industry. By participating, individuals and/or companies are able to offer or consume services and collaborate with the ecosystem do decrease prices and increase the inclusion of new entrants. The fees to operate in the network will be charged in Swapy cryptographic tokens (SWAPY). This way, token holders will have access rights to the Swapy Network, being able to benefit and also contribute to it, receiving tokens in exchange. This Section provides an overview of the Swapy Token, the proposed D'Apps, and the protocol itself. Technical details are discussed on Section 4.

#### How does Swapy Network solves the problems of Access to Credit?

1. An increase in the offer of capital to lend results in a lower cost of capital.
2. A commonly shared and updated data network eliminates the information asymmetry between the players.
3. Better data can allow credit companies to make better lending decisions and offer lower rates to good clients.
4. Lower cost capital and better information will reduce the barrier to entry for new companies.
5. New players in the market will increase competition, further reducing the price for consumers and increasing the access to credit.

This is our market-based approach to accomplish our **dream of Universal Access to Credit**.

### 3.1 Swapy Network Token (SWAPY)

Swapy Network Token (SWAPY), illustrated by the Figure 4, is a ERC20<sup>11</sup> token and the basic unit of value in the Swapy Network. One unit will have 18 decimal points. Which means that the lowest value one can hold is 0.000000000000000001 SWAPY.

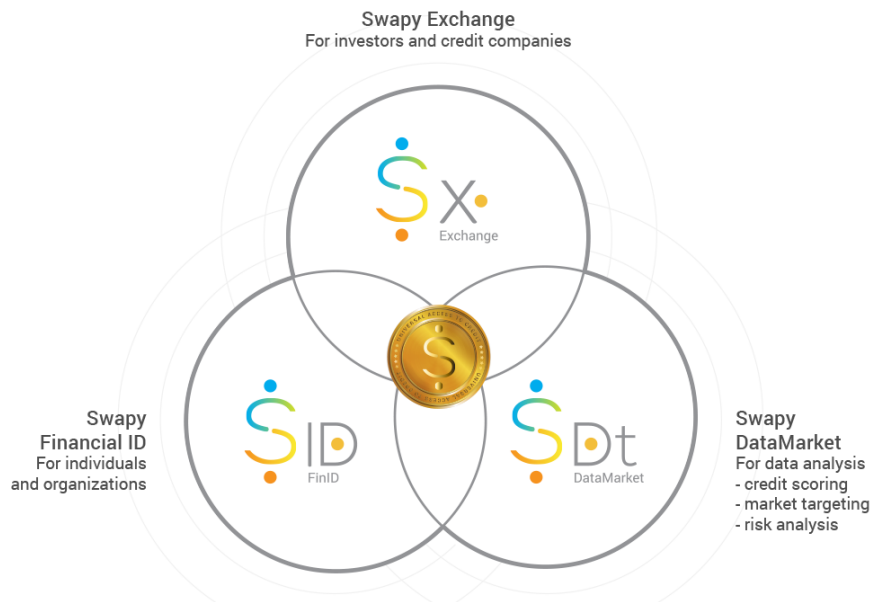
Figure 4: Swapy Network Token



The **intrinsic value of the token is that it is the only way to pay the fees for the services in the network.** Additionally, all the users in the value chain will work for the benefit of the network in order to see the value of their tokens appreciated. Acting correctly, the members will influence others to join, increasing the demand for tokens, consequently increasing the token price and the members' profit. This virtuous cycle is only possible issuing a new cryptocurrency.

In addition to the protocol, the Swapy's team provides three decentralized applications embraced by the Swapy Token: (1) Swapy Financial ID - Know your customer for better financial services; (2) Swapy Exchange - Fundraising for lending companies; and (3) Swapy Data Market - Optimize your operations using Big Data. The first component rely on smart contracts for self-sovereign identity that is the basis for identification inside the Swapy Protocol. The high level picture of our concept is illustrated by Figure 5.

Figure 5: Swapy Network Token convergence

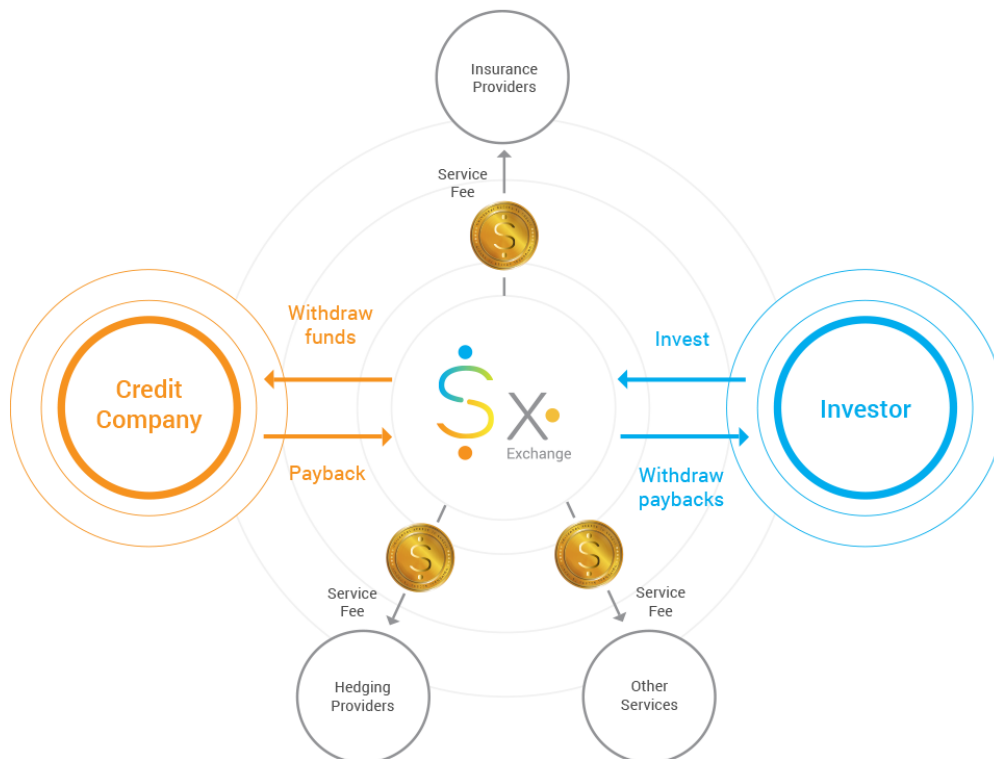


<sup>11</sup>ERC20 is a standard to implement cryptographic tokens on Ethereum blockchain, making it easy to integrate them to other Ethereum contracts [16].

## 3.2 Swapy Exchange

Swapy Exchange is a market-based solution for a global and more efficient money market. Different countries have different return expectations on the capital invested. Japan's economy, for example, has a -0.10% uncollateralized overnight average call rate<sup>12</sup> and 0.3% basic loan rate<sup>13</sup>. So Japanese investors are always looking for higher yield investment opportunities abroad. On the other hand, emerging economies have an incredibly high interest rate. The Swapy Exchange will connect international investors to local credit companies, providing a higher return to the first and a lower rate to the latter. The Figure 6 represents the Swapy Exchange environment.

Figure 6: Swapy Exchange diagram



Basically, a contract signed between an investor and a credit company in the Swapy Exchange is a smart contract deployed into the Ethereum blockchain. Committed to legal compliance, the parties also digitally sign a formal contract. The values are transferred across borders using cryptocurrencies, but the funds and paybacks are pegged to the dollar to avoid volatility. In fact, the investor buys an asset that represents a fundraising offer.

Liquidity is one of the key factors that attracts the investors' attention. Because of it, Swapy Exchange also aims to offer a fully functional exchange of securities. An investor who holds an asset can resell it to a third-party anytime in the network. He must start an asset sale offer determining the price and as soon as a buyer shows interest, both must sign a transaction transferring the payback collection rights (asset) from the first to the latter and also the value defined for the sale from the latter to the first.

<sup>12</sup>Bank of Japan(BoJ), October 2017 [17]

<sup>13</sup>Bank of Japan(BoJ), October 2017 [18]

To be able to raise funds in the Swapy Exchange, every credit company must be fully compliant with the countries they are doing business with. Some taxes may incur when the investors collect the paybacks. For example, in Brazil, if an investor makes a financial investment whose withdraw time is lower than 180 days, he must pay a tax of 6% that is called IOF (Imposto sobre Operação Financeira) plus ticket and interest<sup>14</sup>. However, in case the investment's payback is longer than 180 days, this tax does not incur. Therefore, the investor will only pay the income tax on the profits taken. As some other characteristics of the Swapy Exchange, we can point:

- **All contracts are pegged to the US dollar** and it is up to the Credit Companies taking the loans to protect itself against the exchange rate risk;
- **1% of every transaction is a fee that is paid in Swapy tokens.** Therefore, in \$100,000 transacted, it will be generated \$1000 in revenue for Swapy Exchange.
- Other players in the network will be able to offer services that may be useful to the investors as well as the credit companies;
- The fees charged into the network will be paid in Swapy Tokens. They may do so through partner organizations offering hedging services to the network.

Swapy Exchange has many use cases. We are unable to predict every feature that can be added to this component, however we identified those actors we believe will be the most common ones as following:

- **Investors:** Individuals or funds from countries with lower interest rates which want to pursuit higher returns by investing in loans in other countries with higher interest rates;
- **Credit Companies:** Lenders from developing nations that need to raise capital to be lent. Through Swapy they can do so at a much lower cost ;
- **Swapy Exchange:** The system which will intermediate both parties;
- **Other service providers** such as: (1) Hedging funds and (2) Default insurance companies.

### 3.3 Swapy Financial ID

Swapy Financial ID is a **Digital Financial identity valid in any country** that eliminates the information asymmetry, as well as guaranteeing the data integrity and privacy. As key characteristics we point out:

- One KYC to rule them all: The onboarding process for financial services companies has to follow an Anti Money Laundering (AML) and Know Your Customers (KYC) procedure. For the client it means that he/she repeats the same process every time he wants to join a new service. He or She has to: (1) Fill all the information, (2) Upload documents, (3) Upload a proof of address and (4) validate his/her mobile phone in a 2FA (two factor authentication). By using Swapy Financial ID, users will only accomplish this process once.

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<sup>14</sup>Decree n° 6.306/2007, Art.15 B, XI, XII.

- Financial history portability: As the information will be registered on the blockchain, stored in a decentralized manner, and accessible to whomever the ID owners authorize, anywhere in the world, we have a new interesting feature: the credit history portability. So, a migrant going to a new country can offer banks and credit companies with their credit history, and thus have access to lower rates and customized services according to their profile.

We identified some of our users as: (1) ID owners, those individuals or organizations whose financial information the (Financial) ID is about; (2) Writers, those individuals or organizations who have done business with the ID holders and are allowed to write the result of that transaction in the owner's Financial ID; (3) Information Checkers, those individuals or organizations which can attest the validity of some information or settle disputes in the network by comparing the information provided.

Basically, individuals will register their financial information through our mobile app in their own smartphones. The data will not be transmitted to our cloud servers, remaining cryptographically protected in their own phones. For every piece of data, the app will generate a hash digest that will be stored into the blockchain. Even a single bit modification in the information is enough to trigger a different digest from the hash function. This combination guarantees the data will remain private and safe from tampering, since only the individuals will be able to authorize the access to their data and only the requester will be able to compare the income data hash to the previously registered hash at the blockchain. The data is transmitted off-chain, from the owner to the requester, using end-to-end encryption based on the Signal Protocol.

The individuals will be able to store any kind of financial-related information, such as bank statements, purchase installments history, investments information, and even their valuable assets. The data may vary from country to country. Moreover, the data required by the providers may differ, according to the type of service they are offering. However, the information has worldwide validity and relevance, assuring our commitment to providing a global financial ID. The providers may request portions of the individual data when analyzing him/her as a potential customer.

The users have plenty of configurations into their installed Swapy storage app from which to choose. Those more conservative, are able to decide to not allow or to allow anonymized-only access to their financial data. Those less concerned can also provide identified access to their data. This methodology meets our data privacy concerns and has the power to produce a huge decentralized data market.

Regarding data reliability, every time a user stores a portion of data, him/her should determine an organization to attest the veracity of that data. If the data is related to any business the owner made with any other network member, the validator may be directly this service provider. If not, the user may determine an intermediary, such as Swapy team. The validator may agree or disagree with that information. By doing this, the validator will have the rights to receive a portion of the Swapy Tokens when the user decides to sell the data. It is important to restate that the network members are incentivized to act correctly, since their role will influence others to join and consequently increase the price of the token, maximizing their profits.

### 3.4 Swapy Data Market

In the credit analysis process, the information asymmetry gives an unfair advantage to big corporations. Yet, the cost of the data search and analysis is passed on to the end user. A Data Marketplace enabled by Swapy Network can eliminate the information asymmetry and make all information available to all players, new and old, big and small. The information on the user's Financial ID will belong to the individual, who will receive an agreed upon value in Swapy Network Tokens (SWAPY) for its consultation.

For this marketplace, we believe there will be three different kinds of users: (1) Data sellers, those Individuals or organizations who will have a financial ID and are willing to exchange their financial data for tokens; (2) Data validators, those companies which the individual had business with and might attest the veracity of the data or those companies who can handle the validation process on behalf of the individual in exchange of a portion of the tokens when a sale occurs; (3) Data buyers, those organizations interested in purchasing large datasets in bulk by paying the data sellers to query on their profile. We envision the buyers as various service providers which can consume the data to improve their products and services. For example, some of them may be credit scoring companies wanting to test new algorithms with large and realistic data sets.

By allowing anyone to create their global financial identity, Swapy also creates a huge and reliable data market. Individuals have the choice to allow others to buy their data through Swapy market, receiving tokens as payment. Users have the choice to provide either anonymized or identified data. Other players, such as the service providers, are able to pay with Swapy Tokens in exchange of any amount or granularity of information, from one individual to many individuals, anonymized or identified profiles, selecting by personal profile, gender, income or geography. Since Swapy does not store the user data in any hypothesis, at first we find the users based in the profile parameters filled by the buyer, then we notify the users through the app with the buyer's offer and ask for their approval. In case of a approval, the individual share him/her data directly to the buyer using end-to-end encryption based on the Signal Protocol [19].

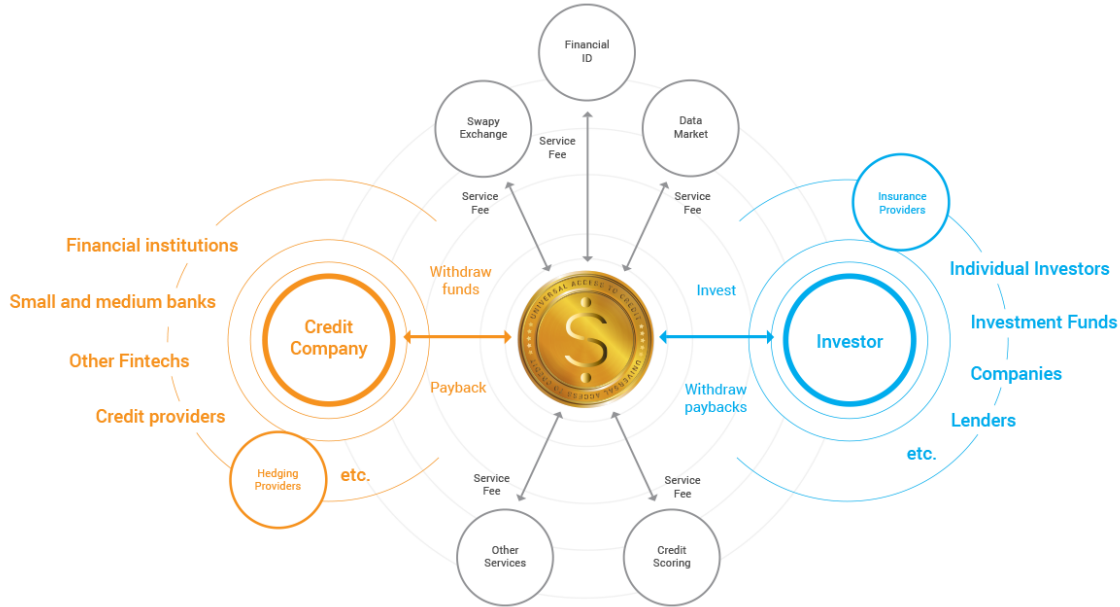
The Swapy Data Market is one of the components that will revolutionize the industry. As of today, there are several institutions collecting and selling personal data without them noticing or benefiting from it. Couple financial institutions hold a lot of data having a huge competitive advantage over the entrants. Also, there are the financial bureaus imposing high prices for credit companies to consult their client's financial information. **By allowing the user to exchange their information for Swapy tokens with other network members, we are generating value to those who actually owns the data. More importantly, we are lowering or even breaking the power of the conglomerates, by increasing the capacity of others to access the data needed to improve their operations.** In a world where the most assertive decisions are driven by a combination of machines and humans, the access to data is essential to a fair competition and a better offer of services.

### 3.5 Circular Economy

New entrants can offer products and services on **Swapy Network** and get paid in SWAPY tokens. They may use their tokens either to pay for other services and data in the network or to sell it in the exchanges. That way, all players (individuals, investors, credit companies and

service providers) who join the network are incentivized to add value and contribute to the ongoing success of the community in order to see the value of their tokens increasing. By acting correctly, they influence others to join the network increasing the demand for SwapY Token and, consequently, increasing the token value. An example of this environment is shown on Figure 7.

Figure 7: SwapY Circular Economy



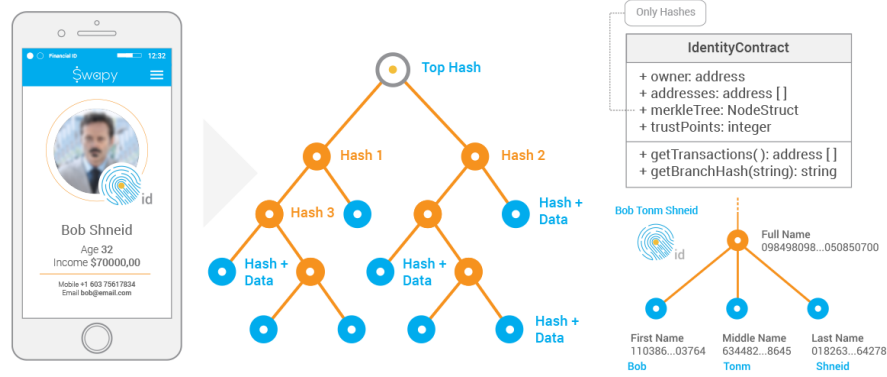
## 4 Technical Details

In this section, we present SwapY, composed by multiple flows that encompasses the SwapY Network. We provide a technical overview of SwapY's smart contracts as well as the first proposed decentralized applications. Currently, our focus is to provide the basis for a B2B fundraising ecosystem, the technology for a financial identity valid worldwide, and the aspects for a data/insights market that relies on the financial identity as a source. The protocol we are proposing is the first steps towards a world of Universal Access to Credit. Keep in mind we will be continuously improving our network. Our protocol was released under Apache 2.0 license.

### 4.1 Self-Sovereign Identity

As a standard for identification in the protocol, the peers rely on a self-sovereign identity approach. Every peer will have their own profile, trust points, attestations, and recommendations, although private data will not be stored into the blockchain. This will allow peers to trust each other without knowing exactly who they are. In addition to this standard, the SwapY's team provides a decentralized application (SwapY Financial ID) that allows individuals to store sensitive data in their own smartphone and associate it to their blockchain identity using the data hash as a fingerprint. The data is granularly modeled into a Merkle Tree allowing one to share and validate only the needed piece. The information sharing mechanism is based on end-to-end encryption and the selective disclosure approach. Using SwapY Financial ID technology, data is organized in levels of granularity, therefore the individuals can share specific parts in a way that only the real recipient will be able to read. The Figure 8 illustrates this system.

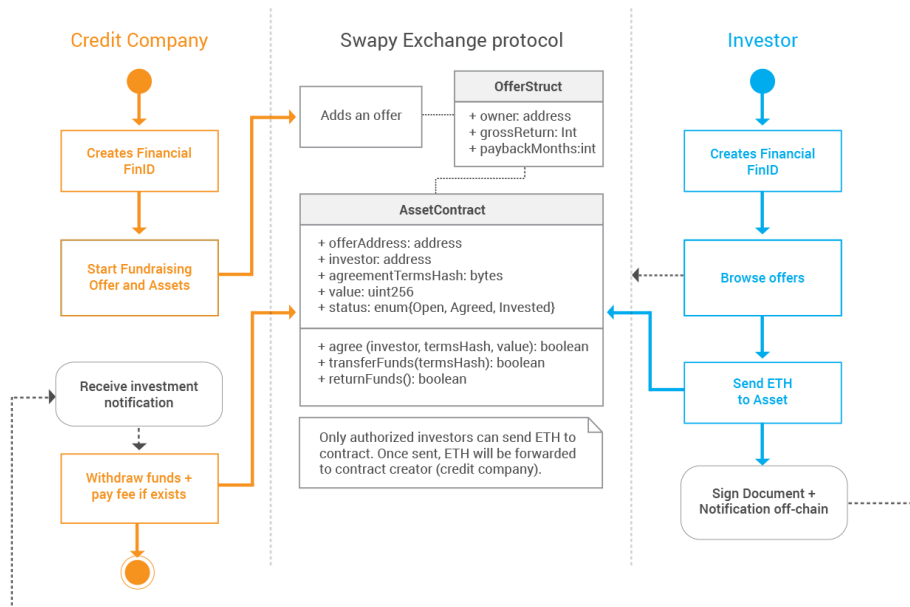
Figure 8: Swapy self-sovereign identity



## 4.2 B2B Fundraising

The main aspects of this flow is the creation of a fundraising offer that is composed by a gross return rate, a payment term, and one or more assets, each one containing its specific value, its reference currency (in any FIAT or cryptographic currency) and its particular physical contract fingerprint. The company raising capital, also known as offer owner, do this by instantiating smart contracts from our protocol and providing its asset's attributes. Investors are able to check the fundraising details as well as the contract owner's self-sovereign identity directly on the blockchain, and decide whether to invest or not. This process consists of sending an amount of ETH (and further possibly any other ERC20-compliant token) to the smart contract accordingly to the value and currency established during its creation. After transferring, the company raising the capital is able to accept and withdraw funds, registering the investor as the return's recipient. The Figure 9 details the interactions of this flow during the process of investment.

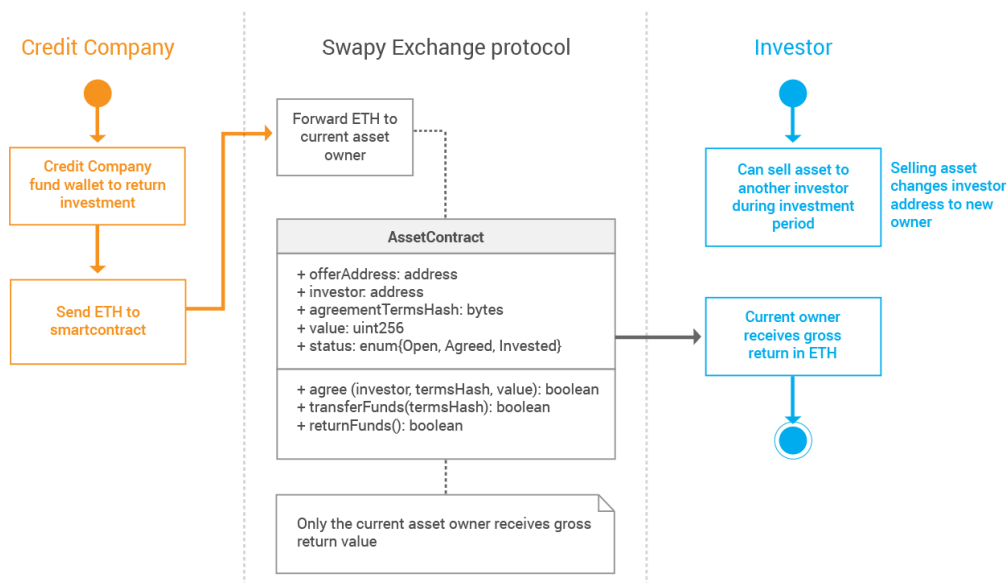
Figure 9: Investment flow on Swapy Exchange Protocol





The company raising capital, usually lending companies, have a deadline to transfer the returns to the current asset investor. In the meantime, an asset investor can sell his rights to receive the return to another investor. The deadline is defined by an amount of days set during the asset's smart contract creation and triggered when the investor transfer the funds, being cancelled if the company raising the capital cancels the investment (funds plus collateral go back to the investor). There are three possible scenarios here: (1) the company raising capital transfers the return within the deadline; (2) the company raising capital transfers the return outside the deadline; and (3) the company raising capital does not transfer the return. When the first scenario happens, the investor is able to withdraw the returns as expected. By doing it, the asset's smart contract writes the transaction as 'positive' into the company financial identity. When the deadline is achieved without a transfer, the investor is able to write the transaction as 'negative' into the company financial identity. In the case of a transfer outside the deadline, the asset's smart contract writes the transaction as 'semi-positive' referencing the 'negative' one when the investor withdraw the return. Additionally, the investor may disagree with the value transferred since it does not match the expected return. This leads to a 'semi-negative' rating in the company financial identity. It only becomes positive when/if the expectations match. The Figure 10 represents the return flow.

Figure 10: Return flow on Swapy Exchange Protocol



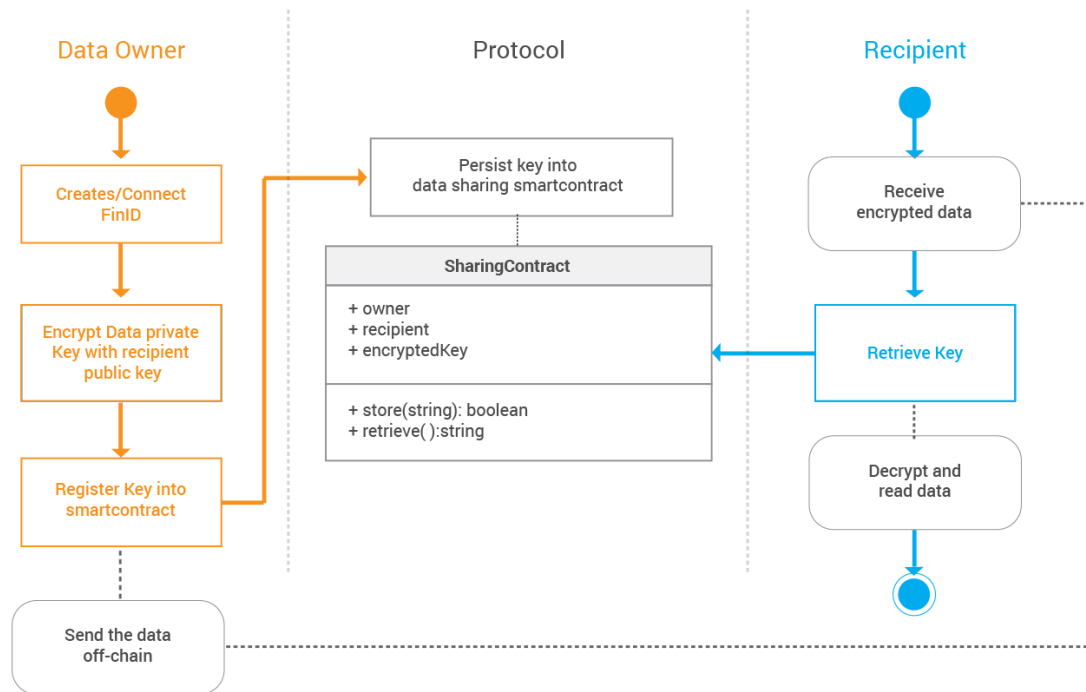
To bring this part of the protocol to real world businesses, the Swapy's team provides a decentralized application (Swapy Exchange) that implements this flow prioritizing the user experience. It will also provide the tools to help the peers in the network in the process of interacting with each other with minimal knowledge on cryptocurrency and blockchain. Through the D'App, both actors are able to request sensitive information (Financial ID) of each other enabling a richer risk analysis. Key performance indicators (KPIs) are supplied to better track the portfolio. By providing an application layer encompassing the protocol, both new or traditional credit companies will be able to raise capital to fund loans in emerging nations as well as investors will be able to seek higher profit, immediately after product launching. Primarily, our app wallet mechanism will rely on MetaMask<sup>15</sup> for both web and desktop versions.

<sup>15</sup>MetaMask is a browser extension for managing Ethereum accounts, and allowing ordinary websites to interact

### 4.3 Data Sharing

Data is not stored inside the blockchain. Instead, it is cryptographically stored on the peer device. Anyone can use any possible means to share the data off-chain to whom they want. However, to ensure that only the recipient will be able to read the information, the protocol provides an smart contract that implements a selective disclosure mechanism. It consists of signing the data's private key using the recipient's public key and storing it at the data sharing smart contract. As long as only the recipient holds his private key, he is the only one who is able to decrypt the data's private key and, therefore, decrypt the data. This protocol is illustrated by the Figure 11.

Figure 11: Swapy protocol - Data sharing flow

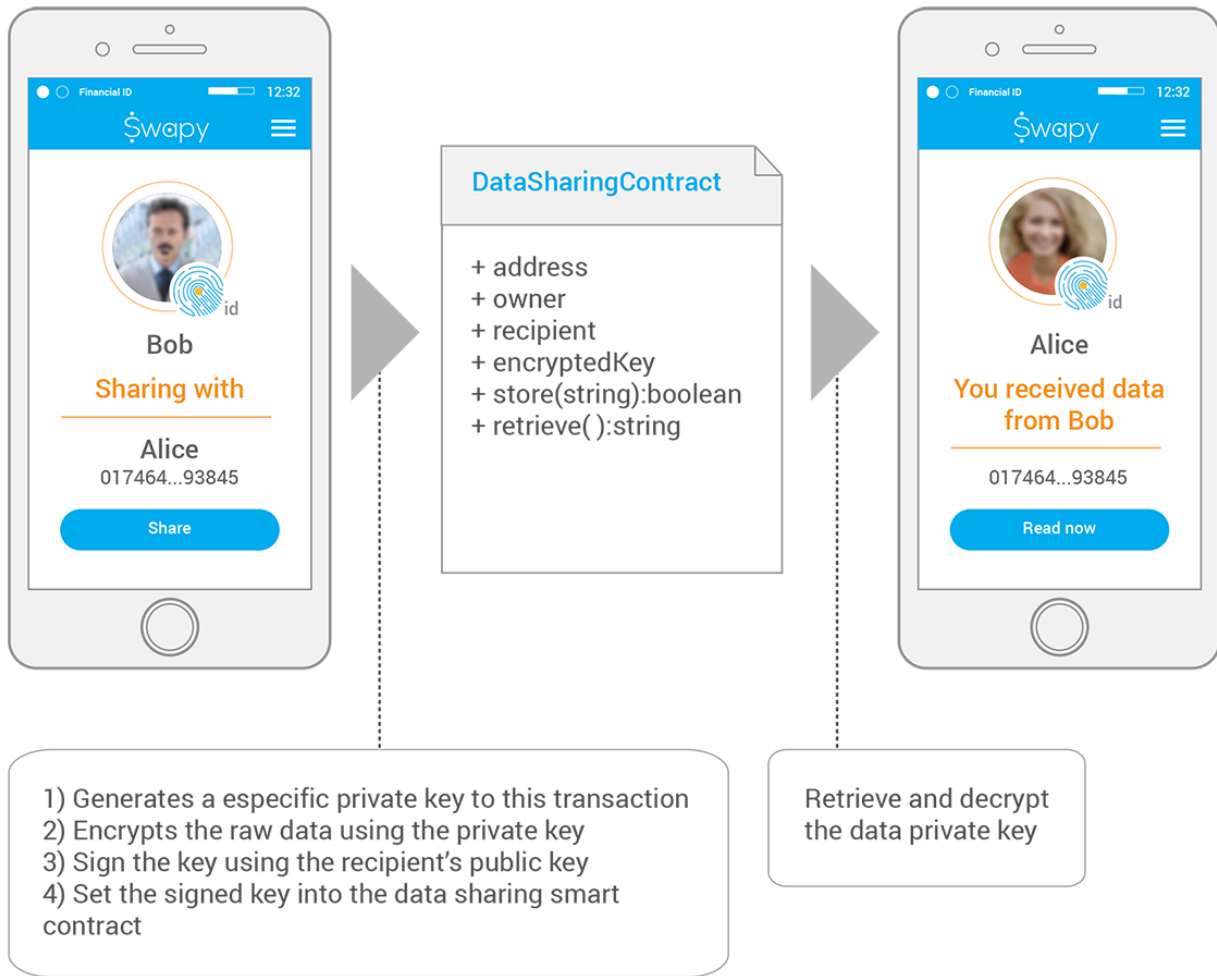


There are many ways to share data. We suggest the use of IPFS or the Signal Protocol. Inside the Swapy Network, peers will be constantly sharing their financial history either completely or partially in many different granularities. May it be to consume a service or just to receive tokens in exchange of it. We provide a decentralized application (Swapy Financial ID) that help to fill, organize, store, backup, and share data to other peers in our network. For every sharing through the D'App, a new cryptographic key is generated to encrypt the data for that specific transaction. It is stored into the data sharing smart contract. This process pushes the data using the Signal Protocol to the recipient who gets notified via a push notification. Then, he is able to read the data's private key from the blockchain using its D'App. Since the data's private key is signed with the recipient's public key, he is the only one who is able to ask the sharing smart contract to decrypt the data's private key and retrieve its actual value. The Figure 12 represents the data sharing flow.

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with the Ethereum blockchain, while keeping the user in control over what transactions they approve [20]. It can also be embedded into the apps.

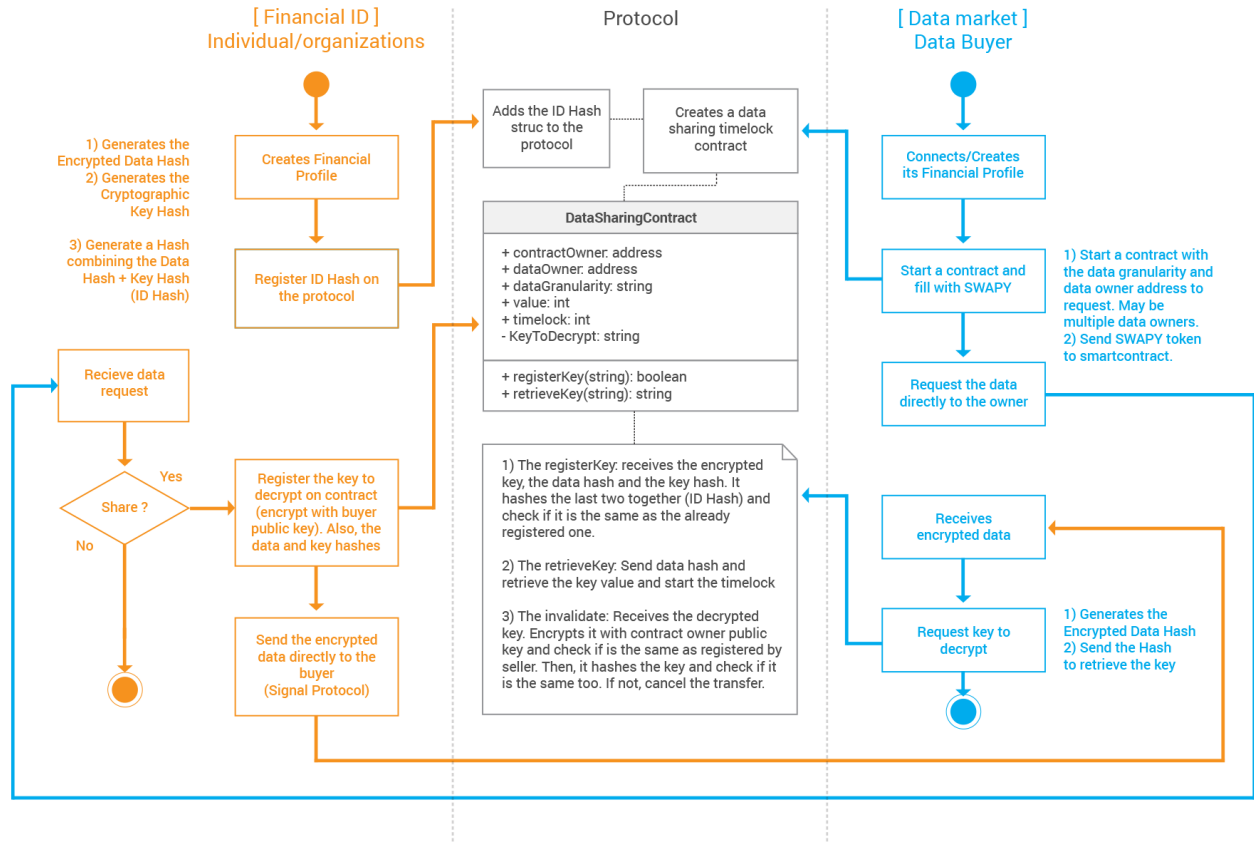
Figure 12: Sharing data through Swapy Financial ID



## 4.4 Data Ingestion

The data flow in the protocol provides a way for individuals to share their financial history, or only a smaller part of it, to other peers on the network in exchange of Swapy Tokens. To do so, a peer interested in buying data from a single peer or multiple peers must start a smart contract informing the ETH address of the peer intended to share data and a timelock for the transfer of funds to complete. Then, the peer must share the encrypted data (off-chain), for example through the IPFS protocol or using the Signal Protocol. By using a Selective Disclosure-based approach, we defined that the data seller should encrypt the data key using the buyer's public key and register it inside the smart contract. This way, only the data buyer will be able to decrypt the data key even though the smart contract attributes are publicly available in all nodes. This also guarantees that only the data buyer will be able to decrypt the data. The Figure 13 details the Swapy data ingestion flow.

Figure 13: Data sharing flow on Swapy Protocol



## 4.5 Insights Consumption

We expect that our data protocol evolves in the mean time. As a company, we will provide a interface in which peers in the network can filter and request data in bulk to individuals in the network, paying value through Swapy Tokens. At a first moment, the individual would share their data directly to the peers. However, there is no possibility to expires this data access grant. So, we believe that to enforce a higher privacy, our protocol should provide an three-parties smart contract connecting data owners, algorithm and infrastructure providers and insight buyers. This way, the data will only be shared encrypted, the algorithm providers will be mining encrypted data, while the insight buyers will receive the data processing results directly from the insight providers. This way, we will be able to enforce privacy in the network.

We expect some use cases. However, we are not able to predict all the use case that creative minds all over the world will be able to provide inside the network. For example, we already expect to arise a lot of different algorithmic approaches towards credit analysis, investment risk analysis, new market targeting strategies, enabled by Swapy Network's huge and reliable data source.

## 4.6 Software Development Plan

The Swapy's software development has started since July 1st, 2017. Our release milestones are divided into: (1) private alpha; (2) public alpha; (3) private beta; (4) public beta; and (5) stable version. On July 31st, we released our private alpha as an preview containing the fund raising contracts. By October 10th we open-sourced our protocol and released the public alpha of our first decentralized application on Ropsten test net, the Swapy Exchange. Since then we are developing side features for the fund raising flow, auditing our code base and removing the dependency of a centralized login service. By mid-december we will be releasing an updated version of the Swapy Exchange D'App using an early version of our decentralized identity. From then until the end of our TGE, we will be reviewing requirements for the Swapy Exchange, Swapy Financial ID and Swapy Data Market as well as prototyping Swapy Financial ID and Swapy Data Market. After the TGE, our schedule is as follow:

1. **1st quarter after TGE:** Swapy Financial ID public alpha on test net providing identification and attestation to Swapy Exchange tokenized assets. Swapy Data Market private alpha on test net operating 1 to 1 data sales.
2. **2nd quarter after TGE:** Swapy Exchange and Swapy Financial ID private beta on main net transacting real tokens. Each credit company we are negotiating with will have their own timeline to start using the Swapy Exchange depending on the compliance process.
3. **3rd quarter after TGE:** Swapy Exchange and Swapy Financial ID public beta on main net. Public "Connect with Swapy ID" API available. Anyone can use for any purpose and transact real tokens. Swapy Data Market on private beta transacting real tokens and real data from Swapy Financial ID.
4. **4th quarter after TGE** Swapy Data Market public beta on main net. Swapy Exchange and Swapy Financial ID improvements. Planning the following year considering the community surveys.

## 5 Token Offer

Swapy Network is an Open Source project managed by the Swiss corporation Swapy Network GmbH. We are seeking the collective contributions of the crypto community and, in return, we make a pledge:

1. The focus of our team will always be in developing and promoting the technology that can potentially make credit cheaper and universally accessible all around the world.
2. 100% of the proceeds of the token offer will go to the development of the Swapy Network protocol.
3. The Swapy Network protocol is open source under the Apache 2.0 license. We will share our contacts, knowledge and resources with teams around the world who would like to contribute to the development.

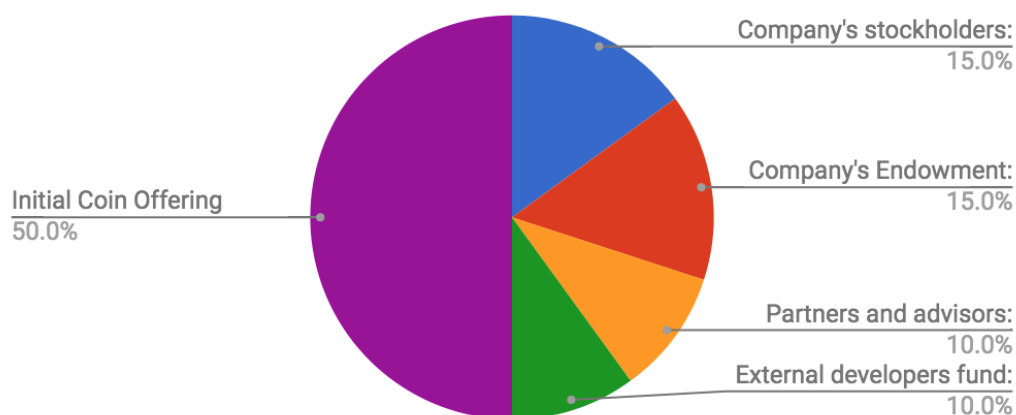
4. We are committed to the highest standards of accountability, transparency and compliance. We support the effort of the community for self regulation. That is why we pledge to commit to the ICO Governance (<https://icogovernance.org/>) compliance, accountability and transparency code and to submit the IGF-1 form.
5. We will always consider the token holders best interests in our decisions.

## 5.1 Economics

The **number of Tokens minted at launch will be 100,000,000 (One Hundred Million)**. There will be no new Swapy Tokens minted over time. Therefore, the total supply of tokens is known and finite. The distribution after the Token Generation event is illustrated by the Figure 14 and will be as follows:

- Company's stockholders: 15% (Founders, employees and early investors);
- Company's Endowment: 15%;
- Partners and advisors: 10%
- External developers fund: 10%
- Initial Coin Offering: 50%

Figure 14: Tokens distribution (100,000,000 SWAPYs)



It is important to emphasize that for the founders and employees there will be a mandatory vesting period of 3 years with a 1 year cliff. For early investors, partners and advisors, there will be a lock up period of 6 months before they can sell any token. For security reasons, all contributions will be received in Ethers. If the token purchaser has fiat money or other cryptocurrency, he/she will have to exchange it to Ether in their favorite exchange. The price of Swapy Tokens at the time of the Token Launch will be pegged to the price of the Ether in the following proportion:

$$1 \text{ ETH} = 600 \text{ SWAPY}$$

## 5.2 Partners

**Blockhaus (Zug, Switzerland):** The world’s first capitalized, swiss-regulated institutional provider of smart contract tokenized ecosystems. Blockhaus combines the strength of the compliant, regulated centralized world with the programmable power of the Blockchain into a decentralized investment bank platform that creates blockchain property through Token Generating Events (TGE).

- Main Contact: **Anatoly Burman** ([anatoly.burman@blockhaus.io](mailto:anatoly.burman@blockhaus.io))
- Address: Zollstrasse 58, 8005 Zurich, Switzerland.

**A Star Labs (São Paulo, Brazil):** Development and research labs leading the adoption of blockchain technology within private and public businesses in Latin America. Born with the moto “Moonshot makers”, A Star has the desire to use the blockchain technology to create the extraordinary. Their research and development lab are not limited to concepts or ideas. They are committed to deliver applicable results and practice above the theory. A Star is committed to help promising startups to create Blockchain enabled projects to change the world. Swapy Network is just the first of many Token Offers to be supported by their “Moonshot Factory”.

- Main Contact: **Guilherme Carvalho** ([guilherme@astarlabs.com.br](mailto:guilherme@astarlabs.com.br))
- Address: Rua Joaquim Floriano, nº 820/834, Itaim Bibi – CEP 04534-002. São Paulo- SP, Brazil.

**IT2S Group (Santa Monica, CA, USA):** IT2S Group is a cloud security leader and developed the Access Shield, an access control solution that deploys the SDP concept. Its team is member of CSA Software Defined Perimeter Workgroup, responsible for develop and test the SDP specification.

- Main Contact: **Leonardo Goldim** ([goldim@it2sgroup.com](mailto:goldim@it2sgroup.com))
- Address: Santa Monica, CA - USA.

## 5.3 Governance

Swapy Network is an open source project managed by the Swiss corporation **Swapy Network GmbH**. We are committed to the highest standards of accountability, transparency and compliance. We support the effort of the community for self-regulation. That is why we pledge to commit to the ICO Covernance (<https://icogovernance.org/>) disclosure code and to submit the IGF-1 form.

### 5.3.1 Project Advisors

- Tim Draper: [linkedin.com/in/timothydraper](https://www.linkedin.com/in/timothydraper)
- Don Tapscott: [linkedin.com/in/dontapscott](https://www.linkedin.com/in/dontapscott)
- David Orban: [linkedin.com/in/davidorban](https://www.linkedin.com/in/davidorban)
- Ratan Singh: [linkedin.com/in/ratanmanehani](https://www.linkedin.com/in/ratanmanehani)

### 5.3.2 Board of Directors

- Edmilson Rodrigues: [linkedin.com/in/edmilson-rodrigues-b4500429](https://www.linkedin.com/in/edmilson-rodrigues-b4500429)
- Túlio Braga: [linkedin.com/in/tuliobraga](https://www.linkedin.com/in/tuliobraga)
- Marcelo Garcia: [linkedin.com/in/marcelogarcia](https://www.linkedin.com/in/marcelogarcia)

## 5.4 Use of Tokens Sales Proceeds

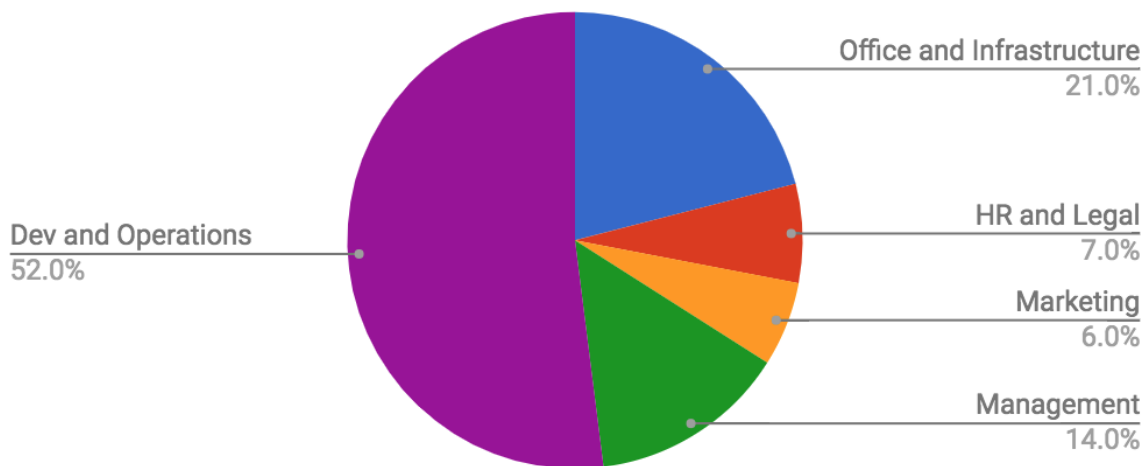
We are estimating a total budget of **USD\$ 19.364.232,12** for a term of 5 years. During this period we will be developing and improving Swapy's protocol, as well as developing the decentralized apps Swapy Exchange, Swapy Financial ID, and Swapy Data Market. The Table 3 indicates the yearly expenses considering costs with team, cloud services, equipments, marketing, hiring, training, software and contracts deployment, trademark registration, and partners fees. Any value raised above the planned budget will be transparently applied for community development.

Table 3: Expenses by year

2018	2019	2020	2021	2022
\$ 3,148,137.82	\$ 3,762,325.75	\$ 3,950,442.04	\$ 4,147,964.14	\$ 4,355,362.35

To help understanding our efforts considering the use of proceeds, we separated the efforts into five main categories: (1) Dev and Operations; (2) Office and Infrastructure; (3) Management; (4) HR and Legal; (5) Marketing. The Figure 15 illustrates the expenses by category as estimated by our team.

Figure 15: Expenses by category



## 6 About the Company

Credit Dream, Inc is the company behind the Swapy Network GmbH. It was incorporated in Delaware (USA) in November 2014. Since then, the company has been working to solve the problem of access to credit.



- Company site: [www.creditdream.co](http://www.creditdream.co)
- Project site: [www.swapy.network](http://www.swapy.network)
- Twitter: [www.twitter.com/SwapyNetwork](http://www.twitter.com/SwapyNetwork)
- Slack Channel (for the ICO): [slack.swapy.network](https://slack.swapy.network)
- Telegram: [www.telegram.me/SwapyNetwork](http://www.telegram.me/SwapyNetwork)
- Facebook: [www.facebook.com/SwapyNow](http://www.facebook.com/SwapyNow)
- Linkedin: [www.linkedin.com/company/10619437](http://www.linkedin.com/company/10619437)
- Instagram: [www.instagram.com/SwapyNetwork](http://www.instagram.com/SwapyNetwork)
- Blog (Medium): [www.medium.com/@SwapyNetwork](http://www.medium.com/@SwapyNetwork)
- BitcoinTalk (Forum Thread): [bitcointalk.org/index.php?topic=2372636](http://bitcointalk.org/index.php?topic=2372636)

## 6.1 Team

Credit Dream, Inc has a multidisciplinary team composed by four C-Level employees (CEO, CTO, COO and CFO), a Lead Designer, three software developers, two financial analysts and a marketing analyst. A brief introduction to each one is disclosed below as well as at the project website (<https://www.swapy.network/team>):

- **Edmilson Rodrigues, CEO & Co-Founder:** Graduated in Business Administration at UFPE. Project Management course at Harvard. Innovation course at Stanford and Draper University. Former Google employee and serial entrepreneur.
- **Túlio Braga, CTO & Co-Founder:** Master student in Computer Science (UFMG). Graduated in Computer Engineering (CEFET-MG). Exchange student at The College of New Jersey. Innovation course at Stanford University.
- **Plinio Braga, Lead Designer & Co-Founder:** Graduated in Design at Universidade Federal de Minas Gerais, UFMG. Studied Design at Karelia University of Applied Sciences, Finland. Graduated as Electronics Technician at CEFET-MG.
- **Bruna Fiori, COO:** Economist and Post Graduation in Controllershhip, also serves as Counselor of the Regional Council of Economy. She was a substitute professor of Economics at the Federal University of Pernambuco (UFPE) for 2 years. 12 years of experience in retail, business management and financial consulting.
- **Brunno Neves, CFO:** Bachelor in Economic Sciences (PUC-SP), freelance trader, multitask entrepreneur and fintech enthusiast. Former Facebook employee. He has experience working in the financial market.

- **Icaro Harry, D’App Developer:** Graduating in Information Systems at UFMG. Technician in Computer Networks by CEFET-MG. Experience with front-end engineering, entrepreneurship and software development.
- **Luis Philipe, Solidity Developer:** Graduating in Mechanical Engineering at (UFMG). Technician in Computer Networks by CEFET-MG. Passionate about web development and entrepreneurial ideas.
- **Adriel Santos, D’App Developer:** Graduated as Computing Technician at CEFET-MG. Skills Without Borders exchange student at Bournemouth and Poole College, United Kingdom.

## 6.2 History

Since our incorporation, we have made much effort to growth our business. Some of our main accomplishments were:

- In December 2014 the startup received USD\$60,000 in angel investment from Tim Draper (Draper Associates).
- During 2015, the company validated the idea of credit for education. The team decided to pivot to credit in general in early 2016.
- In June 2016 the startup was one of 20 to participate at Menorca Millennials.
- In July 2016 the startup received USD\$80,000 in seed capital from Draper Associates and Lánzame Capital.
- In March 2017 the startup received USD\$200,000 in seed capital from Huiyin Blockchain Ventures and Draper Associates.
- In May 2017 the startup was one of five selected to pitch at Consensus 2017.
- In June 2017 an angel investor the founders met at Consensus 2017 invested USD\$100,000 more in the company. The investor is a Japanese FX trader with excellent contacts among other Japanese investors.
- In July 2017 the company was finalist of Singularity University’s Global Grand Challenges awards in the Prosperity track and is going to Pitch at the SU Global Summit.

## 6.3 Legal and Compliance

A comprehensive legal research was conducted to analyze the compliance of Swapy Network business model as well as the corporate structure of Credit Dream, Inc. More information upon request at [ed@creditdream.co](mailto:ed@creditdream.co). Our legal advisors are:

- HCO Law (Brazil) - The first Brazilian law firm providing full service legal advice focused on on-line businesses and the new economy.
  - Website: [www.hcolaw.com](http://www.hcolaw.com)
  - Key contacts: Jihane Halabi ([jihane@eadvisor.com.br](mailto:jihane@eadvisor.com.br)) and Anne Chang ([anne@eadvisor.com.br](mailto:anne@eadvisor.com.br))
- Ryan David Williams (USA): San Francisco-based law firm advising high-growth business and their founders and investors - from formation, to venture financings, through (hopeful) exit.
  - Website: <http://ryandavidwilliams.com>
  - Key Contact: Ryan David Williams, Esq. ([hello@ryandavidwilliams.com](mailto:hello@ryandavidwilliams.com)).
- A premier law firm (Zug, Switzerland)

## 6.4 Press Coverage

Since the beginning, Credit Dream, Inc as well as the Swapy project has been covered by the press media and attended to some startup programs and competitions. Some of those appearances from the most recent ones to the formers are:

- Top 3 at Singularity University Global Grand Challenges 2017 Prosperity Track - Credit Dream is one of the selected startups to present in the Global Grand Challenge Awards that occurs in San Francisco (USA) from August 13th, 2017 to August 15th, 2017 [21];
- BBooster Week attendee - Credit Dream was invited by the BBooster team to participate as startup in a one-week immersion program in the Canary Island (Spain). In total, eight startups were invited to attend to the program from 19th June, 2017 to 23rd June 2017. As stated in its website, BBooster is the first Spanish accelerator for driving new ideas that base their business model on the Internet and within mobile applications [22] [23] [24] [25].
- Singularity University Exponential Finance: Innovation Lab - Credit Dream has exhibited its solution for Universal Access to Credit twice at ExFin in New York (USA), one in June 2016 and more recently in June 2017 [26].
- Top 5 at Consensus 2017 Proof-of-Work Competition by Coindesk. Credit Dream was one of the finalists in the pitch competition at the main Blockchain conference in the world, that occurred from May 22nd, 2017 to May 24th, 2017 [27].
- 10 Blockchain Startups to Watch by PCMAG - Our solution for Universal Access to Credit was covered by PCMAG as one of the 10 exciting companies to keep an eye on as the Blockchain space evolves in February, 2017 [28].
- Top 10 Brazilian Undiscovered Startups by EQUIDAM - Credit Dream was considered one of the 10 hottest Brazilian startups out of 150+ analyzed by their team in November 2016 [29].

- Hacker Unit - Credit Dream was one of the 9 startups selected to this virtual accelerator program. This session was fully focused in Blockchain startups and happened between October and November 2016.
- Top 10 G-Startup Worldwide - Credit Dream pitched at the G-Startup Worldwide São Paulo (Brazil) in August 2016 as one of the finalists [30].
- Menorca Millennials 2016 - Our startup was invited to the decelerator-called program in the island of Menorca (Spain), from 1st June to 15th June 2016 [31] [32].

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