

# DeFi Borrow and Lending Platform

## PROTOCOL WHITEPAPER

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#### **Abstract**

This document describes the definition and goal of the Polkadot DeFi protocol explaining all it's aspects.

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## 1. Introduction

We have seen a tremendous change inside the Cryptocurrency ecosystem over the past few years. What started out as a data structure has evolved over the years into a robust and rapidly growing means of accessing unused capital. The immutability of the blockchain combined with a smart contract has expanded our use-case of this revolutionary technology and is making centralized cryptocurrency platforms like Binance, Coinbase, Kucoin slowly but surely obsolete.

### 1.1 Current DeFi protocols and their goals

Most DeFi protocols operate on the same concept, market makers are eliminated and replaced with an automated market maker pool, which monitors a pool that usually consists of two tokens. Most of the capital inside these pools remain unused however, and this has caused a development of decentralized lending & borrowing.

Utilizing the liquidity pools, a user has the option of collateralizing his digital assets(Cryptocurrency) for leverage, or for increasing his stake yield. The goal of BloxiFi platform is to be a place where users can utilize unused capital inside the Polkadot ecosystem. The most important goal however, is to introduce a collateralization of NFTs which have seen a tremendous expansion during the last year.

### 1.3 Definitions

$U$ , utilization rate

$U_{\text{optimal}}$ , target utilization rate

$R_t$ , interest rate

$H_f$ , health factor

$L_q$ , liquidation threshold

LTV, Loan to value ratio

maxLTV, maximum loan to value ratio

## 2. Platform Architecture

The Borrow & lending part of the platform is implemented in the following way :

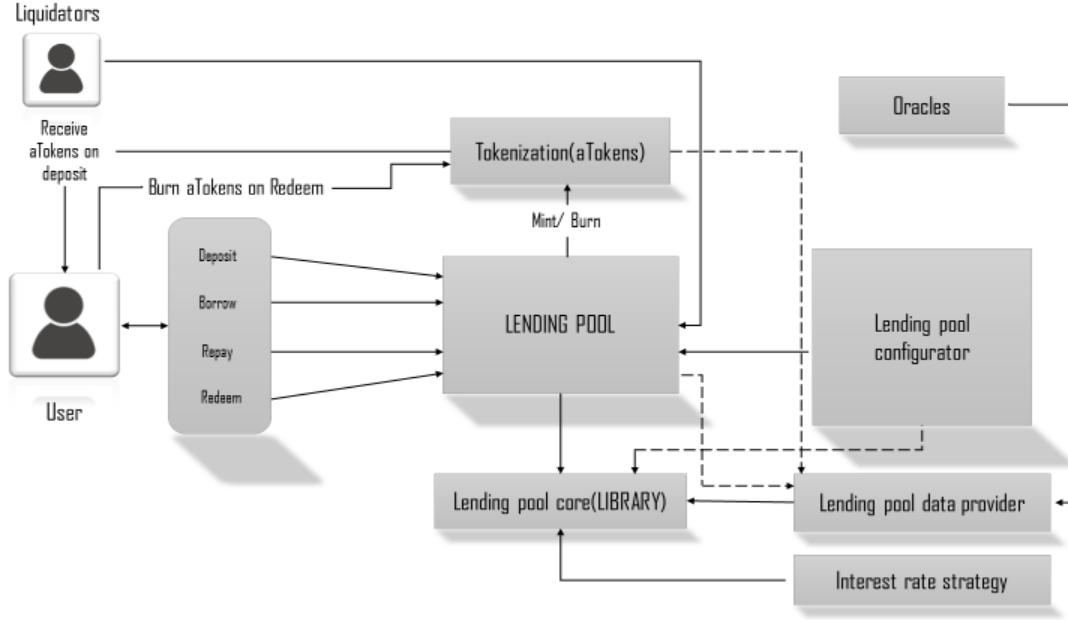


Figure 1 : Platform basic architecture

### 2.1 Interest rate strategy

Interest rate of digital assets deposited to the pool, is dependent on the Utilization ratio. Since liquidity risks appear when the utilization rate nears 100%, the interest rate curve is split into two parts around the optimal Utilization rate  $U_{optimal}$ .

The interest rate  $R_t$  uses the following model:

$$if U < U_{optimal} : \quad R_t = R_0 + \frac{U_t}{U_{optimal}} R_{slope1}$$

$$if U \geq U_{optimal} : \quad R_t = R_0 + R_{slope1} + \frac{U_t - U_{optimal}}{1 - U_{optimal}} R_{slope2}$$

- If  $U$  is less than  $U_{optimal}$  the borrow interest rate increases linearly with utilization.
- If  $U$  is equal or greater than  $U_{optimal}$  the interest rate increases exponentially.

By splitting the interest rate curve this way, a safe utilization ratio is ensured, while at the same time ensuring that the interest rate is both high enough for Liquidity providers to deposit liquidity and low enough for users to borrow from available liquidity.

### 2.2 Debt

When a user borrows an asset he receives a dToken that represents his debt, this token starts accruing debt on the loaned sum (borrowed sum + interest rate). This debt ratio accumulates every block and it is dependent on the Utilization ratio.

## 2.3 Health Factor and Liquidation Threshold

Every borrowed position is characterized by its health factor **Hf**, it can be thought of as a function for the total collateral and total borrows. The health factor is determined through the following:

$$H_f = \frac{TotalCollateralETH * L_Q^a}{TotalBorrowsETH + TotalFeesETH}$$

If the **Hf** < 1, then the borrowed assets are considered undercollateralized and are in danger of being liquidated.

When a user has multiple collateralized assets, then the asset that is going to be sold in order to repay the loan, will be the asset with the highest **Loan to Value(LTV)** ratio.

After the **Hf** < 1, then the user still has a small window of time in which he can stabilize his health factor. What determines when a position is going to be liquidated is called a **Liquidation Threshold Lq** and is equal to **maxLTV** that is defined in the equation below:

$$MaxLTV = \frac{\sum Collateral_i \text{ in } ETH \times LTV_i}{Total \text{ Collateral in } ETH}$$

Once the user's borrowed assets reach MaxLTV, then his collateral is put up for liquidation.

Liquidation scenario consists of the user's collateralized assets being auctioned off until LTV ratio is close to 50% of maxLTV.

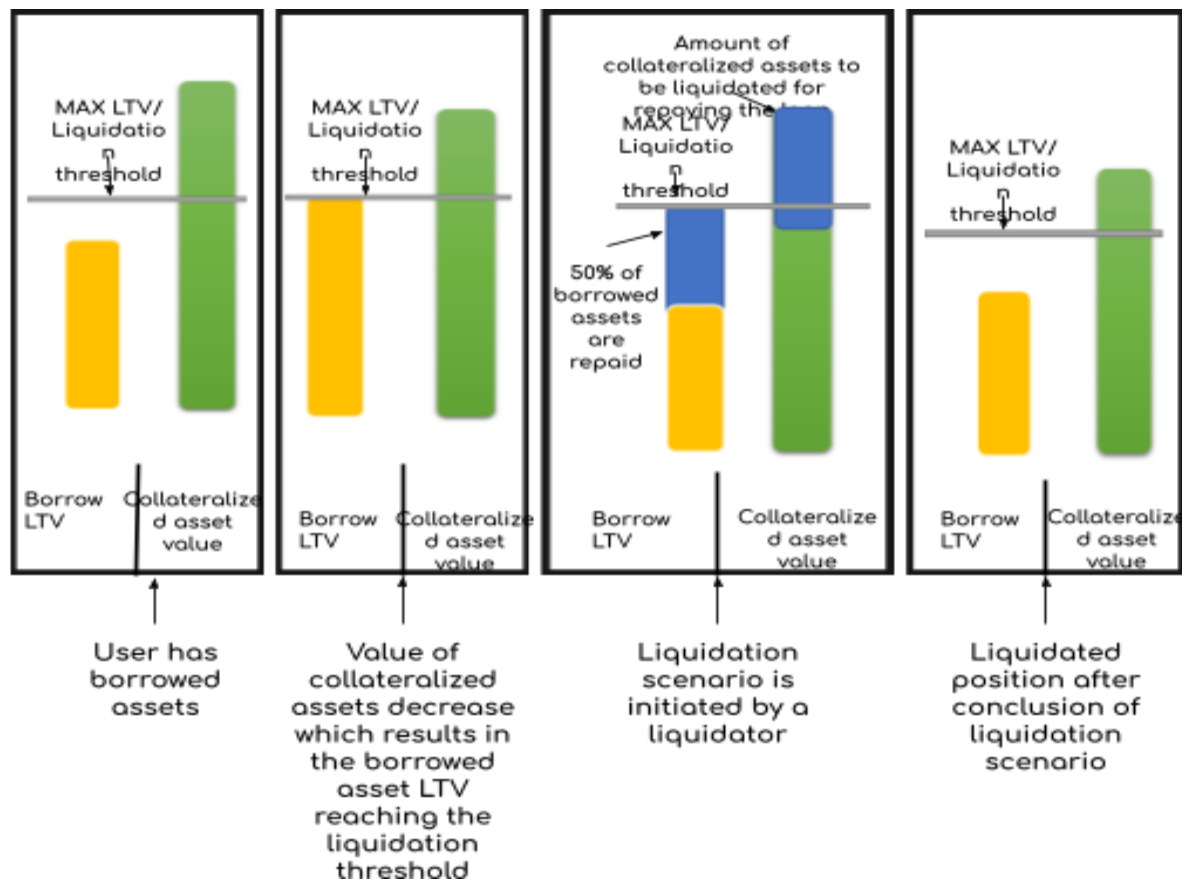


Figure 2 : Liquidation scenario

A position can be liquidated in two ways :

- ❖ Selling through an Automated market maker(AMM)
- ❖ Through Liquidators

Selling liquidated assets through an AMM carries certain risks in the form of high slippage and too many routes between the token we want to buy and the token we want to sell.

Liquidators(users) have an option of buying a liquidated asset at a discount price. The lower price incentivizes liquidators to repay a portion of the user's debt(50%). The discount number is dynamic and it can range between 5%-15%.

## 2.4 Tokenization system

When a user deposits an asset to the pool, he is not in control of those assets anymore. To keep track of how much assets each user is supposed to receive when redeeming his assets, the platform has a built in Tokenization system.

When the user deposits his asset he receives a Token (aToken) which has a 1:1 ratio with the deposited asset. This token gains interest over time which automatically increases the amount of assets that the user receives once he redeems his asset.

Example : When a user deposits 2 WETH to the pool he receives 2 aTokens(2 aWETH) that start accruing interest over time. When the user wants to redeem his deposited funds after a certain amount of time, he will receive his WETH corresponding to the amount of aTokens he has for that particular asset(if he has 2.5 aTokens, he will get 2.5 WETH).

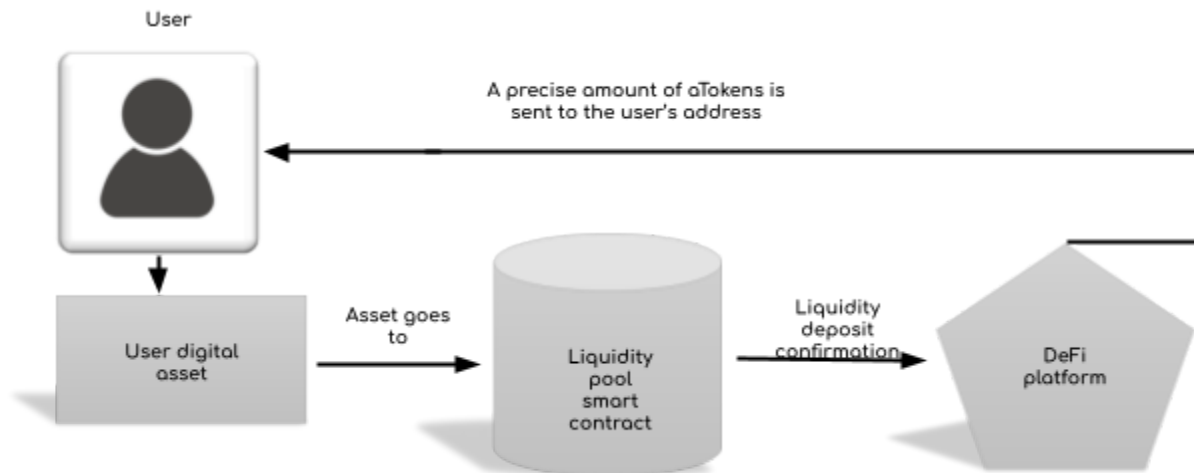


Figure 3 : aToken acquisition process

### 3. The Lend & borrow pool interaction

Users can interact with the pool in the following ways : Deposit assets, Redeem assets, borrow assets, repay borrowed asset, Liquidation call

#### 3.1 Deposit

Deposit action is one of the most simple and is done in the following process.

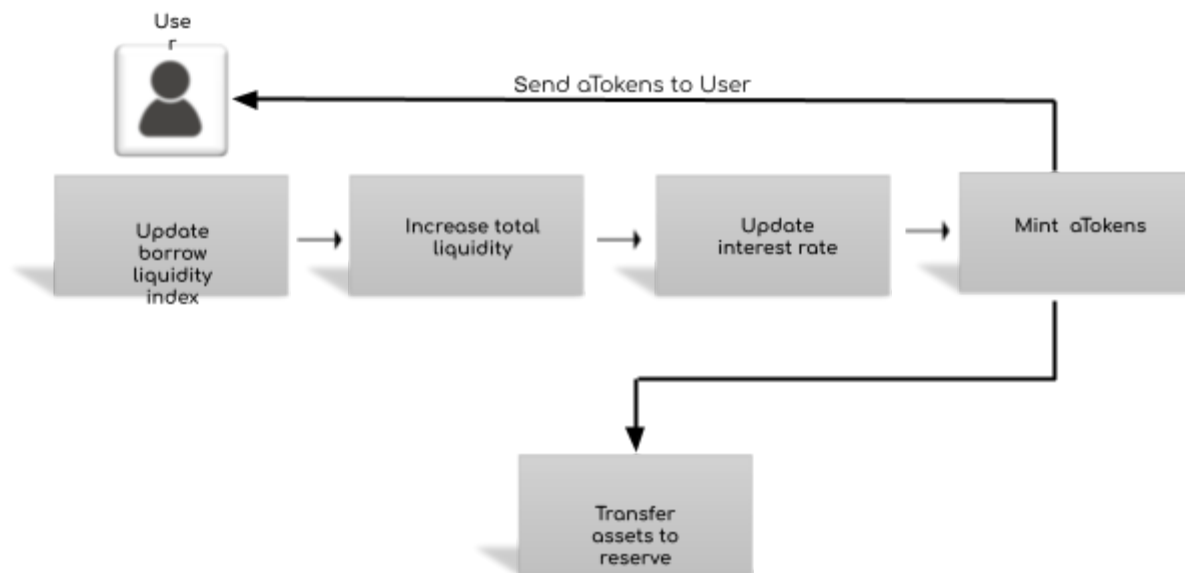


Figure 4 : Deposit funds process

#### 3.2 Redeem deposit

The redeem deposit option allows users to withdraw their liquidity from the pool, the user exchanges the aTokens for the assets that he previously deposited. Users can redeem positions partially or fully.



This action is done by the following process:

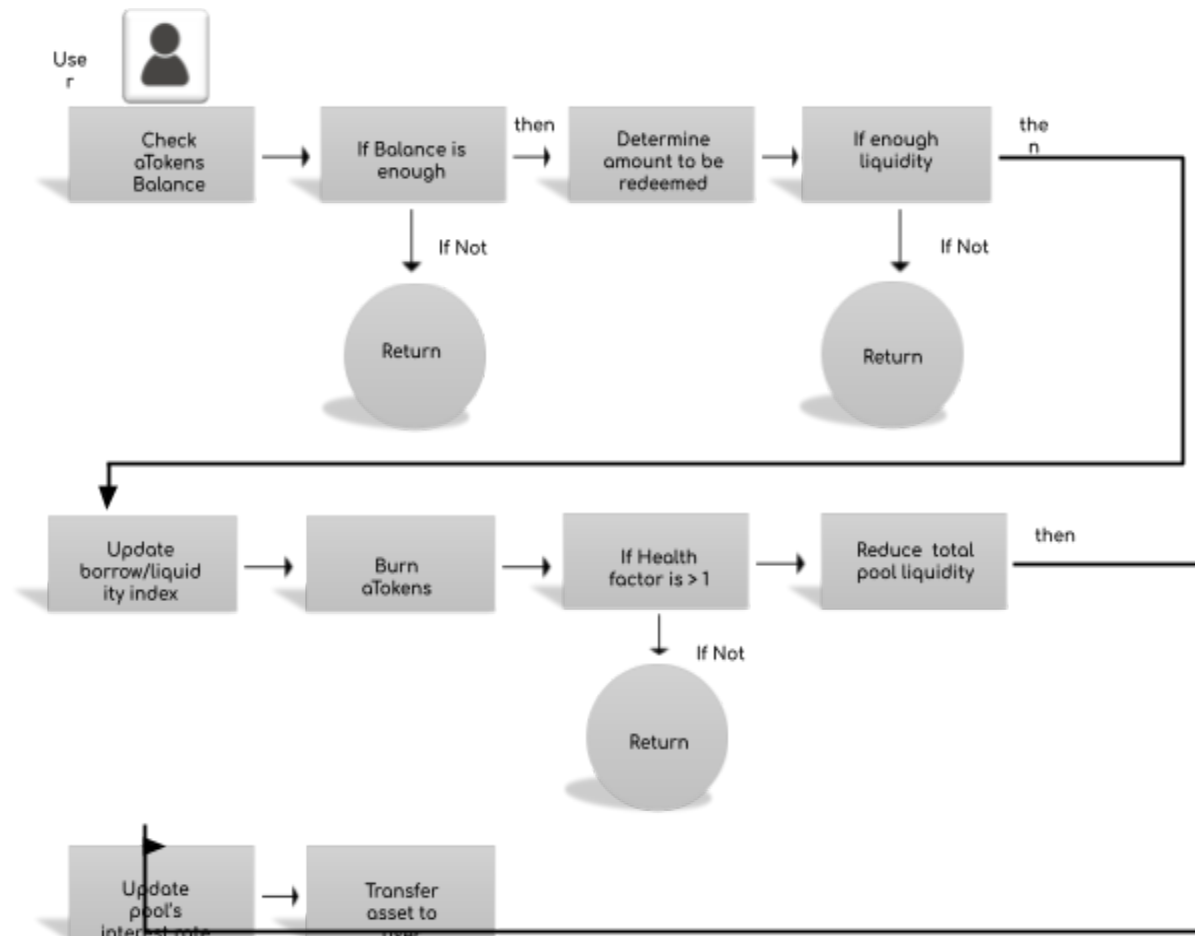


Figure 5 : Redeem deposit process

### 3.3 Borrow asset

Users can borrow assets if the following conditions have been met :

1. User has deposited digital asset to the pool
2. User has approved his digital asset as a collateral

The borrow action is done by the following process :

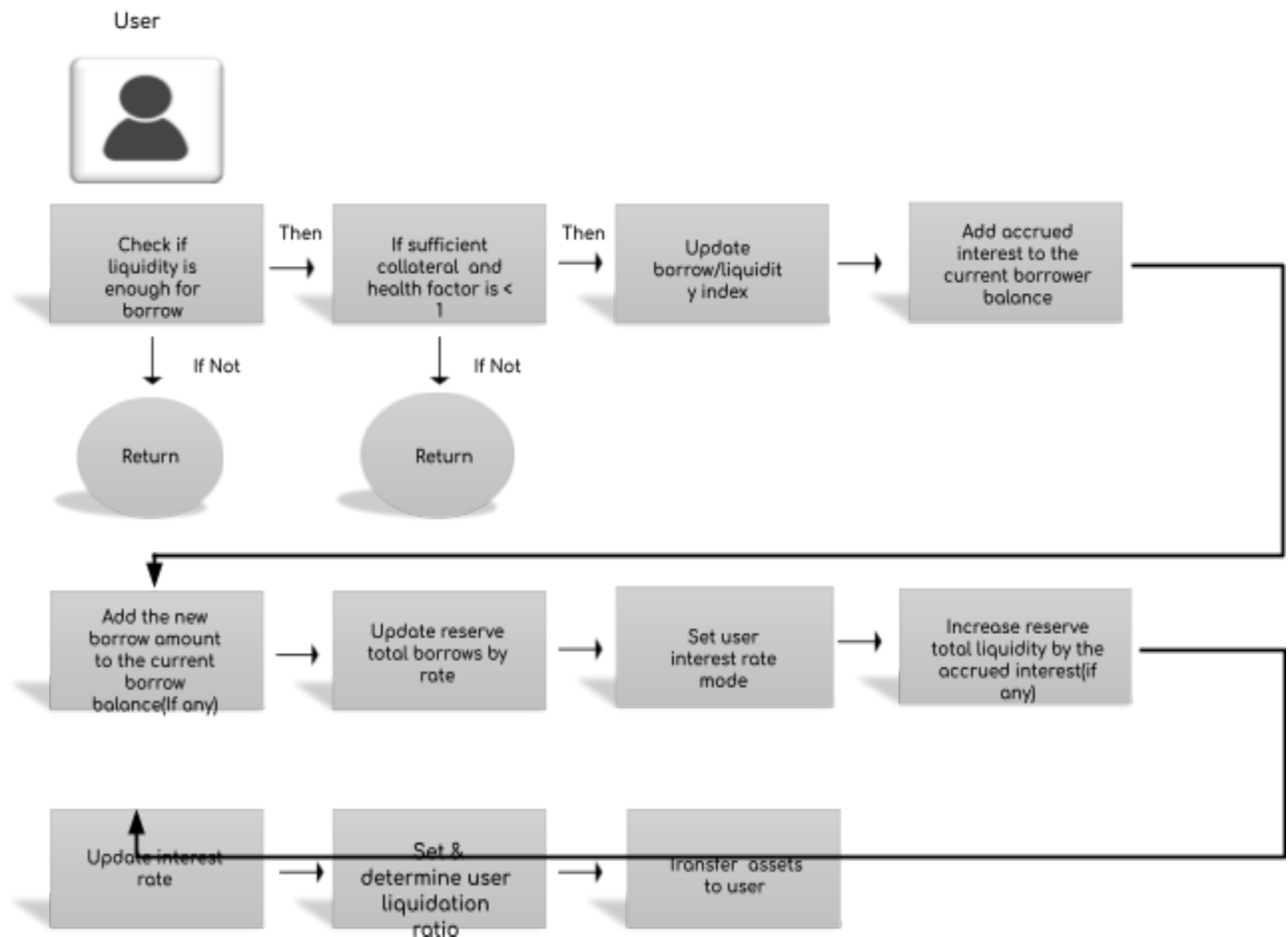


Figure 6 : Borrow asset process

The amount of borrowed assets that a user can get is dependent on the LTV of his collateralized asset. For example if one user deposits 1 ETH and the LTV of ETH is 50%, that means that a user can borrow a maximum amount of 0.5 ETH.

### 3.4 Repay borrowed asset

User is able to repay his outstanding debt anytime by repaying assets to the borrowed pool. Assets that were borrowed must be repaid with the same asset, for example if USDC was borrowed, then the user has to repay that borrowed asset with USDC.

The repay borrowed asset is done by the following process :

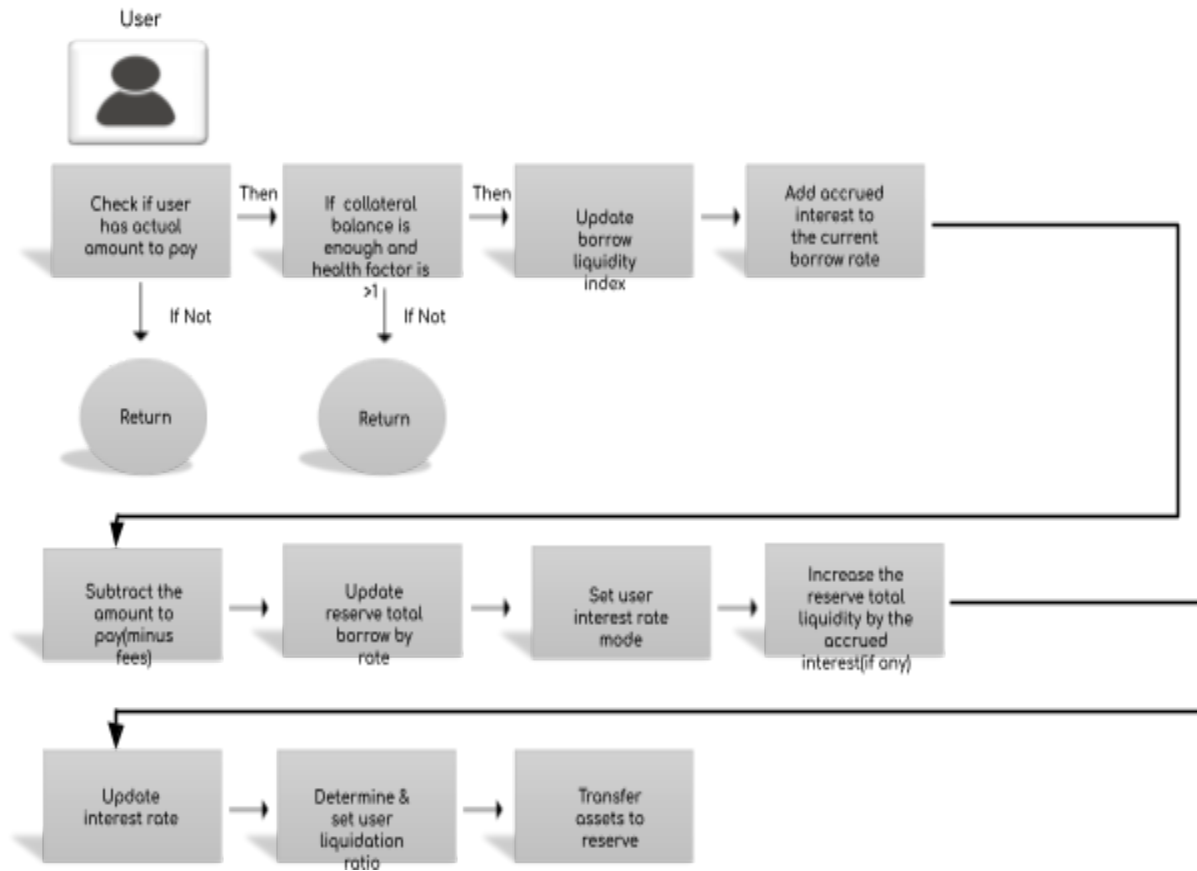


Figure 7 : Repay borrow asset process

### 3.5 Liquidation call

If a Liquidator is interested in buying a liquidated position, he can initiate a Liquidation call. Liquidation call is done by the following process:



Figure 8 : Repay borrow asset process

## 4. Risk Mitigation Module

Risk Mitigation Module is a series of smart contracts which mitigate potential losses done by Shortfall events.

It consists of the following modules:

1. Stake module
2. Auction module
3. Backstop module

Shortfall event definition: An event which is characterized by sudden loss (deficit) of liquidity inside the platform. This can occur due to Oracle failure to update prices, a particular collateralized asset suddenly seeing a steep drop in price and lastly smart contract failure which can occur due to a bug, design flaw or an attack by a malicious party.

Shortfall events are covered by the platform through **Governance** vote.

Users staking in Risk Mitigation Module will receive instructions on how the Module works and what is its purpose as well as the risk involved when depositing their digital assets to the smart contract. Users are advised to carefully analyze the purpose of the module before staking digital assets.

Users who contribute in the providing liquidity and staking in the Risk Mitigation Module, will receive rewards from fees that go to liquidity providers.

The platform reserves 10% of the total platform APY, this 10% is further divided into 3 streams:

1. 5% is reserved for the platform treasury
2. 2.5% is reserved for Stake users
3. 2.5% is reserved for Backstop module liquidity providers

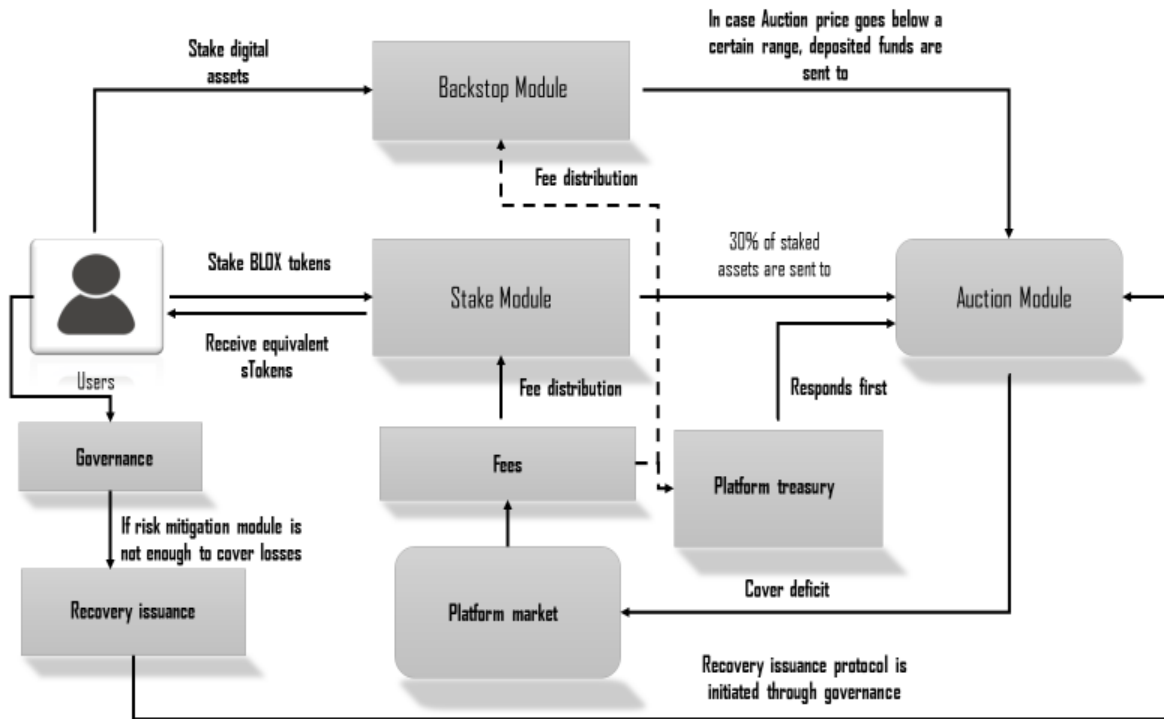


Figure 9 : Risk Mitigation Module during Shortfall event

## 4.1 Stake Module

**Stake Module** are smart contracts that have a central role within the **Risk Mitigation Module**, it can be thought of as a central treasury which is used in case of a shortfall event.

Once a Shortfall event occurs, 30% of locked assets inside the **Stake Module** are auctioned off in order to pay for the deficit in liquidity.

In case the deficit of assets is greater than the amount of auctioned assets, the platform governance can initiate a “**Recovery Issuance**” where additional tokens are minted and auctioned to cover the deficit of funds.

Since liquidity is required for the **Risk Mitigation Module** to work, users are incentivized to stake their own BLOX tokens by receiving rewards from different sources, these are:

1. BLOX staking rewards
2. ArthSwap LP fees
3. ARSW token farm
4. Platform fees

When a user deposits his BLOX tokens, they receive the equivalent amount of **sTokens** which represents the amount of tokens they have staked.

Only users that staked their BLOX tokens are eligible to vote on proposals through the platform Governance.

Deploying assets into AMM pool is done automatically, however, users will be able to choose if they want to stake:

1. Only BLOX token
2. 50% BLOX and 50% ASTR tokens.

Users can withdraw assets from the Risk Mitigation Module at any time, however, there is a lock period of 7 days during which the digital assets are still inside the smart contract and can be used in case of Shortfall event occurrence. The user receives staking fees during this time. Once the lock period ends, the user has full control over his funds again.

If users want to unstake their assets while also providing liquidity within the BLOX-ASTR pool, their funds will then get removed from LP pool and will only receive BLOX tokens and will not receive LP fee bonus nor ARSW tokens during the 7 days of unstaking period.

Users can stake their BLOX tokens through the following process :

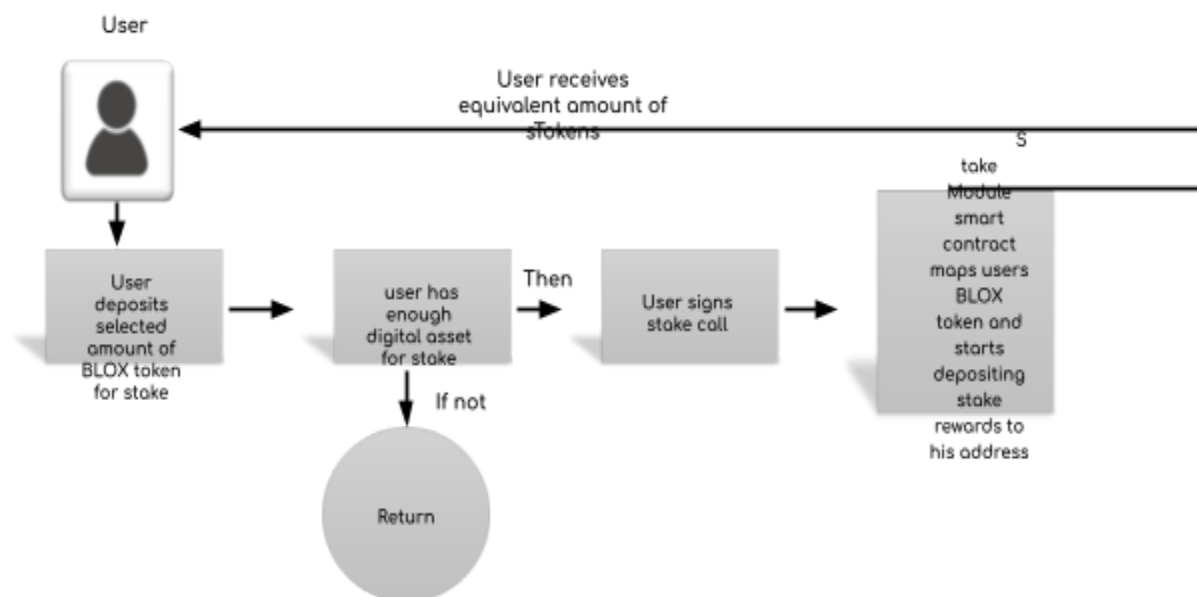


Figure 10 : Stake module call process

Users can unstake their BLOX tokens from the Stake Module through the following process:

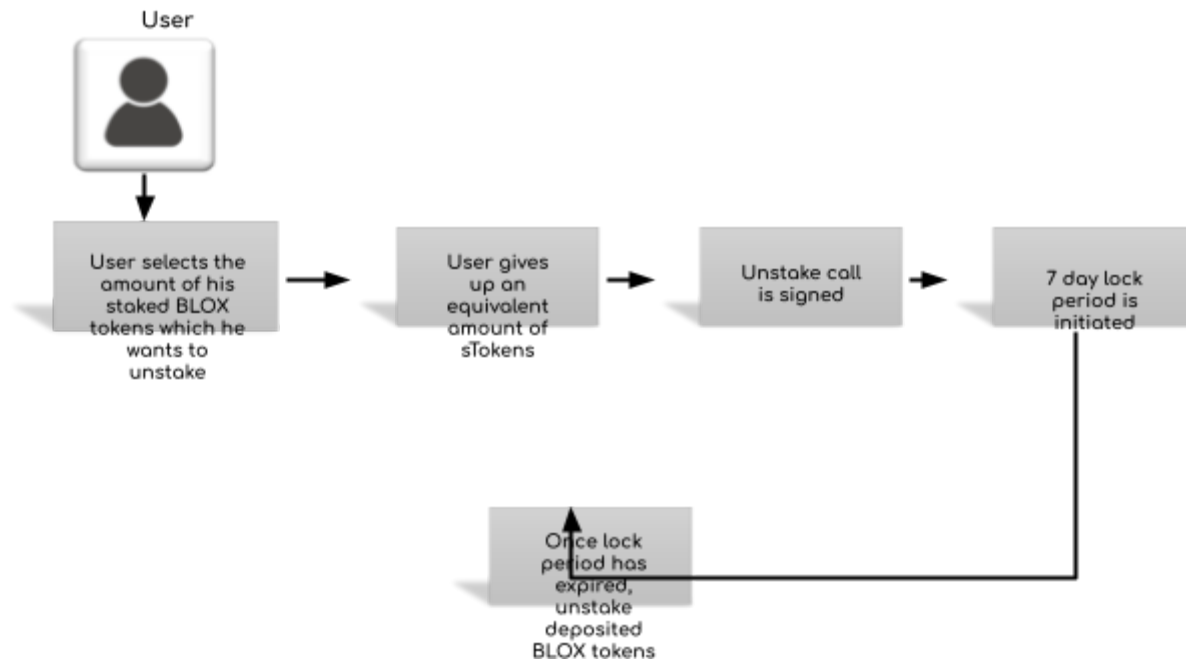


Figure 11 : Stake Module unstake call process

## 4.2 Auction Module

Auction Module is a smart contract which is responsible for auctioning part of the RMM during Shortfall event occurrence.

The Auction Module interacts with the following modules during Shortfall event:

1. Stake Module - gives staked assets to be sold off for a discount.
2. Backstop Module smart contract - support Module which ensures that staked assets will be auctioned off

During Shortfall event occurrence, the platform treasury will cover for the losses incurred. In case the treasury isn't able to cover the losses, 30% of the Stake Module staked BLOX tokens will be put up for Auction through the Auction Module and bought with the Backstop Module deposited liquidity.

The Auction process uses the Dutch auction style which goes from top to bottom price.



## 4.3 Backstop Module

Backstop Module is a series smart contracts where users can deposit digital assets which include:

1. USDC
2. ASTR

During Shortfall event occurrence, deposited funds inside the Backstop Module are used to buy off assets from the Stake Module through the Auction Module.

Backstop Module liquidity providers receive auctioned assets proportional to their BM pool liquidity percentage.

If users wish to withdraw their liquidity from the Backstop Module, their deposited assets will enter a 7 day lock period during which they'll keep receiving fees but their assets are still eligible to be used in case a Shortfall event occurs.

After the 7 day lock period has passed, users' digital assets are released from the smart contract.

Users can deposit their digital assets to the Backstop module through the following process:

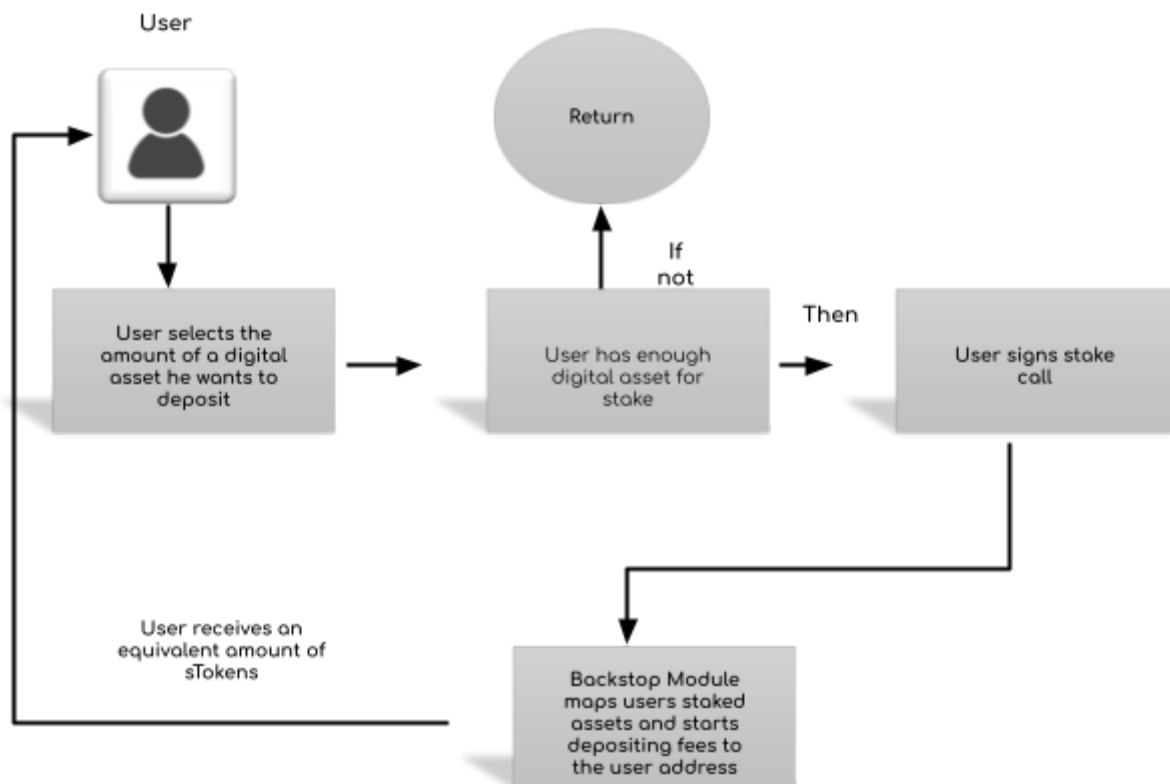


Figure 12 : Backstop Module stake process

User can unstake their digital assets from the Backstop Module through the following process:

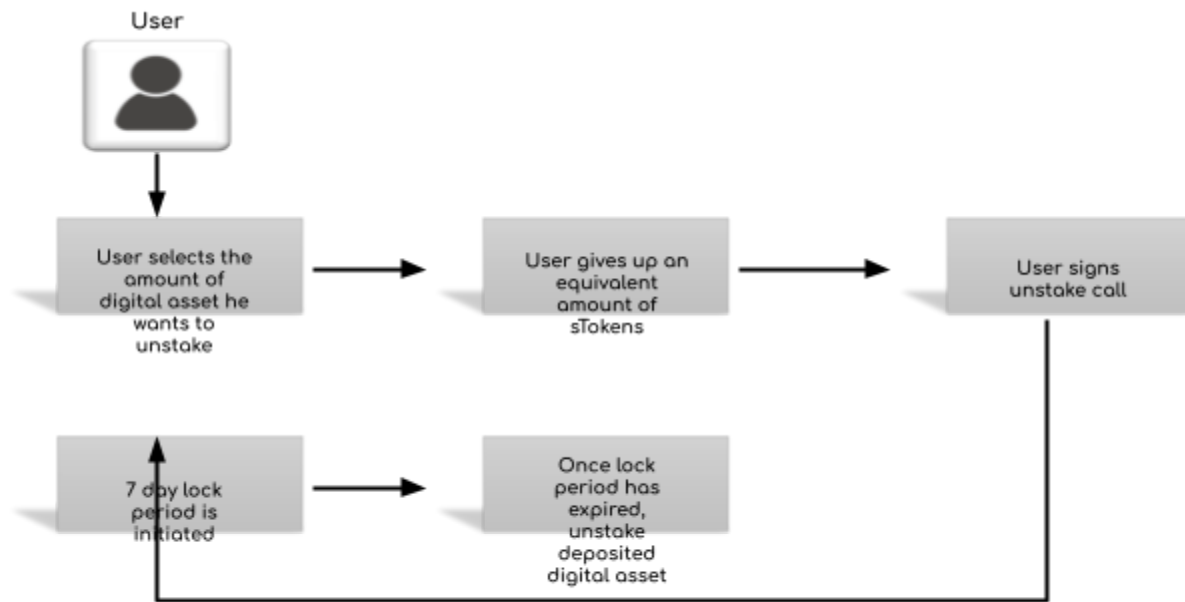


Figure 13 : Backstop Module unstake process

#### 4.4 Recovery issuance

In case 30% of BLOX tokens are not enough to cover losses due to Shortfall event then through governance it can be voted to issue more tokens in order to cover all the losses. These tokens will first be sold to stakers of Backstop Module and if that is not sufficient through AMM.