# Devision - Devision.xyz

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2022-01-20

**Abstract**

The purpose of this paper is to introduce the Devision project and explain the solutions it provides the Cardano NFT (CNFT) community. Part I offers a high-level overview of the product's key features, and a breakdown of the issues that plague NFTs, the benefits of fractional NFTs, and why we elected to build on Cardano. Part II details the functionality of our product from a more technical standpoint. We delve into some of the novel mechanisms we have developed to make fractional NFT markets resilient to bad actors.

# 1 Part I - Overview

## 1.1 Mission Statement

Devision enables the creation of liquid markets backed by ultra-premium digital assets on the Cardano blockchain. Our mission is to make investing in "the best of the best" NFTs simple, safe, and affordable, inviting mainstream adoption.

## 1.2 Problems

Liquidity is the measure of how easily you can convert an asset into another asset. You may have the rarest, most valuable vintage stamp in your possession, but without a buyer that understands the value of that specific stamp AND enough capital to afford it, you will be left holding it or selling to a pawn shop for below the market value.

NFTs are non-fungible and therefore illiquid by nature. This most notably causes:

- **Volatility** - illiquid markets, also known as "thin markets," are more susceptible to price fluctuation.

A number of additional issues inherent to NFTs are:

- **DeFi Incompatibility** - the vast majority of DeFi projects are designed for fungible tokens.
- **P2P Trading** - Unlike fungible tokens which can utilize liquidity pools for instant transactions, NFTs rely on peer-to-peer trading leading to slow sales.
- **Price Estimation** - Price setting is based on speculation and comparison to other similar NFTs for sale or previously sold.
- **Out-priced Buyers** - as the price of an NFT rises, the demand does as well, but much of the prospective market cannot participate because the unit price is not in their price range.

## 1.3 Solution

Dividing NFTs into fungible tokens directly resolves the issues of liquidity, unlocks all the potential of DeFi, and fixes the other issues described. Through smart contracts, where code is law, assets are locked while in divided form, creating a supply of fungible tokens to represent ownership in the underlying asset that can be traded and used with DeFi dapps. This has the following benefits:

- **Volatility Stabilizing** - Liquid markets have many available buyers and sellers where prices change in comparatively small increments.
- **Leveraging Assets** - Divided NFT owners can take full advantage of all that DeFi has to offer.
- **Instant Swapping** - Liquid markets make it instant and efficient to swap NFT value as needed.
- **Clear Pricing** - The value of the asset(s) can be confidently assessed using its market cap.
- **Access for All** - You don't have to mortgage your house or sell a kidney to have a stake in premium NFTs.

## 1.4 Examples

Let's consider a few real-life examples, first without dividing NFTs, and then with.

### 1.4.1 Clare the CNFT Enthusiast

Clare is tired of spending ADA on minting NFTs, feeling that it's too much of a lottery to be sustainable and a pain to sell when she needs to. She has done some research and has made a list of the best NFT projects on Cardano, but is devastated to see that she can't afford any on the secondary market. She wants to have exposure to the best of the best CNFT projects without burning a hole in her wallet.

Unfortunately for Clare she only has a couple of options: She can buy CNFTs in her price range, continue to roll the dice with CNFT minting, or buy into a Decentralized Autonomous Organization (DAO) that holds a collection of high-end CNFTs. The last option is the best option in her mind, but she is disappointed because she doesn't get to choose the specific CNFTs she will have a stake in.

In the next section we will demonstrate a CNFT investor's journey when divided NFTs are made available.

### 1.4.2 Clare the CNFT Enthusiast using Devision

Clare learns about Devision through a friend on Discord. She quickly realizes that she can put her knowledge of CNFTs to work and buy into the CNFTs she knows are the best. Spending a few minutes exploring the options, she settles on some choices - a Dino SpaceBud, a Winged CardanoBit, and a collection of Alonzo CardanoTrees - exactly what she wanted. She connects her Nami wallet, chooses how much she'd like to get, and swaps some ADA for tokens in each of them. As the proud owner of 1,000 PNKDINO tokens, 3,000 WINGZ tokens and 100 ZOTREE tokens, she wonders which DeFi DApps she can use them with. Clare provides some tokens as liquidity to earn yield, some to act as collateral for a loan to pay her bills, and she donates some to her favorite DAO charity.

### 1.4.3 Avery the CNFT Collector

Avery has a SpaceBud, one of the most sought after CNFTs. They would like to use the emerging DeFi ecosystem coming to Cardano, but need ADA to do so. Avery is left with the hard decision of selling their whole SpaceBud or missing out on the Cardano DeFi boom. They decide the right choice is to sell, but that's only the beginning. Avery must now play the detective and guess the worth of the SpaceBud, a guesstimation based on previous sale prices of similar CNFTs and the floor price of SpaceBudz. They pick a number that seems good and lists the Bud on jpg.store, the top CNFT marketplace. It sits there untouched for a month. Worried they're missing out on the DeFi boom, Avery lowers the price a few times until someone buys. Avery feels a little frustrated at selling the Bud below market price, but justifies because the liquidity was needed. The price of SpaceBudz rises 3x the following month, leaving Avery frustrated to have given up the investment at such a discount. This is a story known all too well by many CNFT collectors.

In the next section we will demonstrate a CNFT collector's journey when divided NFTs are made available.

### 1.4.4 Avery the CNFT Collector using Devision

Avery would like to move value from their SpaceBud to the new and exciting Cardano DeFi market. They go on Devision and divides the Spacebud CNFT. In return, Avery receives ownership tokens and kicks off a **batch swap**, a key feature of Devision described in detail in the next section.

The batch swap establishes a healthy liquidity pool, determines the initial price point, and distributes ownership tokens to the public. Once the batch swap is concluded, Avery will receive a portion of the ADA and LP tokens for the portion that goes to the liquidity pool. Avery can sell or buy more ownership token from this point forward using the liquidity pool.

Not only has Avery quickly and safely liquidated a portion of their NFT, they've also created a healthy market around it, of which they own a stake.

Avery may decide they want to return the divided CNFT to private ownership using another Devision key feature, our **bidding & buy-out** mechanism described in the next section. A bid can be made to buy-out the underlying NFT at any time. It will be accepted as long it ensures other token owners

receive market rate for their tokens. Alternatively, now that the NFT has a profile and a market value, another NFT enthusiast Dory might be keen to make a higher bid. If Avery or any other owners are not ready to have their stake bought out, they can buy up ownership tokens to increase the market cap to the point that would see Dory's offer invalid.

In all scenarios, if a bid is valid, all owners receive fair compensation, above market rate, for their stake.

## 1.5 Key Features Explained

### 1.5.1 Batch Swap

A batch swap is a mechanism to discover a new market's token price, distribute ownership tokens, and generate ADA for the liquidity pool.

From a high level, some amount of new tokens are up for "sale" and anyone can put ADA against them. At the conclusion of the batch swap, the new tokens are swapped for whatever ADA is in the batch on a pro rata basis. If one participant put in 10% of the total ADA, they receive 10% of the new token.

More accurately, each batch swap begins with 15% of a new Devision collection's total token supply. During a period of ~7 days, participants can deposit as much ADA into the batch swap as they like. This ADA can be withdrawn up until the conclusion of the batch swap. Every transaction incurs a variable fee. This fee increases towards the batch swap conclusion. This fee mechanism is called **tapering** because it steadily reduces the amount of ADA movement in and out of the batch swap. It's purpose is to disincentivize price manipulation and allow the batch swap to settle.

There are two batch swaps for each new Devision collection brought to market - a private and a public batch - each for 15% of the total supply and using the same mechanism.

- **Private Batch - DCENT Burners:** This batch swap is private. To participate, some amount of Devision's utility token - DCENT - must be burned. This limits the participants to those that are most interested in the protocol's long-term success.
- **Public Batch:** Any and all participants are welcome. This allows the public market to establish an evaluation.

At the conclusion of these batch swaps, the market is considered live and the liquidity pool is unlocked for trading.

### 1.5.2 Bidding & Buy-Outs

The most difficult problem to solve when considering divided NFTs is how to handle the selling of the underlying NFT and recompensing of token holders. Without the ability to sell the underlying NFT, it is trapped with no way to realize the value of the market... We have looked at how other fractional markets mishandle this issue, and we have the solution.

A bid can be made to buy out the underlying asset at anytime. To be valid, there are a number of steps and requirements.

To bid, a bidder must lock the ADA in the Devision Safe containing the NFT(s) they are bidding on, ensuring the bid is legitimate. The bid must be higher than the market cap of the ownership tokens associated with that Devision Safe. When a bid that is higher than the market cap is made, a ~7 day auction timer begins. During this period, the market has the chance to respond to the buy-out bid. There is an incentive to rally the market price up to a valid bid, since a sale would reward token holders at an above market rate. On the flip side, if the market surpasses the bid, there is an incentive to return below it if the market believe it is a fair evaluation. If it does not, then the bid is undervaluing the market and therefore will be invalid.

This mechanism acts as a market "check-in" and a stabilizer. Any underperforming market will attract bids to buy-out the underlying NFT(s) for a discount. By placing a bid, the market is forced to "check-in" and consider the worth of the assets being bid on.

- If the market deems the bid to be below market value, it will rally to it and surpass it, invalidating the bid.
- If the market deems the bid to be an accurate evaluation, it will rally to it but settle below, validating the bid
- If the market deems the evaluation to be over-valued, it will still likely rally up until the bid price since there is an arbitrage opportunity, but will settle below it, validating the bid.

In the case of a bid being valid after the ~7 day settling period, a 24 hour timer begins where others can outbid the bid. Barring a higher bid, the asset

is sold at the conclusion of the 24 hours.

This bidding & buy-out mechanism creates markets that are resilient to crashes and offer a clear buy-out of underlying assets at a fair price for token holders.

## 1.6 Why Cardano

### 1.6.1 Developed NFT Market -> Emergent DeFi Market

With transaction volume on Cardano surpassing Ethereum, the timing is perfect for a service that bridges Cardano NFTs and Cardano DeFi. The CNFT market is the most developed, highest volume market on Cardano, with the majority of value on Cardano in the form of a CNFT. On the other hand, DeFi is set to explode as over 200 companies have plans to launch their DApps on Cardano in 2022. A perfect storm is brewing: DeFi companies are releasing their utility tokens and services, and CNFT owners want to participate but have their liquidity locked in CNFTs. Devision is the solution, allowing for the flexibility to liquidate CNFTs at will and participate in DeFi protocols.

### 1.6.2 Security

Over $10.5 billion in value was stolen in 2021 due to DeFi contract exploits.

Cardano is much safer thanks to the use of UTXOs and functional programming languages such as Plutus. It is possible to know the exact outcome of a transaction with the eUTXO model. Inputs and outputs are known ahead of signing. If any changes occur throughout the process, the transaction fails at no cost to the user. Functional languages offer improved modularity, isolating pieces of functionality to limit unintended side effects. This allows for far greater levels of assurance of contract correctness. Cardano transactions also do not “see” the whole chain like Ethereum smart contracts do, drastically decreasing the number of edge cases that must be considered and tested.

### 1.6.3 Low Fees and High Throughput

The fees to interact with the Cardano blockchain are negligible when compared with Ethereum. Like any suitable blockchain, there is a fee when submitting any transaction to the chain. On Cardano, the required fee amount is known

ahead of time and is a combination of a flat fee and a variable fee based on transaction byte size. Transaction fees typically amount to less than $2. On January 19th, 2022, Cardano had over $10.3 billion in volume and paid only $76,000 in fees compared to Ethereum's $7.5 billion in volume and $38.6 million in fees, according to Messari. The transactions per second of Cardano are currently hovering at ~250 while Ethereum sits at a mere 15 TPS. With the introduction of Hydra, Cardano's proposed scaling solution, that number jumps to over 3,000,000 TPS. For perspective, Visa handles 24,000 TPS.

### 1.6.4 Blockchain Bridges

Cardano has a focus on developing bridges between chains, ensuring our project's longevity through the aggregation of web3 communities and ecosystems. Current bridge projects include the Force Bridge from Nervos and the official ETH - Cardano Bridge from Bondly and Input Output, among others. This anti-maximalist mentality will allow Devision to divide NFTs from any and all chains in the future.

### 1.6.5 Community Connection

Cardano's technical superiority aside, the heartbeat of a blockchain is its community. Our team has been involved in the Cardano community for over three years, participating in the incentivized testnet, operating stake pools, minting SpaceBudz, trading CNFTs on Discord, and now exploring early DeFi. We have a great deal of time and money personally invested in the success of Cardano. With many friends in the CNFT, DeFi, and development communities, we have direct feedback on what is needed and how we can help most. Additionally, we have relationships with some of the largest holders of premium CNFTs that are willing to use our services, bringing the highest quality CNFTs to market at launch. We've been here in good times and in bad, in profits and in losses, in FUD and in praise... There's no place we'd rather be developing.

# 2 Part II - Functionality

## 2.1 Devision Platform

### 2.1.1 Overview

In essence, Devision is a platform which facilitates shared ownership of native assets.

Devision provides a collection of interrelated functionality that makes shared ownership of digital assets on the Cardano blockchain practical and accessible. The functionality includes:

- the locking of digital assets
- the initial ownership token distribution
- liquidity pool management
- effective market-priced unlocking
- ownership token buy back

For each **Safe** a validator will be created determining the address at which the assets are locked, the mechanism of liquidity provision and unlocking.

## 2.2 Recap of Cardano

This section hopes to clarify what we do and don't mean by "Smart Contracts" in Cardano. The term is inherited from other blockchains, principally Ethereum. While illustrative in terms of conveying what functionality the Cardano blockchain supports, Cardano doesn't do smart contracts in the sense that they exist on Ethereum. Rather Cardano has two concepts through which smart contract functionality can be created. These are: minting policies, and validators. This is a whistle stop tour to explain (roughly) what these are.

Cardano is a blockchain and as such consists of a database of transactions. A transaction consists of moving assets from a number of addresses to other addresses.

Cardano's database is organized by "UTXOs". A UTXO is essentially a container of assets, and each UTXO is assigned to an address. UTXO is shorthand for unspent transaction output. Each UTXO has an ID and this ID will be unique in the entire history of the blockchain. Put another way: a

UTXO exists only once. The UTXO model is used by Bitcoin, and can be understood in contrast to an account based model. The latter is used in the Ethereum blockchain.

To specify a transaction, we require the IDs of UTXOs to be input (spent) together with the output UTXOs, their addresses, and the assets they each contain. A record of all transactions is kept as the ledger which provides the "truth" of which assets belong to which addresses.

The defacto currency (asset type) on Cardano is ADA. However, Cardano supports native assets - the ability to create and transact with assets other than ADA. Whether a token (asset) can be minted or burnt within a transaction is determined by its minting policy. Native assets are specified by their policy ID, determined by the minting policy, together with a token name.

Cardano is actually referred to as having an EUTXO model, where "E" stands for extended. In a regular transaction, to validate that a transaction is legit (errr... valid), the transaction must be "signed" by all the addresses from which input UTXOs are associated. This prevents transactions being successful without the owners consent. In the extended model, validators are code that play the role of signatures.

A validator is associated with an address and is the unique validator to this address. If a transaction wishes to spend a UTXO associated to the address, the validator must first give its consent.

In the Cardano ecosystem there is a concept of "contract". This would perhaps have been more accurately named "valid transaction builder components" - perhaps rejected for being less catchy. Constructing valid transactions is a non-trivial task, even in relatively simple contexts. Contracts on Cardano facilitate the construction of valid transactions interfacing between wallets, chain data, and external sources. Thus they are helpful to the development of DApps. They are however not integral to smart contract functionality on Cardano.

All this said, "Smart Contracts" is still used as a cover all term for validators, minting policies, and other logic that creates functioning DApps.

A final word on native assets and NFTs: NFTs are native assets of which there exists just one. In general, NFT series are native assets which share a common policy ID, and have unique names. In any case, Cardano understands

NFTs just as any other native asset. As such, we refer to native assets rather than NFTs specifically.

## 2.3 A Safe

Creating a Safe involves establishing the validator, creating some new auxiliary native assets, and transferring the desired set of assets to the corresponding address. The validator governs permissible transactions for all the following stages.

The percentages below do not take into account fees, and the precise values may vary from those chosen in deployment.

### 2.3.1 Create

The primary aims of this stage:

- Create the necessary validators, and minting policies.
- Transfer the native assets to be locked, ie the Safe.
- Kick off the subsequent stage.

An owner selects either a single token or a collection of native assets they wish to be divided.

This will involve a transaction in which the assets are input from an address of the user's control, to the address associated to a Safe validator corresponding to the Safe.

The Safe will also determine the minting policy of the ownership tokens, the liquidity tokens, and other auxiliary tokens that provide functionality in subsequent transactions. The owner will receive 50% of ownership tokens, and long hold liquidity tokens representing 20% of ownership tokens sent to the liquidity pool. Long hold liquidity tokens cannot be redeemed until the LP is in redemption state after a buy-out.

On mint, the remaining 30% of ownership tokens remain at the address awaiting the steps below.

### 2.3.2 Release

The distribution of ownership tokens.

Primary aims of this stage are

- Distribute ownership tokens
- Efficient price discovery
- Recompense owner
- Provide initial liquidity

Secondary aims

- Reward utility token owners

There are different mechanisms that would address these aims. We envision that in future, users will have a choice of release mechanism. The following is V1.

**Batch swap:** At high level, a batch swap works as follows. For a period of time, users can transfer ADA to the address. After the fixed period has elapsed, the allocated ownership tokens are distributed proportionally to the participating addresses. Participants have the opportunity to assess whether the relative share of ownership tokens they'd receive reflects the value they believe to be correct. This mechanism is somewhat akin to the "taste test" used by Sundae Swap in establishing their liquidity pool.

More precisely, when a user wishes to participate in a batch swap, their transaction involves a state token that encodes a record of their participation. If they wish to withdraw, this state token is updated. Multiple state tokens can exist in parallel, while the batch swap is open to participation. After a period of time is concluded, the state tokens are aggregated to provide the complete information.

A batch swap is used to do the initial price discovery. Only those that burn some amount of DCENT utility tokens will be able to participate in the first batch swap. 15% of ownership tokens are involved at this stage. ADA representing 10% of the ownership tokens (ie two-thirds of the ADA in the batch) is allocated to the liquidity pool while 5% is allocated to the owner.

A second batch swap is open to all users. Again 15% of ownership tokens are involved at this stage. Again, ADA representing 10% is allocated to the liquidity pool while 5% is allocated to the owner.

Towards the close of a batch swap, there is a tapering phase. The tapering involves increasing fees and putting limits on transactions. This disincentives

significant last minute shifts in pricing by bad actors.

This establishes a liquidity pool with 20% of the total supply of ownership tokens and recompenses the owner with an initial 10% sale. Batch participants and the owner can now participate in the liquidity pool, either as providers or users.

### 2.3.3 Liquidity Provision

The primary aims of liquidity provision:

- Accurate and current valuation of Safe.
- Ability to increase or decrease ownership token share on demand.

As described, the liquidity pool (LP) begins with 20% of the ownership tokens, together with the ADA allocated from the batch swap. The valuation is now determined by the liquidity pool automated market making (AMM) algorithm.

There are numerous LP algorithms now tried and tested that would meet these criteria. As above, what follows is V1.

The initial LP is modeled on Uniswap V2. Although not the most efficient, it is transparent and relatively simple to implement for V1. The price discovery mechanism is determined by a constant product formula.

The state of the LP is encoded via the use of a state token. A state token must be used in each transaction where the state of the pool changes, such as in a swap.

There are three tokens at play: ADA, ownership tokens and short hold liquidity tokens. Short hold liquidity tokens can be exchanged while the LP is live, in contrast to long hold liquidity tokens which can be exchanged only when the LP has moved into redemption state, ie after an accepted offer and mending. A swap is where ownership tokens are exchanged for ADA or vice versa. An owner of either can also exchange these with the LP for liquidity tokens. Greater liquidity provision reduces the volatility of an LP. Liquidity tokens can be exchanged with the LP back for ownership tokens and ADA, Liquidity providers are recompensed for this proportional to how active their liquidity has been.

Each swap requires a fee. The fee has three components:

- a constant, flat fee
- a linearly proportional fee
- a variable fee depending on current traffic - fees will rise the busier the LP becomes and vice versa.

Fees are used to recompense liquidity providers, as well as guard against anticompetitive state-hogging. **State-hogging**: in the context where transactions must be in series such as here, since each transaction modifies the state, a bad actor could submit a sequence of transactions preventing others from doing so. As Cardano fees are relatively low, this anticompetitive practice is, in many scenarios, cost effective. For example, consider a time limited auction without a minimum increment (or simply insufficient minimum increment). A bidder could keep submitting trivial increments (+1 lovelace), which together with fees may still be significantly less than a price another user would be willing to pay, but is now unable to submit. Implementing fees ensures the users most motivated to use the LP will have access to the state token without significant lag.

### 2.3.4 Unlocking

The primary aims of the unlocking stage

- Allow for the Safe to return to private ownership
- Ensure the sale is at "market rate".

Unlocking requires an offer, and acceptance of the offer. Once the LP is established, the Safe may receive offers of all out purchase on the asset set. An offer involves transferring the offer amount (of ADA) to the address, encoding the details necessary for accepting transaction if/when accepted. An offer must meet a number of criteria before it is accepted.

An offer must stand for a minimum of 7 days. This will allow owners and potential participants the time to become aware of the offer, and assess whether the current LP valuation reflects their own belief.

An offer can be outbid. An offer outbidding an existing bid must stand for at least 24 hours to allow the LP to reflect general sentiment.

An offer can only be accepted if it at least meets the "settled" LP valuation plus the excess for long hold liquidity tokens. LP valuation is considered

"settled" if the state token has reached a point of relative idleness. This annuls the potential for state-hogging, and implies that LP valuation is accurate.

An offer which meets the necessary criteria can then be accepted. An acceptance transfers the Safe as determined by the offer. An offer can be withdrawn only if it is not successful, ie it is outbid or falls below the settled valuation. In such cases, the offer amount (minus fees) is returned whence it came.

On acceptance the LP state is modified to reflect that the Safe is now unlocked, and that LP has moved into its redemption state.

### 2.3.5 Redemption

The primary aims of the redemption stage

- Ensure all owner token holders receive their slice of the accepted offer.
- Allow the draining of the LP

The state of the LP token is now in redemption state. Swaps are now at the price fixed by the valuation at the time of acceptance, and are only in the direction of liquidity token and ownership token to ADA.

Long hold liquidity tokens are now also able to be swapped, and receive the premium.

## 2.4 Devision Utility Token - DCENT

#### 2.4.0.1 Utility:

- Can be used in place of ADA for fees across the platform.
- Reward liquidity providers.
- Reward holders a percentage of all mending events (when an underlying NFT sells for ADA).
- Whitelist burners for new Safe batch swaps.

#### 2.4.0.2 Total Supply:

2,000,000,000 DCENT tokens

#### 2.4.0.3 Distribution:

55% Platform/Incentives - as mentioned above

20% Team

10% ISPO - ADA stakers earn DCENT by staking ADA with a Devision Cardano stake pool.

5% Private Sale

5% Future Hires

5% Advisors and Partnerships