



## **The Future of Derivatives Trading**

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### **Abstract**

EMX proposes to offer a trading platform aimed at revolutionizing global derivatives markets. EMX is developing the EMX Exchange (EMX), based on this platform, which will offer futures contracts which give price exposure to underlying assets as varied as crude oil, gold, stock indices, or bitcoin. Our team consists of experienced quantitative traders, exchange officers, market makers, FCM employees, and engineers.

We will attempt to dramatically lower the cost of trading and, through the use of a frequent batch auction model, help ensure an equitable market for our participants.

Liquidity provision is paramount for any new exchange. We have a detailed plan for building liquidity, notably by creating an internal and external market making program to source liquidity from exchanges world wide.

The platform will feature a mix of global futures contracts including contracts similar to those traded on established traditional and crypto derivatives exchanges.

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## 1. Introduction

EMX is a platform aimed at reinventing the world's existing derivatives markets. We aim to revolutionize the entire trading experience by making it less expensive, easier, and fairer.

We intend to dramatically lower the cost of trading by leveraging cryptocurrency and efficient design. Our platform will transform the traditional roles of the broker, the exchange, and the clearing house into a more streamlined process. Building a standardized and modern futures derivatives market should reduce the cost of managing risk and make the marking, clearing, and settlement processes more efficient.

Our market design also improves the price discovery process and minimizes market impact costs. By utilizing frequent batch call auctions in lieu of a central limit order book, we de-emphasize the importance of speed and reassert competition based on price. The recent rise of alternative liquidity pools in equities has shown that there is significant demand for fresh ideas in execution and the sourcing of liquidity; we aim to translate many of these innovations to the derivatives arena.

Finally, a non-monopolized derivatives market will give unencumbered and democratized access to a wide variety of futures products. Traders will no longer need to access multiple exchanges for their commodity derivatives trading, as EMX would list a very broad range of contracts on a single platform. Price discrimination by other exchanges amongst different types of market participants would not exist on EMX as traders will all be subject to the same fee structures and have access to the same data feeds. The efficiencies gained by a newly-architected platform could also allow for the creation and listing of new futures products, spurring innovation in the industry and giving market participants new tools for managing risk.

## **2. Derivatives trading fundamentals**

### **2.a. What are derivatives? What are futures?**

Derivatives are financial products whose value is derived from the price of an underlying asset – such as a barrel of oil, a bushel of wheat, a stock index, or a bitcoin.

Futures contracts are a standardized type of derivative that are traded in a centralized marketplace (an exchange) and cleared by a central counterparty (a clearing house). They are transactions between a buyer and a seller of a financial instrument at a predetermined price for delivery or cash settlement at a set time in the future.

For example, if you buy a futures contract for a barrel of oil expiring in December for \$50 in October then you are purchasing the December delivery of 1000 barrels of oil at that set price, regardless of oil's price movements from October until then. If the underlying price rises to \$60, the value of the futures contract will rise in value as well, and the holder of the long position in that futures contract can attempt to trade out of it for a profit before expiry. Of course, futures contracts can decline in value and there is a risk of loss in every futures contract.

There are other products which fall under the umbrella of a derivative, such as options on futures or contracts for differences (CFDs). Futures are arguably the simplest and most heavily traded derivative, as they are well defined and regulated around the world (CFDs are not legal in the United States unless they are traded subject to regulations as swaps and only between “eligible contract participants”), so we will focus on futures for now.

### **2.b. Who trades futures?**

Futures contracts are used by a myriad of parties. Their original purpose was for businesses to create more dependable cash flows and to manage risk by hedging, or protecting, against future price movements. For example, an oil producer may sell futures contracts to lock in the price of future revenue so they can have an assured sales price and still meet their operating and financial obligations (i.e., pay their workers) in the event of a collapse in the price of oil. Conversely, an airline company may buy futures contracts to lock in jet fuel prices on a forward basis in order to mitigate a rise in the price of fuel.

Market makers and speculators are also important participants in futures trading. Market makers will buy and sell with minimal directional inclination, hoping to profit from small

differences between sell and purchase prices. Speculators, on the other hand, will make bets on which way the underlying will move, and will carry significant risk in doing so. Market makers and speculators often assume the risk and provide the liquidity that commercial market participants and hedgers require.

### **2.c. How do futures trade?**

Futures contracts trade on regulated exchanges, which facilitate the matching of buyers and sellers, and ensure the integrity of the market. Participants place buy and sell orders at prices they'd be happy with, called limit orders. A buy limit order for \$50 would buy at any price at or below \$50. The collection of resting buy and sell limit orders are collectively referred to as a *central limit order book*. Participants are free to wait for incoming orders to match with – called trading passively – or cross with an existing order – called trading aggressively.

Once a trade is matched, it is intermediated by a clearing house. The clearing house guarantees the financial performance of what was agreed upon. In financial parlance, the clearing house takes on the counterparty credit risk of the trade.

In a traditional futures exchange, buyers and sellers interface with the exchange and clearing house through a broker, an entity which handles the routing of orders and the collateral to back the trades.

### **2.d. Leverage in the futures market**

The futures market is often characterized by the use of leverage. Leverage, or trading on margin, means that participants can enter into positions by depositing enough collateral to meet *initial margin* requirements. Initial margin is the amount of collateral, or performance bond, that is required to deposit with a broker (or clearing house directly) to secure the financial obligations of the customer.

Purchasing a \$1 contract that moves 1% each day will have a 1 cent daily gain or loss, but purchasing it on 3:1 margin means that you would expect to gain or lose 3 cents on the same \$1 purchase instead. Your profit potential is much higher, but so is your risk.

Clearing houses establish minimum initial and *maintenance* margin requirements that apply to all market participants. Maintenance margin is the amount of collateral required to remain in a position. Once a losing trader's collateral falls below the maintenance margin minimum, the

broker will issue a margin call to the trader asking for more funding. If the margin call is not satisfied, the broker can liquidate the position to prevent further losses, as the broker would be responsible if the trader becomes insolvent.

As a trader stays in a position, a daily *mark-to-market* mechanism enforces the exchange of daily profit-and-loss between the clearing house, each broker, and their customers. This process works to secure the stability of a clearing house by utilizing standardized settlement prices established daily by the exchange, so unrealized profit and loss does not build up in the system.

### 3. The current landscape – ripe for innovation

#### 3.a. Difficult and expensive to access

The majority of futures trading volume is concentrated on a few large exchanges around the world, such as the Chicago Mercantile Exchange Group (CME), the Intercontinental Exchange (ICE), and the Eurex Exchange. These large entities are the result of dramatic consolidation in the sector.

CME Group, for example, includes the former Chicago Board of Trade (CBOT), the New York Mercantile Exchange (NYMEX), the Commodities Exchange (COMEX), and the Kansas City Board of Trade (KCBT); collectively CME Group trades everything from interest rate futures to hogs and gold futures contracts. The Economist describes it as “the biggest financial exchange you have never heard of”<sup>1</sup>. Intercontinental Exchange was created through the acquisition of the International Petroleum Exchange (IPE), New York Board of Trade (NYBOT), Winnipeg Commodity Exchange (WCE), Climate Exchange Group (CLE), NYSE EuroNext (New York Stock Exchange), EuroClear & operates 23 regulated exchanges or marketplaces and 6 clearing houses globally.

These large companies extract massive rent costs from their established markets. In the United States, futures exchanges are free to dictate where their products are cleared and may also own or control the clearing house. Market and network effects create a “winner take all” environment whereby participants have no choice but to migrate to the most liquid market. This often leads to a single dominant market for each type of futures contract.

Additionally, with only a handful of exceptions, the products for one exchange have no counterpart in any others. For example, S&P 500 futures are only readily traded on CME, while cocoa futures reside solely on ICE. Liquidity, licensing agreements and strong network effects erect high barriers to entry. On a product by product basis, exchanges wield global monopoly-like power.

This is a strong contrast to equity exchanges, in which liquidity is spread out and competition is rampant. To trade GM stock, you can source counterparties on NASDAQ, NYSE, or on any number of private dark pools maintained by banks or market makers. While these liquidity pools are required (in the United States) to protect investors from accidentally executing at worse

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<sup>1</sup> CME Group: The futures of capitalism, <http://www.economist.com/news/finance-and-economics/21577387-biggest-financial-exchange-you-have-never-heard-futures-capitalism>

prices through the establishment of the National Best Bid & Offer (NBBO) system, they are free to offer a variety of order types, pricing schemas, –and in the case of the upstart exchange IEX– unique timing mechanisms to differentiate themselves. The equities market has largely embraced this fragmentation.

Since futures liquidity is so concentrated yet global liquidity pools are distributed across various exchanges for different contracts around the world, it can be difficult for traders who wish to trade in multiple contract types to simply trade only on one platform – and thus it is difficult to reap the potential benefits of cross-margining across contracts on a global basis. Whether you operate a multinational business - or simply speculate on global markets - you'll often need to source multiple brokers that will route your orders to multiple global exchanges. You'll need to trust each with housing your collateral safely, and you often give up the benefits of cross-margining that can come with keeping multiple positions with one broker.

### **3.b. Trading costs are high; fee schedules complex**

With few exchange operators and strong barriers to entry, it is no surprise that futures exchanges are extremely profitable. In 2016, the CME had revenues of \$3.6B and a net profit margin of 43%<sup>2</sup>. ICE enjoyed revenue of \$4.5B and a profit margin of 35% during the same year<sup>3</sup>. The overwhelming majority— eighty-five percent – of the CME's revenue originated from transaction and clearing fees, paid by both buyers and sellers on a per contract basis.

Exchange profits are directly correlated to volumes, and volumes have been growing<sup>4</sup>. Derivatives volumes in 2016 were the highest they have ever been, led by Asia at 36% of global volume. Looking at volumes over the last ten years, it is notable that futures volumes are not correlated to bull / bear periods in the markets; they've grown during the recession of 2008 as well as recent periods of growth. Global appetite for futures contracts has never been stronger.

Futures traders vary, from *high frequency trading* (HFT) firms who hold positions for seconds, to physical commodity traders who often use the exchanges for hedging purposes and who have holding periods of months or years. To maximize profit from these different segments, exchanges practice extreme price discrimination: participants can pay wildly different fees depending on their relationship (including membership status) with the exchange or the volumes that they trade. For trading the S&P 500 E-mini contract, one of the best barometers of

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<sup>2</sup> CME Group annual report, 2016, <http://investor.cmegroup.com/investor-relations/annuals.cfm>

<sup>3</sup> Intercontinental Exchange annual report, 2016, <http://ir.theice.com/annual-and-quarterly-reports/annual-reports>

<sup>4</sup> MarketVoice, 2016 Annual Volume Survey, <http://marketvoicemag.org/?q=content/2016-annual-volume-survey>

the overall American large-cap equity market, exchange fees per contract can range from \$0.35 to \$1.18<sup>5</sup>. The lowest fees are reserved for “member firms”, which require the purchase of high priced memberships. Volume discounts can lower these fees for member firms or market makers to \$0.10 per contract. HFTs take full advantage of these discounts to make a large number of low profit trades which other traders simply cannot afford to compete with. This lack of parity makes it difficult for traders to compete on a level playing field.

In addition to exchange fees, retail clients also pay a myriad of brokerage fees. Two popular brokers in the United States, Interactive Brokers and TD Ameritrade, charge \$0.85 and \$2.25, respectively, to trade the same S&P 500 future. Therefore, the total cost (exchange, brokerage and clearing fees) for trading one S&P futures contract for a retail trader in the US can be anywhere from \$2.04 or \$3.44 using these brokers – many multiples of the \$0.10 exchange fee (plus brokerage) many HFTs pay<sup>6</sup>.

### **3.c. Structural challenges of traditional exchanges**

The nature of today’s derivatives exchanges creates problems which can’t be overcome by additional competitors competing on speed or on access.

One problem is inherent to its architecture: since exchanges typically have a matching engine that processes orders in time-priority, traders are advantaged by being as physically proximate as possible. This has led to rampant *co-location*, or the practice of installing one’s trading servers in the same building—or in some cases, even in the same networking equipment—as the exchange’s matching engine, at significant cost. Trading firms also spend heavily for access to high-speed communication services, such as microwave lines, to funnel data from one matching engine to another as quickly as possible<sup>7</sup>.

Firms employing these strategies recoup their investments by being able to make a large number of marginally profitable trades with high certainty. For example, when latency-sensitive traders sense that a large, slow buy order is starting to execute, they will begin buying, incrementally pushing the price up. By the time the large order is nearing completion, the latency sensitive firm will be able to liquidate by selling to the large order at a higher price. Since a co-located firm is able to dart in and out of positions quickly, strategies like this can be very

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<sup>5</sup> CME Fee Schedule as of April 17 2017, <http://www.cmegroup.com/company/files/cme-fee-schedule-2017-04-17.pdf>

<sup>6</sup> This does not include the brokerage fee that HFTs pay. Brokerage fees are privately negotiated and the authors don’t have a way of determining what they pay

<sup>7</sup> Time is money when it comes to microwaves, Financial Times, <https://www.ft.com/content/2bf37898-b775-11e2-841e-00144feabd0>

lucrative.

Firms which rely on speed will often have statistical models to predict when they should trade, but sometimes they have mechanical advantages as well. One publicized example is that the CME used to disseminate trade information to certain traders faster than it would broadcast it to the market as a whole<sup>8</sup>. Since liquidity for its contracts rests solely on the CME, this presents a huge advantage. In this scenario, if a trader has advance knowledge that the S&P 500 E-Mini is going to marginally tick up in price, they can send buy orders to purchase any related equity index on any number of other exchanges, risklessly profiting on the spread.

The notion of trading against a very aware counterparty is known as *toxicity*, and the cost of trading against these agents is known as *market impact*. Venues which show both sets of buy and sell orders publicly are known as *lit venues*, and are notorious as the most toxic places to trade, for all asset classes.

### **3.d. The rise of alternate liquidity venues in US equity trading**

While futures traders are limited to lit exchanges, US equity markets have evolved into an entirely different model boasting an abundance of execution destinations. The fragmentation of liquidity in these venues is organized around the avoidance of toxicity: orders will generally be funneled into a pipeline which executes the least toxic orders first, and the most toxic orders last.

The initial destination for many orders is an over-the-counter market. Retail orders, for example, are matched relatively quickly by wholesale market makers like Citadel or Virtu (ex-Knight Capital), and often at better prices relative to lit exchanges. Since retail traders are the least toxic counterparties, market makers will even pay brokers to execute against them in an arrangement known as *payment-for-order-flow*<sup>9</sup>. Non-toxic institutional order flow will typically be matched over-the-counter as well on specialized dealer platforms.

Unmatched equity orders are next commonly routed to a specific form of off-exchange venue called a *dark pool*. Dark pools are owned by broker-dealers or market makers and behave very differently from lit exchanges as posted quotes are not publicly available. From an execution standpoint, the most important attribute of a dark pool is its ability to control its participants.

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<sup>8</sup> CME Upgrade Soothes Critics Who Viewed Prior System as Unfair, Bloomberg, <https://www.bloomberg.com/news/articles/2016-05-23/cme-upgrade-soothes-critics-who-viewed-prior-system-as-unfair>

<sup>9</sup> Payment for Order Flow, Bloomberg, <https://www.bloomberg.com/quicktake/payment-for-order-flow>

More toxic traders are filtered out, ensuring that remaining orders are relatively benign. Dark pool traders are consequently more willing to execute large orders since there is less adverse selection, and market makers can be profitable quoting tighter spreads than they would otherwise. The net effect for all dark pool trades is that market impact is significantly lower than if they were executed on lit exchanges.

Off-exchange trading for equities is very popular, and continues to take market share away from lit exchanges. As of 2016, off-exchange trading in equities was nearly 40% of all volume in the United States<sup>10</sup>. Dark pools now account for 15% of total US equities trading<sup>11</sup>. Researchers have even found that because dark pools concentrate informed traders, price discovery on the public exchanges is improved<sup>12</sup>.

Last on the order flow pathway are lit exchanges. Despite differences in fee schedules and incentive structures, the market impact of trading on lit exchanges is generally much higher than that of an off-exchange venue.

Dark pools and other off-exchange venues are less common in futures trading. Many futures contracts on exchanges are thinly traded and can exhibit large price fluctuations when filling sizable orders. Block trades are permitted, subject to exchange rules and minimum order thresholds.

### **3.e. Cost savings from distributed ledger technology**

There is significant complexity in the back-office processes which facilitate derivatives transactions. Payments, clearing, and settlement processes are currently intermediated by a whole host of systems, depositories, and counterparties which differ across borders and across products. A standardization of global trade reporting and governance could be a noteworthy driver of cost savings in simplifying these workflows and increasing overall productivity.

A recent paper from the US Federal Reserve has illustrated this possibility, and even foresees larger changes on the horizon:<sup>13</sup>

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<sup>10</sup> TABB Equities LiquidityMetrix June 2017, <http://tabbforum.com/liquidity-matrix>

<sup>11</sup> Increasing Transparency of Alternative Trading Systems, <https://corpgov.law.harvard.edu/2015/11/24/increasing-transparency-of-alternative-trading-systems/>

<sup>12</sup> Zhu, Haoxiang, Do Dark Pools Harm Price Discovery? (November 16, 2013). Forthcoming, Review of Financial Studies. SSRN: <https://ssrn.com/abstract=1712173>

<sup>13</sup> Mills, David, Kathy Wang, Brendan Malone, Anjana Ravi, Jeff Marquardt, Clinton Chen, Anton Badev, Timothy Brezinski, Linda Fahy, Kimberley Liao, Vanessa Kargenian, Max Ellithorpe, Wendy Ng, and Maria Baird (2016). "Distributed ledger technology in payments, clearing, and settlement," Finance and Economics Discussion Series 2016-095. Washington: Board of Governors of the Federal Reserve System, <https://doi.org/10.17016/FEDS.2016.095>

*[Distributed ledger technology] has the potential to provide new ways to transfer and record the ownership of digital assets; immutably store information ... [potential use cases] could address operational and financial frictions around existing services.*

*Finally, as a recent innovation, [distributed ledger technology] has the potential to also drive change to the financial market structure in ways that take advantage of the new technology.*

EMX is on the forefront of using distributed ledger technology in streamlining the trading of derivative contracts.

## 4. Trading on the EMX Exchange

### 4.a. EMX Token

Our proposed system works through the issuance of *the EMX token (EMX)*, an Ethereum-based token. EMX is used for collateral and discounted fees. EMX holders may also choose to play the role of a lender and stake their tokens in return for a fee.

The usage of an EMX token as a trader or lender on the platform carries risk, so it is imperative to understand how the ecosystem works.

### 4.b. Futures contracts

The EMX exchange will include both traditional and cryptocurrency futures contracts. Futures on EMX should function largely the same as they do on traditional futures exchanges with a few exceptions. EMX will administer an auction-based matching model versus a central limit order book, and contract quantities traded may be fractional, while on traditional trading platforms, they are whole numbers.

The majority of our contracts will be highly correlated with existing products on liquid exchanges and EMX may utilize leading benchmarks as part of the settlement process for EMX settlements.

The mechanics behind order matching and settlement are described in section 5.

### 4.c. Trading against margin

As explained in 2.d. “Leverage in the futures market”, futures traders need to post initial margin when entering into a trade. Acceptable forms of collateral on the EMX exchange will be ETH and EMX initially, with BTC and other cryptocurrencies following in the near future. Different acceptable forms of collateral may have different haircuts (reduction in available margin). Traders will have the ability to *hedge* their posted collateral to achieve smaller haircuts (greater leverage). This hedging is done through shorting an ETH or EMX future for the initial margin amount. One feature on EMX will give traders will have the ability to *automatically* hedge their collateral if they choose, although it will not be required. See section 9 for additional information on the use case of the EMX token.

#### **4.d. Clearing and Risk**

The clearing house is integral to risk management and exchange functionality. It is there to guarantee customer performance. EMX will initially operate a centralized clearing house to offer appropriate safeguards and standards. In the future, our intention would be to introduce smart contracts on the public Ethereum blockchain where collateral is stored and pre-programmed (yet, parameterized) risk control decisions are made. Although Ethereum is currently what we envision as the public chain of choice, we will continue monitoring advancements in blockchain technology to identify the best technology that will allow for near real-time, on-chain clearing.

The clearing house will also be responsible for maintaining and distributing funds from the guaranty fund in the unlikely event of a default. There will also be additional safeguards to protect customer funds that will be outlined in the exchange rulebook.

Multiple times per second, EMX will monitor markets and prevent problem positions from arising. Traders who are in breach of their required margin levels will be asked to deposit more collateral to EMX. If they do not meet this in a timely manner, they will be force liquidated. Traders who violate the margin policy and are indeed force liquidated will be assessed an additional fee which will be used to help fund the insurance fund.

In the extreme and unlikely event there is a shortfall in the system beyond the insurance fund, unrealized gains may be offset by some losses from delinquent traders, some of which may be clawed back through legal recourse. EMX is committed to building an institutional grade exchange and will be implementing measures to inform traders of their current and future margin requirements to prevent such measures as outlined above.

## 5. Matching engine

### 5.a. Designing a fairer marketplace

As explained in section 3, slower traders are often disadvantaged when participating in today's competitive environment. An attempt in creating a more level playing field must then begin with redesigning the rules that heighten the importance of speed.

This is not a straightforward problem to solve as trading firms invest large amounts of capital and manpower on technology optimizations, cutting-edge equipment, and co-locating servers near exchanges. Any solution needs to make sure that market data both arrives to every listener near-concurrently, and that every listener has an equal ability to respond.

Introducing a speed bump to outgoing orders, similar to what IEX implements in the equities market, helps mitigate unfairness when trading across exchanges, but participants can still receive an advantage by having a closer connection to the IEX matching engine and receiving its data a little bit sooner.

We've decided to take a more drastic measure and forego the traditional central limit order book completely. We instead utilize a mechanism which we believe is much fairer method of trading, but one which still facilitates efficient price discovery: frequent batch auctions.

These auctions are designed such that activity is disseminated periodically, rather than continuously. The recurrent loop of the matching engine – upon which orders are received from a trader, incorporated into the order book, executed if there's a cross, and multicasted back to all listeners – happens on a frequent batch schedule. We envision the batch schedule to occur every 250 milliseconds. Auction executions will happen at the end of each batch. By de-emphasizing speed and creating a fairer marketplace, we aim to awaken competition based on price and execution. Figure 1<sup>14</sup> below illustrates the flow for our frequent batch auction process. In our markets,  $t$  will be 250 milliseconds, with auction computation times 50-100ms. We will tune these parameters based on trader feedback.

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<sup>14</sup>Eric Budish, Peter Cramton, John Shim: Implementation Details for Frequent Batch Auctions: Slowing Down Markets to the Blink of an Eye† American Economic Review: Papers & Proceedings 2014, 104(5): 418–424 <http://dx.doi.org/10.1257/aer.104.5.418>

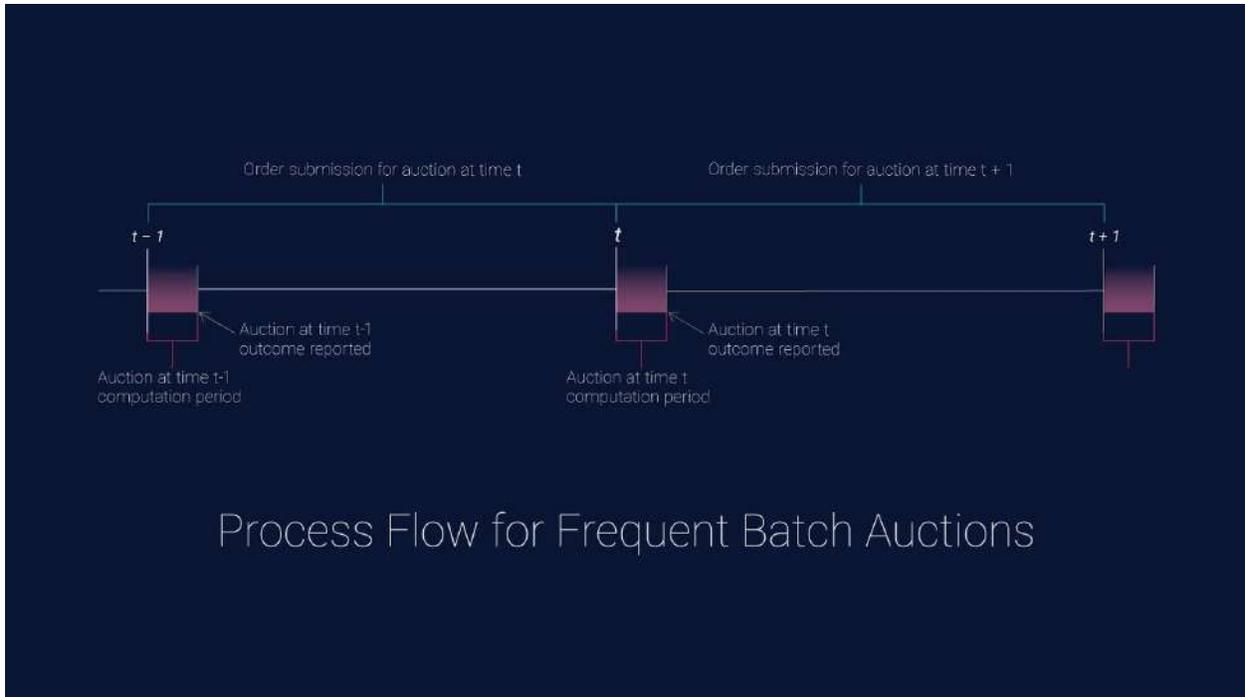


Figure 1. Process Flow for Frequent Batch Auctions

With a continuous flow of orders, we also need to decide at what point orders will be rejected for being too late. Consistent timestamps are of paramount importance in an exchange - and our backend systems will deliver a consistent timestamp such that traders will always know whether an order is being considered for the current auction or next. This will also be crucial for allowing our Exchange Compliance team to ensure market integrity.

### 5.b. The crossing algorithm

Qualified orders will be matched at a price that maximizes executable volume. This is called the crossing price. Market orders are matched first followed by limit orders. If there is an imbalance of buys and sells at the crossing price, unfilled orders from previous auctions are matched first, and the remaining orders from the current batch are filled pro-rata. Hence, there is no *time* priority of orders *in the same batch*. Figure 2 illustrates the crossing price calculation. Note, in the case where there are no market orders and no limit orders that cross, there will be no trades (Case 1). When there are market orders or limit orders cross (Case 2), the price that intersects the most number of buyers and sellers is considered the crossing price and is the price everyone pays in that auction.



Figure 2. Supply and Demand Curves and Crossing Price

### 5.c. Benefits of frequent batch auctions

There have been numerous studies on the efficacy of frequent batch auctions over that of continuous limit order book trading<sup>151617</sup>. The main arguments in their favor are:

- i. **Frequent batch auctions eliminate the speed advantage of the fastest liquidity taking traders.** By making liquidity providers less susceptible to order “sniping”, the cost of liquidity provision would decrease and potentially lead to lower spreads and enhanced liquidity.
- ii. **Auctions are more fair to different types of traders, as everyone pays the same price in each auction.** No longer will the largest or fastest traders get better prices than retail

<sup>15</sup> Elaine Wah, Dylan Hurd, Michael Wellman; Strategic Market Choice: Frequent Call Markets vs Continuous Double Auctions for Fast and Slow Traders. <http://financelawpolicy.umich.edu/wp-content/uploads/sites/26/2015/10/E.-Wah-Strategic-Market-Choice.pdf>

<sup>16</sup> Eric Budish, Peter Cramton, John Shim; The High-Frequency Trading Arms Race: Frequent Batch Auctions as a Market Design Response. Q J Econ 2015; 130 (4): 1547-1621. doi: 10.1093/qje/qjv027

<https://academic.oup.com/qje/article/130/4/1547/1916146/The-High-Frequency-Trading-Arms-Race-Frequent>

<sup>17</sup> Nicholas Economides and Robert A. Schwartz; Electronic Call Market Trading: Let competition increase efficiency. The Journal of Portfolio Management 1995; 21 (3): 10-18 [http://www.stern.nyu.edu/networks/Economides\\_Schwartz\\_Electronic\\_Call\\_Market\\_Trading.pdf](http://www.stern.nyu.edu/networks/Economides_Schwartz_Electronic_Call_Market_Trading.pdf)

trader or slower institutions.

iii. **Traders pay effectively the mid price, reducing the transaction cost to enter a trade.**

The bid/ask spread goes away in auctions, and a buyer and seller within an auction can transact at better prices for both.

iv. **Regulators and market observers can better survey markets.** By reducing the number of tradable time points, data will be simpler to visualize. With fewer speed-sensitive traders, liquidity providers will also cancel orders less frequently, decreasing the size of market data feeds. All participants on the exchange will be anonymous, and all traders will have a unique identifier and time stamp associated with their account.

v. **Data dissemination will be fairer.** The EMX reporting of the marketplace would occur on a strict schedule a few times every second. This means traders don't have an incentive to race to save a few milliseconds from their orders, resulting in a more fair marketplace where people compete on price, not speed.

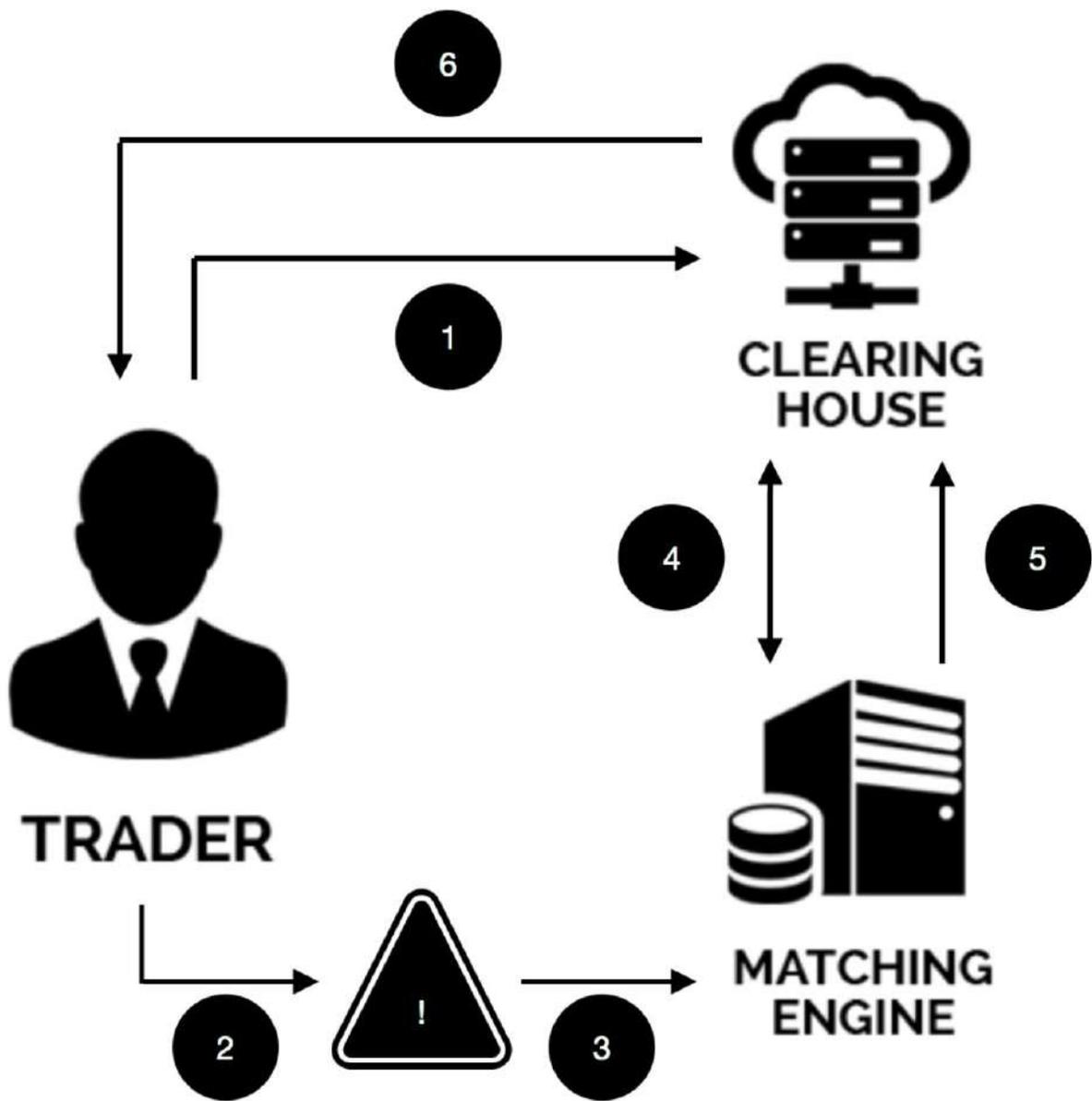
#### **5.d. Expiration and settlement**

Settlement and expiration procedures for each futures contract on the EMX platform will be specified in the Exchange rulebook. For proprietary contracts traded only on EMX, we will create our own settlement procedures. For contracts that are also listed on other Exchanges, we will likely settle to the prevailing most liquid price.

## **6. Illustrating the entire process**

For further clarification, let's walk through the entire process with a graphical aid.

1. The trader deposits collateral with the EMX clearing house.
2. The trader sends an order to the exchange. It passes through a pre-trade risk check.
3. If the risk checks pass, the order is sent to the matching engine.
4. Before adding the order to the order book, the exchange matching engine ensures that the order has adequate margin by inquiring with the clearing house.
5. If the order is included in the cross of the auction, an execution occurs and the trade is settled at the clearing house. Orders not executed remain on the orderbook until canceled.
6. After contract expiry or closing a position, gains/losses and collateral are automatically returned to the trader.



## 7. Features

### 7.a. Contracts

EMX will list both crypto futures and traditional equity, commodity, and currency futures. Some of the initial contracts will include:

- BTC-USD
- ETH-USD
- EMX-USD
- EMX Large Cap Crypto Index
- US Equity Index
- Oil

Our system was built with scalability in mind and we will add additional contracts over time (crypto, equities, commodities, currencies, bonds, etc), in collaboration with our community and dictated by what traders around the world desire to trade.

### 7.b. Platforms and Connectivity

We will launch a **web-based trading platform** with **REST** and **WebSocket** APIs. Additional enhancements will include:

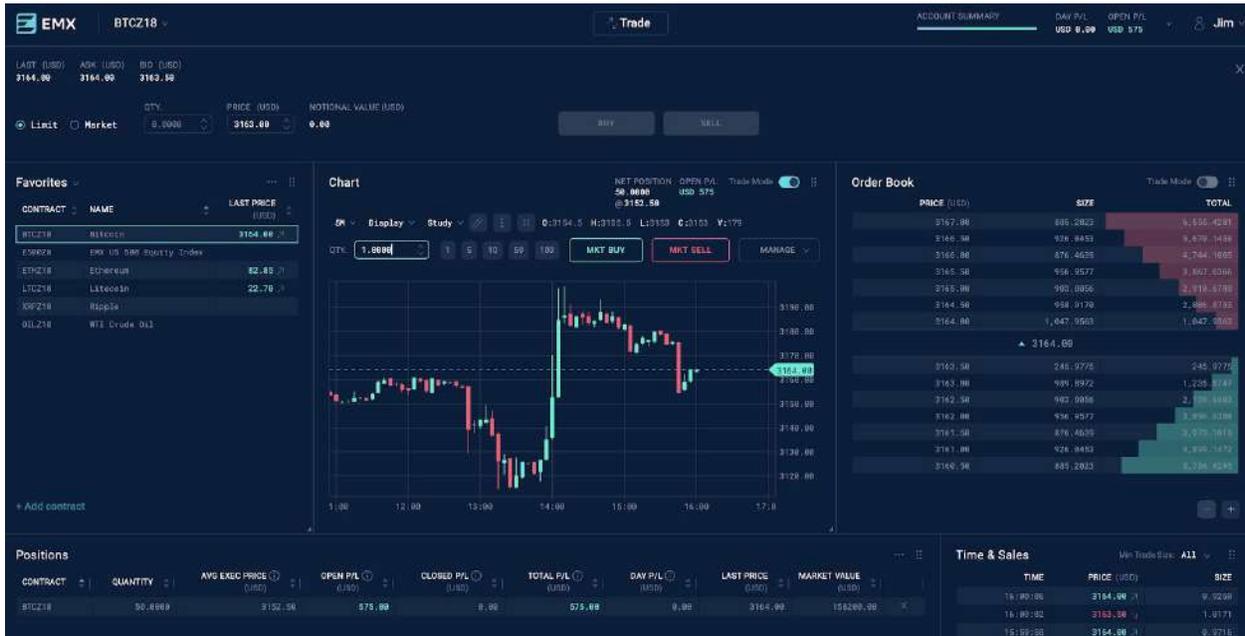
- Mobile “responsive” web App
- Native Android App
- Native iOS App
- Native Desktop Apps (Windows, OS X)
- FIX APIs

### 7.c. Language support

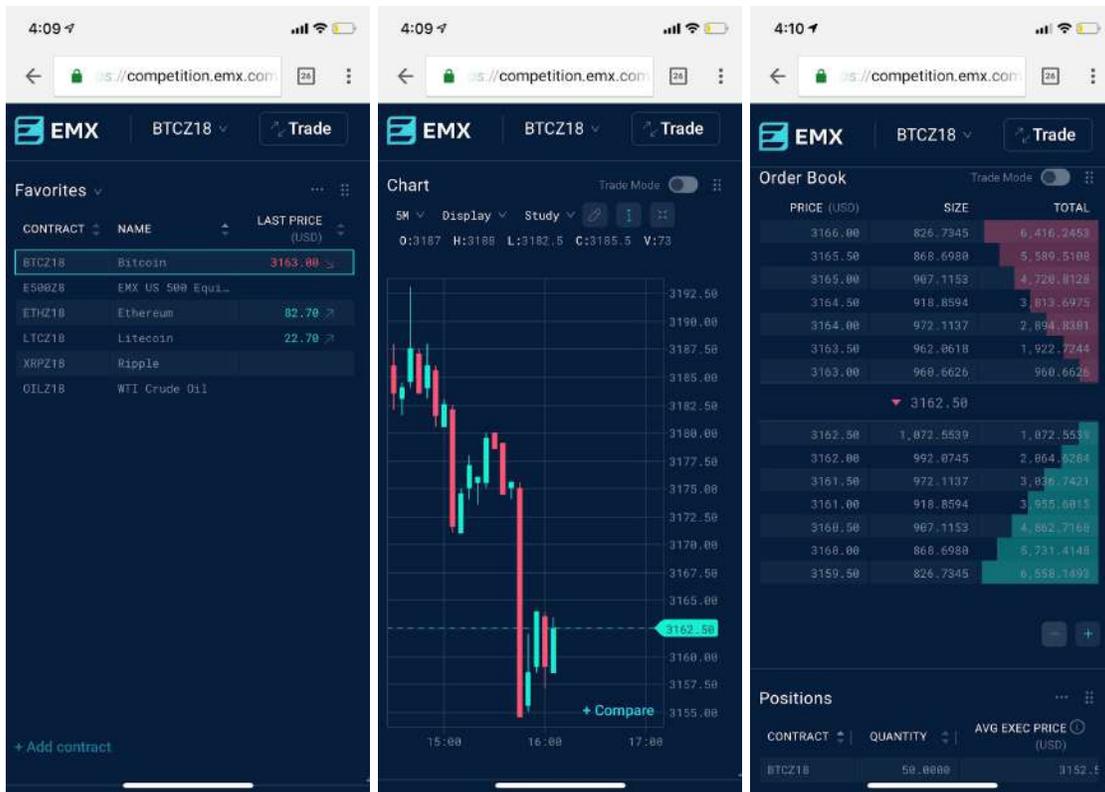
We will launch with English, Korean, and Chinese language options in the trading application. Other languages (Japanese, Russian, etc) will be implemented over time.

### 7.d. UI preview

## Web



## Mobile



## 7.e. Fees and Revenue

Sources of revenue for EMX include:

Exchange fee	Trading fees on a notional basis, instead of per contract basis
Withdrawal fee	EMX may charge a small withdrawal fee
Liquidation fee	Traders who are force liquidated due to insufficient margin will be charged a liquidation fee, which will be used to fund the guarantee fund
Other fees	New features of the EMX platform may charge fees (for example, lending).

See section 9 about reducing fees using the EMX token.

## **8. Sourcing liquidity**

The biggest hurdle in establishing a new futures platform is liquidity. When contracts are illiquid, price discovery is more difficult, impact costs are higher, and the market is less attractive to all parties.

Over the past year, we have spent a significant amount of time talking with prominent futures traders, exploring the weaknesses of existing platforms, and assembling a team with the technology and financial know-how capable of building an attractive alternative to today's exchanges. We believe we understand the challenges associated with generating liquidity on our platform.

We highlight a few of our key strategies for this below.

### **8.a. Construction of a dedicated liquidity provision team**

We aim to build a committed *liquidity provision team* for futures contracts on our platform. Its aim will be to maximize crossed volumes (i.e. minimize auction imbalances) instead of profits and can be thought of as a *liquidity provider of last resort*: if there is an imbalance of buyers and sellers, the internal liquidity provision team will step in and fill the traders who did not get filled.

This team will operate and trade with the same market data, capabilities, and limitations of any other trader. In other words, it will operate entirely separate from the Exchange and will not be privy to any information that isn't publicly disclosed.

As liquidity provisioning inherently takes on positions which are less popular, this effort may take some time to get going. While research and production code for this entity will not be made public, monthly profit and volume performance will be displayed when possible.

A dedicated volume-first "market making" strategy like this is common in many large equity agency dark pools. These volume-oriented teams work to backstop many different metrics of execution quality, such as price improvement or fill percentage.

### **8.b. Heavy stress testing and rules for abnormal conditions**

One of the keys to cultivating liquidity is having a system which is reliable during high volume

and high volatility periods.

Financial markets are characterized by extreme “burstiness”. Though the majority of time is spent in relatively calm waters, the minority of volatile periods is several magnitudes higher in every metric—volume, variance, skew, etc. This is true at every time horizon, whether you are looking at markets on a minute-by-minute basis, or on a day-to-day scale.

Additionally, plotting the returns of any time horizon on a frequency basis (such as on a histogram), will show that markets have very long left-handed tails—also called negative skew. In other words, when markets rise, they tend to rise slowly over time; when they fall, they fall violently and quickly.

What this all means is that our system needs to be able to operate well during tail events. While many individual traders may switch to our platform because of the appeal of lower transaction fees alone, established players will know that fortunes are made or lost during times of extreme market dislocation.

We intend to attack this problem with a multi-pronged approach:

- i. Regular stress tests. We will simulate the order profiles of volatile periods in the past and measure our system throughput and performance during those times.
- ii. Maximum price movements. Contracts will have built-in stop conditions similar to that of existing exchanges, which impose maximum limitations on price fluctuations against some reference price.

### **8.c. Achieving legitimacy**

An important part of this endeavor is establishing a legal method of trading futures on a blockchain. As we expound upon in Section 10, our intention is to create a regulated, legal approach for all parties on the platform – our company, EMX holders, and traders.

Regulators are an important part of building public trust and safeguarding markets, and we intend on building strong relationships with them. We believe that bringing down cost and complexity barriers can be done without sacrificing market stability, and that our proposed platform will not just “do no harm” but will improve and innovate. In fact, judging by recent statements, we believe we see eye-to-eye with regulators like the CFTC in a shared mission of

fostering “open, transparent, competitive, and financially sound” markets<sup>18</sup>.

#### **8.d. Marketing efforts**

Developing an extensive global community of traders is essential for EMX to succeed and have liquid markets. EMX plans to generate wide interest for the exchange, build and retain a large user base, and foster advocacy for the product, through a variety of marketing campaigns and activities. In the cluttered crypto ecosystem, we cannot simply rely on organic word-of-mouth growth or traditional tactics. Our marketing will be executed and amplified through a generous referral program, multiple trading competitions, paid advertising campaigns, influencer marketing, community outreach and event sponsorships, and strategic marketing partnerships with trusted brands. Highlights include:

##### *Referral Program*

Prior to our token sale, we will implement a referral program that rewards users for completing simple actions, such as creating an account on EMX.com, following our social profiles, and referring other users to the platform. When the exchange launches, this referral program will be modified to become a commission-based affiliate program, where traders will earn reduced trading fees or a number of trading credits for referring their friends.

##### *Trading Competitions*

We will host recurring trading competitions to create brand awareness and generate PR buzz. By offering appealing prizes, we will incentivize users to try a simulated version of our platform and challenge them to one-up each other. These competitions will be amplified on social channels and traders will also be rewarded for referring others to compete. This will build a large email list and subscriber base that we can later use for marketing and conversions.

##### *Community Outreach*

We will leverage ambassadors in key markets to plan and organize meetups that will organically grow the EMX community. The EMX team will also attend and sponsor 10-15 international conferences such as Consensus Singapore, the World Blockchain Summit, BlockShow Asia, Korea Blockchain Week, Berlin Blockchain Week, Devcon, and more, to spread awareness of the exchange.

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<sup>18</sup> CFTC Mission Statement, <http://www.cftc.gov/About/MissionResponsibilities/index.htm>

#### **8.e. External liquidity provider program**

We also keep a large percentage of our tokens in reserve for the purpose of fostering our *external liquidity provider program*. This is a program to incentivize external liquidity providers to quote on our platform, and will be done in conjunction with our sales and marketing efforts.

The liquidity provider program will loan reserve tokens to select and qualified providers with the requirement that these tokens are used to fulfill late-stage auction imbalances. Our hope is that this program will encourage liquidity providers to trade during the platform's early days while minimizing their risk and initial cash outlay.

#### **8.f. Ability to hedge cryptocurrency risk**

One common reservation for many potential traders we've spoken with is that crypto-currencies can be too volatile to hold. Given the price variance of BTC and ETH in recent years, it is very possible that any potential futures trade priced in a crypto-token, particularly one with a longer-term and directional focus, will be dominated by the token's price change rather than anything else.

To address this, we have allowed for traders to hedge their initial margin, effectively fixing the price of their crypto collateral to USD. While this is optional, the added benefit of hedging will be a reduction in haircuts applied to hedged collateral (allowing increased leverage).

## **9. EMX Token**

As mentioned in section 4, the EMX token is intended to be used to access the liquidity on the EMX platform. Market makers use EMX as collateral alongside other forms of cryptocurrency collateral. In addition, EMX may be used to reduce fees.

### **9.a. Collateral**

Market makers on EMX may use the EMX token as collateral.

### **9.b. Fee Reduction**

EMX will charge trading fees listed in section 7.e. Those holding EMX can receive fee discounts.

### **9.c. Lending and Staking**

EMX holders can lend and stake their token with EMX can earn fees from growth in the insurance fund. Every two weeks, 10% of net gains in the insurance fund will be paid out to holders who have kept their tokens with EMX. Payment is pro-rata and based on how long tokens were staked in that period. In the unlikely event there are net losses to the insurance fund, tokens from the staked fund will be used to make traders whole, and stakers may receive less than they deposited.

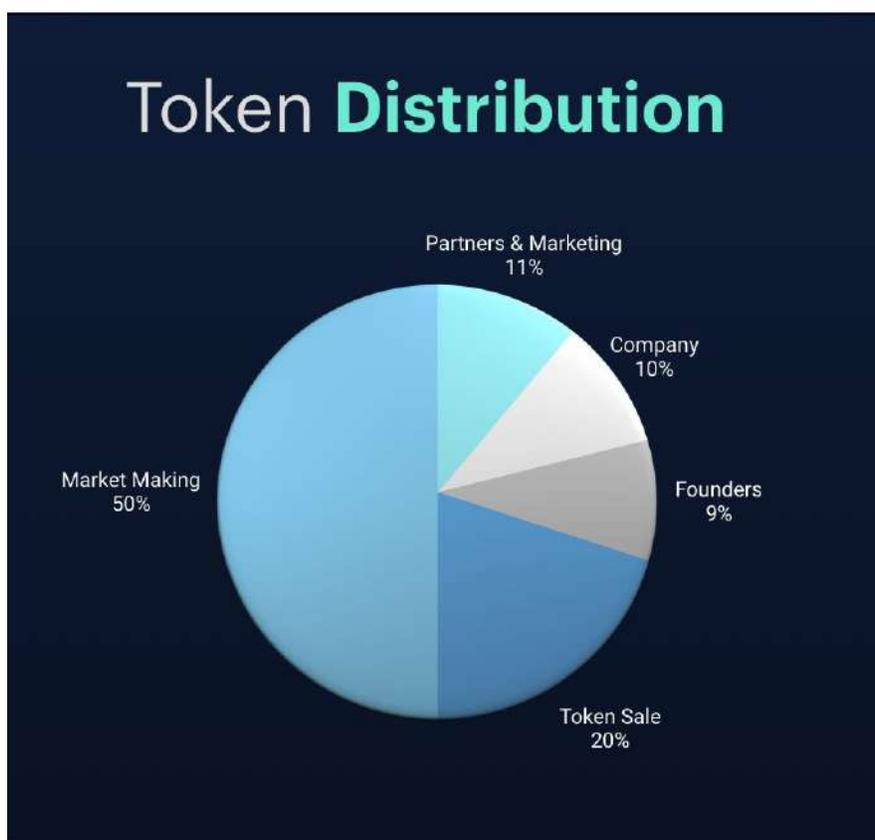
### **9.d. Rewards**

Customers who hold enough EMX can unlock premium features on the exchange, including higher leverage, and will earn more prizes if they participate in EMX-hosted trading competitions.

### **9.e. Voting and Governance**

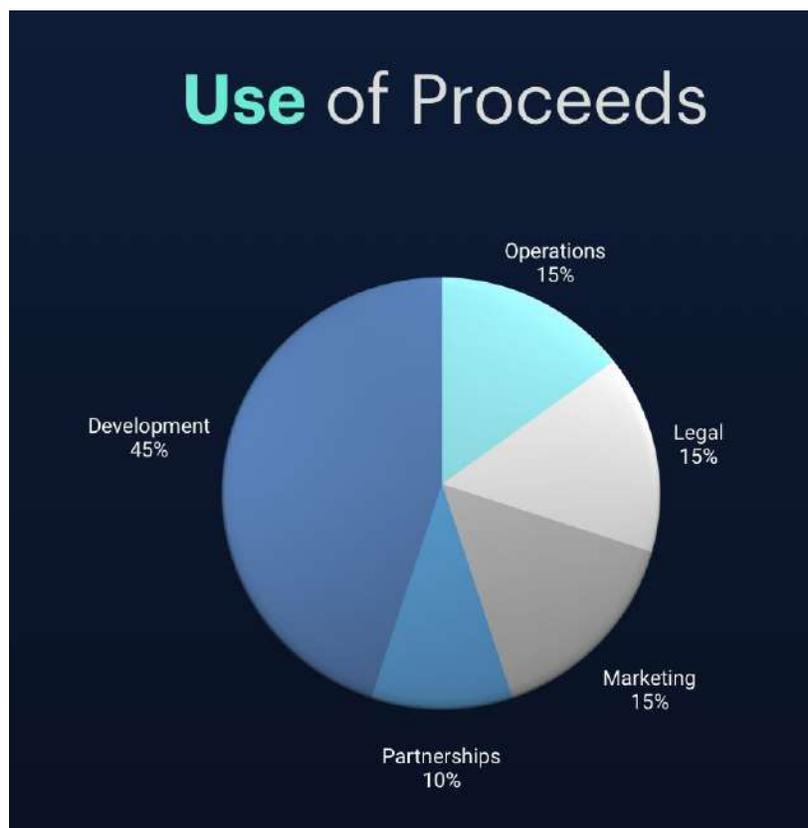
EMX holders can vote on new features and products, and help prioritize the EMX roadmap.

## 9.f. Token distribution



The goal of any exchange is to have ample liquidity and trading volume. After all, what good is a market if nobody shows up to buy and sell goods? Therefore, we have a large pool of tokens reserved for market makers (50%), which will be used to jumpstart the virtuous liquidity cycle, as liquidity attracts more liquidity. Market making tokens are used by the internal liquidity provisions team and external market makers as collateral to trade and supporting the growth of the exchange by possibly converting to USD to take the long side of EMX-USD futures positions or as collateral on traditional exchanges. Tokens used outside of these needs, if any, can only be used on a monthly vesting schedule over 4 years, with a 1 year cliff. Tokens for founders also have 4 year vest with a 1 year cliff.

## 9.g. Usage of proceeds



The majority of the funds in the first phase are intended for development, with the rest split for a dedicated sales and marketing staff to bring traders onto EMX, legal, and operations. In addition, we have reserved part of the initial proceeds for the internal market making team to ensure there is liquidity on our exchange. During the second phase, we intend to utilize the proceeds from to further capitalize the market making team, to support liquidity operations in more contracts and in a larger capacity.

## **10. Legality and Regulatory Oversight**

### **10.a. Legality**

The legal issues involved in an endeavor of this nature are complex and uncertain. Our team is working diligently with experienced legal professionals to ensure that our platform is within complete compliance of all applicable requirements where we operate. We have no desire to conduct or condone unlawful activities, nor subject token purchasers or holders to prosecution.

### **10.b. Regulatory Oversight**

Cryptocurrencies are in their infancy and many global regulators have differing opinions on how to treat and oversee cryptocurrency exchanges. Some jurisdictions have created clear rules, others have given guidance and yet another subset have remained silent. EMX's goal is to create an institutional grade exchange that operates offers our traders the highest level of transparency and protection. In order to do so EMX has a two prong approach.

Initially, the Exchange will be domiciled in Bulgaria. We intend to operate our Exchange in global jurisdictions that permit trading of self regulated crypto to crypto derivatives contracts. We will perform AML/KYC on our market participants and prohibit traders from certain jurisdictions where it is not permissible for them to access our markets. We also intend to publish an Exchange Rulebook and will have a compliance and market regulatory function that will perform market oversight and enforcement. Further details will be contained in our Terms of Service upon signing up for EMX and the Exchange Rulebook which will reside on our homepage.

Our ultimate goal is to be regulated under the US Commodity Futures and Trading Commission (CFTC). As part of that process, EMX intends on filing with the CFTC to become a Designated Contract Market (DCM) and a Designated Clearing Organization (DCO). These two designations, if granted, will provide us the authority to operate an exchange and clearing house under one of the most respected regulatory bodies in the world. There is no guarantee that we will be able to obtain such designations from the CFTC. The Platform is not intended to be available in the U.S. or to U.S. Persons absent proper approvals.

## **11. Disclaimers**

This document is intended to introduce EMX to the world, and is for informational purposes only. This document does not constitute an offer or a solicitation to sell shares or securities in any company. It is not a prospectus for investment.

This document has not been written towards the laws or regulations of any particular jurisdiction. While this document – specifically Section 10– may have references to or interpretations of laws in the United States, these references and interpretations are not legal advice and should not be used to make any legal or financial decisions. The general public should conduct their own “due diligence” regarding any statements or conclusions made, explicitly or implied.

This document does not constitute a promise of any kind. This project is constantly evolving and any information in this document is subject to change. Our project is an ambitious one, and though we believe that we are uniquely suited for the challenge, we cannot offer an assurance or a guarantee of success in any fashion.

This document contains forward-looking statements. These forward-looking statements, which you can identify by our use of words such as “expects,” “plans,” “estimates,” “anticipates,” “projects,” “intends,” “believes,” “outlook” and similar expressions that do not relate to historical matters, are based on our expectations, forecasts, projections, and assumptions at the time of this document, which may not be realized and involve risks and uncertainties that cannot be predicted accurately or that might not be anticipated. These could cause actual results to differ materially from those expressed or implied by the forward-looking statements.

### **11.a. Value of EMX token**

The EMX token is a tool intended to be used for trading on the EMX platform. The usage of the EMX tokens carries risk. The EMX token should not be expected to gain value or have value outside of these roles. A token is only used at the behest of the token owner, and any time it is used, there is a possibility that the token will lose value or be lost.

The EMX token is not an investment in any way, shape, or form. Possessing the token does not grant the owner a share of any profits outside of any made through his own endeavors in the stated roles above. Passively holding the token has no expectation of profit or value.

The EMX token is not intended to be a security. Possessing the EMX token does not grant the owner any ownership, right, or interest in any company, enterprise, or undertaking.

If exchanged for or compared against any other asset, the value of the EMX token may be volatile. EMX makes no assurances regarding the value of an EMX token, and any fluctuations in its value are outside of our control.