



White Paper

December, 2018

Version 2.2.1

Synopsis

A crypto derivatives exchange engineered for the million-token world. Connectivity to every major exchange. Dark pool trading. **One account.**

Abstract

LXDX is a cryptocurrency exchange platform built to introduce new products and significantly improve the quality of execution for all users. Members get access to infrastructure combining the benefits of algorithmic smart routing and dark pool trading. The platform is built to the requirements of professionals with the mandate of bringing these features to everyday traders.

Our exchange is a radical departure from the incumbent solutions: **LXDX** is built from scratch in highly optimized C++, the architecture is hosted on our own hardware in primary market data centers such as FR5, and the engineering and policy have both been approached with the gravitas of industry professionals.

LX Proof of Risk (PoR) fundamentally improves and democratizes liquidity provision. We bring a firm commitment to fairness and transparency — beyond just policy at the exchange, we will facilitate routing orders to other venues when their prices are superior. We don't secretly market make on our own platforms. We work with regulators in every jurisdiction in which we operate. We go beyond all licensing and market surveillance requirements.

LXDX is the product of a team with decades of technical and market experience who are committed to bringing the quality of traditional financial exchanges to crypto.

Our system is financed via a true security token — the **LXDX Token**.

Contents

| | |
|---|----|
| 1. Ethos..... | 4 |
| 2. Vision | 4 |
| 3. Background..... | 4 |
| 3a. Liquidity..... | 4 |
| 3b. Reliability..... | 5 |
| 3c. Fairness | 7 |
| 3d. Transparency | 7 |
| 4. Lit Exchange | 8 |
| 4a. Product Innovations | 8 |
| 4b. Improved Contract Specifications..... | 8 |
| 4c. Connectivity..... | 9 |
| 4d. Proof of Risk | 9 |
| 4e. Improved User Interface..... | 10 |
| 5. Dark Exchange | 10 |
| 5a. Dark Pool Privacy and Reporting..... | 10 |
| 5b. Features..... | 10 |
| 5c. Connectivity..... | 11 |
| 5d. Trade at Settle | 11 |
| 5e. Does Crypto Need Dark Pools? | 11 |
| 6. Smart Routing..... | 11 |
| 7. Architecture Overview..... | 13 |
| 8. Liquidity Model..... | 14 |
| 9. Execution | 16 |
| 10. Balance Sheet Management | 16 |
| 11. Trading Operations | 16 |
| 12. Fundraising Goals | 17 |
| 13. Token Economics | 17 |
| 13a. Revenue Share | 17 |
| 13b. Equity..... | 17 |
| 14. Token | 17 |
| 15. Recap | 17 |
| 16. Disclaimer | 17 |
| 17. Arbitration | 18 |
| Roadmap | 19 |
| Leadership..... | 20 |
| Advisors..... | 21 |
| Core Team | 22 |
| With Help From..... | 22 |
| Execution Algorithms..... | 23 |
| Common Questions and Answers | 24 |
| Glossary..... | 25 |
| References..... | 26 |
| Community | 26 |

1. Ethos

Users deserve more from the platforms where they trust their time and money. **Demand better.**

2. Vision

Blockchain technologies are positioned to have transformational impact. An autonomous, decentralized, and robust financial system is under rapid construction — a system freed from the massive inefficiencies and corruption of the incumbent regime.

Cryptocurrencies are a wholly new asset class. To the extent that they can be integrated into the existing infrastructure, we seek to facilitate that integration. Where they cannot, we will build the tools to make trading and hedging in this new class of investments safe, fair, and cost-effective.

Looking beyond the current crypto ecosystem, the revolution is now in the way that companies seek financing. Tokenization of assets and securities is moving quickly. The combination of blockchain technology and innovations in securitization will support tens of thousands of fledgling microcap companies over the next few years. We need exchange platforms that can scale accordingly.

*If many existing exchanges can't reliably support five to fifteen trading pairs, are they likely to support **10,000**? Or a **million**?*

We anticipate scaling in tokenization well beyond 10,000 tokens. We are building towards the million-token future. Art, real estate, commodities, usage-rights — we see a future where all become increasingly tokenized. We optimized our architecture accordingly. In truth, there are many ways to build a high-performance exchange and trade-offs are inevitable. Our design prioritizes horizontal scalability.

Smart contract driven, decentralized solutions will undoubtedly play an increasing role in any future, but we are many years out in terms of backend performance and usability. Bancor's smart token contract[±] feels like a transformational innovation: autonomous market making that guarantees at-least baseline liquidity in any asset. However a market maker without the ability to incorporate side channel information (such as correlated assets) is going

[±] See [Bancor white paper](#)

to struggle to ever match the quality of quotes of a dedicated market maker on a centralized exchange. Emerging smart contract solutions excite us, but most futures we envision have centralized and decentralized platforms working in concert.

Our core team knows exchange technology. We've made careers of it. We have the talent and will to build out this vision. We already built the guts of our system to scale to numbers of coins and trade volumes **orders of magnitude** greater than what exist today.

Investors, both large and small, deserve the reliability, performance, and professionalism of traditional capital markets.

So we built it.

3. Background

Existing crypto exchanges require improvement on four axes:

- **Liquidity** – Limited top of book liquidity causes the cost to execute trades, particularly those of size, to be expensive. Limited sets of coins per exchange forces users to maintain many exchange accounts
- **Reliability** – Repeated intermittent downtimes and sluggish operation
- **Fairness** – Price manipulation, insider trading, and front-running
- **Transparency** – No insight into the mechanisms of how the exchanges operate, what policies govern how your orders are handled, and who has access to them

The cumulative effect makes trading crypto significantly more cumbersome than it could be; many users, be they retail or institutional, remain on the sideline.

3a. Liquidity

The true product of an exchange is liquidity. Top of book liquidity is poor across even some of the most active exchanges.¹

The cost to execute crypto-to-crypto or crypto-to-fiat trades on today's exchanges:

| 1/2 SPREAD WIDTH ON COINBASE PRO, BINANCE, BASIS POINTS | | | |
|---|------------|-------------|--------|
| Pair | Size | | |
| | 10,000 USD | 100,000 USD | 1M USD |
| BTCUSD | 9.0 | 21.0 | 101.0 |
| BTCETH | 2.0 | 300.0 | 711.0 |
| ADAETH | 4.0 | N/A | N/A |
| XMRBTC | 7.0 | N/A | N/A |

Table 1: Execution Costs vs Size

Compare the above to the average cost to execute 1M USD of any stocks, commodities, or FX:

| 1/2 SPREAD WIDTH ON CME, ICE, ZME | | | |
|-----------------------------------|------------|-------------|--------|
| Pair | Size | | |
| | 10,000 USD | 100,000 USD | 1M USD |
| SP500 | < 1 | < 1 | < 1 |
| GOLD | < 1 | < 1 | < 1 |
| EURUSD | < 1 | < 1 | < 1 |
| Coffee | 2.3 | 2.3 | 4.5 |
| Sugar | 1.0 | 1.0 | 2.0 |

Table 2: Execution Costs vs Size in Basis Points

Traditional markets typically charge below 2 basis points or 0.02% in fees and spread total.² Even less liquid commodities, traded on more expensive venues, rarely carry all-in execution costs above 5 basis points. Traders on existing lit venues are overpaying, but it's traders forced to the OTC markets, where there are 1-10% spreads, who are most poorly served by the current status quo.

LXDX attacks the liquidity challenge with the following:

- Relationships with highly active traders to participate on both our lit and dark products
- Smart routing to eight venues at launch, more pending. More liquidity and many, many more coins available for trade from a single account
- Better designed contract specifications
- Radically improved exchange technology with massively improved latencies to facilitate greater algorithmic liquidity provision
- Greatly reduced balance sheet needs for market participants through higher leverage and multitude of custodial and non-custodial trading options

3b. Reliability

Reliability at **LXDX** is our promise to deliver on system availability, security, and performance.

Availability

Traditional exchanges experience technical issues once — **maybe once** — every few years.³ The exchanges are otherwise open to transact exactly as indicated. *"Will I be able to sell or move my assets today?"* is not a question that needs to be asked in traditional markets.

Most of our competitors have built their solutions on the cloud. Promising to deliver availability on systems you don't own or control is difficult and needless. We run all core exchange services on our hardware in our own data centers. We don't share cores or bandwidth.

Most of the engineers tasked with designing or maintaining the current systems do not come from backgrounds working on critical systems or exchanges. Nonetheless, the current projects have done an amazing job at expanding the world's interest in both trading and cryptocurrencies. Many of the innovations in today's crypto exchanges may meaningfully translate back to traditional capital markets.

That said, a lot of engineering and optimization, built out over decades, has gone into the design and implementation of traditional exchanges. Key lessons learned: focus on driving down communication times between boxes, isolate and control intra-server communication, limit TCP communication use internally, avoid OS-level networking stacks. All of these requires running your own hardware, building out your own data centers, and selecting your hardware and software according to the aforementioned specific requirements.

Fundamentally the price for generality, when talking performance, is high. It is clear that ASICs manufactured for the specific purpose of mining bitcoin (or, more to the point, performing SHA-256 hashes) significantly outperform general purpose CPUs at the task. In exactly the same manner, data centers built for the specific purpose of operating an exchange outperform virtualized cloud containers that could be used for all manner of tasks.

We don't hate cloud here at **LXDX**. To the contrary, our infrastructure has all manners of microservices, be they serverless or containerized, that live in cloud. But when it comes to the exchange core — the layers that focus on matching, clearing, market data dissemination, etc. — we favor specific over general solutions.

Controlling and owning the hardware gives us opportunities to build for redundancy in ways that are nearly impossible in cloud architectures. Every box in our architecture is expendable; we chaos test[‡] the systems to enforce it. Moreover, even when multiple systems fail, our servers, given their much lower intra-box communication times, can reconcile state with each other extremely quickly. As such, design-wise, we are quite robust to even black swan cascading failures (hot recoverable).

Security

Security is the single greatest challenge in this space. Seriously reconsider where you trust your money with anyone who speaks on the subject with less gravity.

Apprehensions about exchange security create a negative feedback loop when it comes to liquidity. Users are uncomfortable leaving large amounts of assets at exchanges, which then exacerbates the lack of liquidity available at a particular moment in time, especially during large price moves.

We designed all our systems and policies with a third-party security auditor. We're building out fully staffed blue and red teams tasked to seek out vulnerabilities in our architecture. We are committed to making security the largest piece of our engineering org. We will run sizable, public bug bounties and be highly engaged with the community in the discussions of how we safeguard our systems.

We have partnered with BitGo for running our wallets, but we host our own redundancy layer on top to guard against double spend attacks and to fine-tune wallet egress policies. Atop this we will offer insurance options and provide users the option to keep their coins stored with us both fully cold and fully isolated.

We additionally provide options for trading with minimal custody. We have partnered with

Commonwealth Crypto to provide non-custodial trading for users seeking to trade via request-for-quote (RFQ).

We are operating within the sandbox and will be a fully regulated, licensed exchange in Malta under the Virtual Financial Assets (VFA) license. We are also working to operate with similar regulatory clarity in both Singapore and the US. While this undeniably serves to protect ourselves as operators of exchange products, it equally serves to protect our users from having their assets seized or frozen when regulators do inevitably intervene.[‡]

Performance

Every system on the critical path is written in C++. The internals are 150,000+ lines of highly optimized code.

Because we control our hardware, our boxes are both tuned optimally and run the latest and greatest hardware. We use kernel bypass NICs to achieve sub 3μs latency hops per box. We're transitioning all exchange internals to Solarflare's X2 XtremeScale architecture (25Gb, 500 nanoseconds per hop) as the X2522 cards become available.

These are typical latency profiles for an order's entire life through our system:

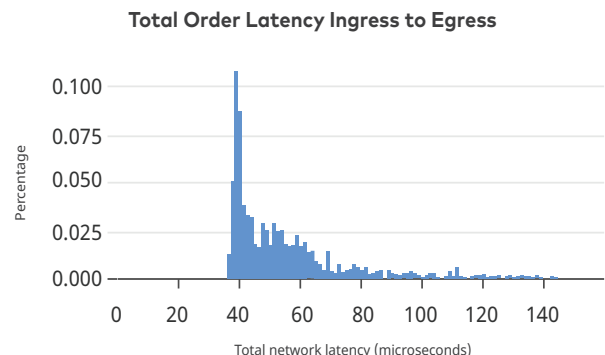


Figure 1: Latency Profiles for LXDX

While many competitors will brag about their matching engine's speed, the matching engine is a tiny piece of the overall architecture. We speak in **total** network latencies through our entire system.

The end results of all this performance optimization:

- Deterministic and minimal market data and order response times

[‡] Total losses to BTC-E seizure/forfeiture still a mystery. Multiple hundreds of millions.

-
- No need to limit user signups or restrict trading because systems are overloaded
 - No *5 order per second* type limits (We support 100 to 1000+ depending on connectivity method)
 - No engineering culture of putting out fires to *keep the lights on*

The latter point is significant; our engineers are free to continue to innovate on platform features and enjoy a better quality of life. This enables better retention and ensures we keep our most senior engineers with us on this mission for many years to come.

3c. Fairness

Fairness is both a commitment from us to users on how we, as an exchange, conduct ourselves and also the commitment to ensure that we have surveillance procedures in place to ensure that our markets are fair and honest for everyone.

After flowing into a matching engine, all orders flow into Market Surveillance. Market Surveillance watches in real-time for suspicious trading activity. We monitor for price manipulation abuses including flipping, pumping, flickering, and quote stuffing. We have checks that search for everything from money passing to accommodative and collusive trading. We perform this monitoring both real-time and end of day. We have the data and tools to protect against the types of misconduct that most severely disadvantage well-intentioned participants.

We are committed to member equality — we never show preferential treatment to any customer. We do not covertly take payment to list any asset on our exchange. Our employees do not trade on our own products.⁵ We provide full audits as well as dashboards to aid reviews by regulatory bodies.

Users will have exact clarity on how their orders are handled and who has access to their data. We will never sell our customer's flow in closed-room deals to high frequency firms⁶ and we will never cut deals with any exchange participants we don't make publicly available.

3d. Transparency

LXDX is a system that will eventually route orders to both our dark and lit products as well as all other major liquidity sources. We will provide extensive metrics for users to measure the quality of our executions against other benchmarks.

Furthermore, we provide detailed schematics for how our exchange is architected, our network topology, and what occurs during the life cycle of an order on our systems.

Our liquidity provider program, **Proof of Risk**, is fully open to the public. If you can write an algorithmic trading bot to earn credits, you reap the same benefits as anyone else. Period. Zero nepotism. Zero favoritism.

There has been ample speculation concerning fictitious exchange volumes. To help empower researchers to prove the veracity of our markets, we will provide L3 exchange market data freely available for download. We come from a background where such manipulations are a grievous offense and will work with the community to the highest degree to demonstrate we are not participants in such conduct.

We are dedicated to following the rules of every jurisdiction in which we operate. We're applying for broker-dealer and/or exchange licenses in Singapore, Hong Kong, and the United States. A sizable percentage of our capital raise will be committed to compliance and licensing efforts. The more regions in which we can safely operate, the more users we can onboard, the greater we can grow the crypto excosystem and the better liquidity we can help provide for everyone.

4. Lit Exchange

The **Lit Exchange** functions in much the same way as the incumbent retail trading platforms, but is designed with the vision of supporting a massively larger world of assets. In the short term, we will offer a different swath of products than most other venues, focused heavily on levered products and derivatives.

With a simple and seamless UI, users can elect to trade directly on the exchange or via the **Smart Router**. We hope that our platform will often offer users the best price, but many forces drive price discrepancies across venues. We're happy to assist our users in taking advantage of those opportunities.

Many products we list are rare or fully absent on other venues. Our focus is derivatives, not spot trading. We will primarily serve the spot market demand through our smart routing product. Our product roadmap includes single strike warrants, swaps, options, and an emphasis on liquidity in stable coins.

We are working with partners to list the first levered index products for exchange trade. On our roadmap, we will expand quickly into Trade at Settle products and Inverse Swaps. These should be familiar to those who've traded other crypto swap products.

Some of these derivative products will be new to many of our users and we will devote time and capital to educational efforts to ensure these products are well understood by our users. We will roll out new products gradually both to ensure ample liquidity but also to make that our users have time to research and understand the products we're launching to the market.

Education is but one small piece of our commitment to providing best-in-class support. We are astonished by the variance in support quality across exchanges; Asian exchanges provide service head and shoulders above what you get on the European and American platforms. KuCoin, Binance, and Huobi are particularly strong in both responsiveness and quality of support.

Our support solution is two-tiered: a customer facing team focused on simple and common problems that is geo-distributed, and a second technical team who interfaces directly with our core development team. By

closing the distance between the product engineering and product support teams, there's reduced friction and shorter turn-around times for resolving issues.

4a. Product Innovations

Our warrant products provide a radically simplified and safer way for users to speculate and hedge on the underlying crypto assets from both the long and the short side. We allow both purchase and sale of warrants and we do this in a way with no socialized losses, no margin lending, no auto-deleveraging and absolutely zero risk to the exchange's balance sheet.

These will be the first active markets for trading and hedging volatility in the majority of crypto assets.

On the leveraged trading side, when we launch our variant of Inverse Swaps, our contract specifications will be similar to existing cryptocurrency swap products with the following exceptions:

- Financing adjustments occurs four times per day to help keep the basis (spread between the mark price and the swap price) in line
- Much larger set of exchanges make up our marking basket
- Our swap products are fixed leverage; users are able to control their leverage ratio through direct interaction with their margin balances

The continuous swap — and the inverse swap — were great financial innovations. We are making some improvements, but it should be noted that we have a deep appreciation and gratitude for those who paved the way before us.⁷

4b. Improved Contract Specifications

Under the "make-take" fee pricing that is common across the majority of venues, exchanges offer a rebate to liquidity providers while charging a fee to "takers" of liquidity that initiate trades using marketable orders that transact against posted limit orders. Make-take fees range in magnitude, but on crypto venues, these make up the bulk of transaction costs.

Current exchanges have tick sizes significantly smaller than their trading fees. This creates a toxic flickering of tiny orders spread out across hundreds of price levels.

This leads to order books that are nearly impossible to visualize for a trader. In conjunction with the highly asymmetric maker-taker fee structures, it creates a constant race-to-join phenomenon where, in order to avoid taker fees, users have to keep joining multiple price levels to try to get filled. We strongly believe this is a waste of user's time and energy. Data strongly suggests that the optimal tick sizing for most products is closer to 1 basis point than the 1/10th of a basis point we see on most crypto exchanges.⁸

As such, our products generally tick in larger increments than what is common across most venues. This leads to much greater near-book liquidity, because queue position is higher value, and also cuts down on messaging both for the exchange and for users with automated systems providing quotes to the market.

We will be experimenting with matching algorithms beyond simple time-price priority. As liquidity improves and volatility gradually declines, we will transition the more stable products to a partial pro-rata system.⁹ We will also support sub-tick orders on the dark pools, which is the more appropriate compromise for minimizing crossing costs.

4c. Connectivity

LX currently accepts orders in the following formats:

| Connectivity | Lit Exchange | Dark Exchange | Smart Routing |
|--------------|--------------|---------------|---------------|
| Web | ✓ | ✓ | ✓ |
| REST | ✓ | ✓ | ✓ |
| FIX | ✓ | ✓ | ✓ |
| Binary | ✓ | ✓ | |
| MT5 | | ✓ | |

Table 3: Connectivity Options

Binary is our proprietary internal format. It is only available for users who colocate at our data centers. Both order entry and executions for the binary (native) format are highly terse, optimized messages reminiscent of ITCH/OUCH.

Users who locate their servers with us will also get access to our low latency price feeds to remote exchanges (which is used by various internal systems including **Smart Router**).

4d. Proof of Risk

Proof of Risk is a revolutionary, democratized liquidity provision program open to all members of our exchange. If you trade or provide liquidity for another to trade, you are providing an essential service to the market ecosystem and should be compensated.

Our **Proof of Risk** is a credit system where users earn credits for both the taking and provision of liquidity, i.e. order placement.

Every minute:

- Users earn 1 **Risk Unit (RU)** for each exchange product in which they execute a trade
- Users earn 1 **RU** for each exchange product in which they had an eligible quote
- Users earn 1 extra **RU** for each product in which they provided the greatest liquidity or traded the most volume

RUs are the fuel for our stochastic reward system. 5% of all exchange revenue collected each day are reserved as a reward in a drawing where each **RU** you earn is an entrance ticket.

This daily drawing is structured such that only 50% of days result in a payout. Metaphorically, a coin is tossed daily. If it comes up heads, the drawing takes place and 5% of all tokens collected are awarded to a randomly chosen user. If the coin toss comes up tails, the tokens roll into the next day's pool.

Both the drawing and "coin toss" will be performed by audited RNG algorithms on publicly available information to demonstrate provable fairness.

For example:

Alice quoted liquidity for others in two products and earned a total of 2190 **RUs**. She also traded actively earning an additional 810 **RUs** throughout the day. So a total of 3,000 **RUs** for the day.

The total **RUs** accumulated by all users through the day totaled 600,000 **RUs** and total exchange fees totaled (after conversion to ETH) 1000 ETH. Thus, Alice has 3,000 chances in 600,000 to be awarded 5% of the 1000 ETH that the exchange collected.

The daily toss comes up heads and the previous day's toss did not, so the previous day's fees roll into today's drawing. Today was less active than yesterday, where the total fees collected were 1500 ETH. The total sum in the stochastic reward pool is 2500 ETH and Alice has 3,000 / 600,000 or a 0.5% chance to collect.

Why are the rewards stochastic?

We want every member of our platform to know their actions matter. Even if you trade infrequently, you are still an important part of our liquidity and deserve a chance to be rewarded for your trading. The more active users, who professionally quote many products, will have many more entrances in the drawing and accordingly better odds.

Markets are about bringing together users with different ideas, motivations, and trading styles. Stochastic rewards provide a way for all types of users to share in the benefits of growing the platform's liquidity.

For our market makers who are averse to the variance of a stochastic system, we anticipate liquid markets in daily **RU** credits to follow after platform launch.

4e. Improved User Interface

Our team has built many trading frontends over our careers, but the requirements of a highly functional web interface that facilitates both retail and professional trading are non-trivial. By virtue of there being many existing platforms on the market, we have had many sources from which to draw inspiration.

The **LXDX** frontend is focused on function, cleanliness of design and simplicity of use. That said, there is a great deal of complexity and intelligence in our product that is quite rare. The range of optimizations is many, but a few highlights will include:

- Search based (with smart auto-fill) instead of menu-driven coin navigation
- Data from other exchanges displayed in-line with our order book
- Automatic Satoshi tests when users add a withdrawal address (to verify the correct address was added)

- Ability to set callback "triggers" to automate common actions: withdraw a set amount of coins when a balance is above a certain threshold or an order is filled; automatically place a stop order given an observed price
- Minimalistic and stripped-down mobile version

5. Dark Exchange

The **Dark Exchange** is our solution for the launch of private institutional dark pools and for, where applicable, the infrastructure that aggregates liquidity across these pools. We are partnering with institutional traders and retail brokers to build out liquidity pools for customers looking to quietly trade for larger sizes than what is available on traditional lit venues.

The primary driver for trading within our dark pool products is to minimize market impact and tap greater liquidity for larger-size orders. Privacy and impact concerns aside, the **Dark** product additionally provides many features relevant for institutional execution including Trade-At-Settle markets, advanced order types, and conduct monitoring to ensure users are acting as good faith liquidity providers to the pools.

Our first pool is launching in Singapore. We are in the process of launching additional sites with partners in Turkey, Thailand, Japan, and the UAE. After the launch of our **LXDX** exchange in Malta, we'll be additionally opening a Malta Dark Pool.

5a. Dark Pool Privacy and Reporting

Trades in the dark pool are reported minimally (in compliance with regulations) to the public market. All records are kept to satisfy surveillance and compliance, but otherwise, the preference is that no trade events are published to any public feeds. Each pool will have slightly different volume aggregation reporting, but the typical policy will be to report daily volume by coin.

5b. Features

All traders within the dark pool are scored according to a formula dominated by two metrics: trade-to-cancel ratio and toxicity. Within the pool, all participants are ranked according to this score and users are divided into four quartiles. Q1 is the highest scoring (best behaving) and Q4 is the worst.

All orders placed within the dark pool contain a maximum quartile field. Traders above this quartile cannot interact with the order. Orders to the dark pool also carry additional functionality to what's available on the lit product including:

- Flag to ignore crossing with orders below a certain size
- Flag that specifies the order can be traded with only locally to the current pool
- Flag to "ping" other members that an order has arrived (optional)

5c. Connectivity

Connectivity options will vary by dark pool, but include at a minimum MT5, FIX, and Rest/Web.

5d. Trade at Settle

Very large block executions are generally quoted as basis point discounts/premiums to a reference index. For example, if you would like to opportunistically buy 5,000 BTC, you might advertise that you're a buyer for "5000 at -1 to CME" indicating that you would buy up to 5,000 BTC at a 1% discount to the CME's Bitcoin reference rate. A seller willing to sell at such a discount locates a buyer through an arduous manual process.

The solution to this problem in traditional markets is Trade-At-Settle (TAS) contracts. **LXDX** will bring this solution to cryptocurrency block markets. TAS contracts will be quoted in 10 basis point increments, with a minimum order size tentatively set to 50 BTC or 500 ETH. Each day these contracts will expire, settling to the Chicago Mercantile Exchange's (CME) reference rate.

TAS contracts greatly simplify the bulk execution process for institutional customers. In many liquid commodity markets, TAS makes up over 5% of the total volume traded. Specifying a small discount or premium relative to a trusted benchmark drastically simplifies the execution burden and facilitates huge improvements in available liquidity.

5e. Does Crypto Need Dark Pools?

Consider the increasing prevalence of trading via dark liquidity in traditional equities markets:

Darkness Rising

Percentage of trading volume, based on daily close

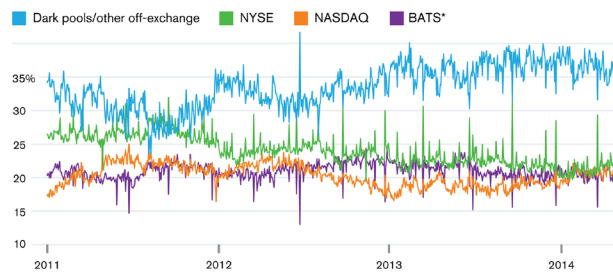


Figure 3: Dark Pool Market Share (Source: Bloomberg)

Off exchange volumes in both the US and Europe are approaching 45%.¹⁰

We see great parallels for cryptocurrency trading. There's often the need to accumulate or unwind large positions without *spooking* the market. There is nothing dishonest or unfair about this; institutions need the ability to trade meaningful size without being front-run. The long-term viability of crypto hedge funds and general institutional interest demands it.

OTC is often a hornet's nest. Not only are the spreads wide, but large OTC brokers track the performance of their customers' trades. This data informs their models on how to quote spreads as well as directs when they should trade-along their customer's flow. Doing a better job at modeling customer demand facilitates more competitive pricing, but it does mean that the indicated prices you see are not always representative of *fair value*.

6. Smart Routing

Our Smart Router is designed according to what we're both familiar building and using in traditional markets.

User Flow for **Smart Router**:

1. User enters a **Smart Order** {asset, size, direction, price limit, time limit, execution-algo}
2. Order flows to **Dark Pool**; order may instantly match if the prices in the dark pools are better than what's available (fee-adjusted) in the open market. Otherwise the order is temporarily worked in the aggregated **Dark Book** for 250ms hoping to *run into* another order. After the 250ms pass, the residual unfilled order is passed to the **Smart Router**.



3. The **Smart Router** fragments the order and works the fragments across all connected exchanges according to the joint constraints of satisfying the user's execution algorithm and obtaining the best possible price.
4. Child fill messages flow back to the user as they occur. Additionally, at either the time limit or upon full execution, an execution report is returned to the user providing detailing metrics on the quality of the execution, the state of the market upon initial receipt, and what best-case execution would have been for other execution strategies.

Technical flow for **Smart Router**:

1. Every night, the **Liquidity Model** is trained via walk forward simulation, yielding a model for determining both fragmentation and make/take policy for each execution algorithm.
2. **MD Gateway** connects to redundant feeds to each remote exchange via WebSocket and proxy-poll REST. Messages are normalized to our terse binary native format and multicast-UDP messaged out to subscribing services.
3. **Pricer** adjusts the feeds to include adjustment from triangular arbitrages, trading, and withdraw/deposit fees.
4. **Executor** consumes the augmented feeds, and using the models from the **Liquidity Model**, fragments and optimally manages orders for the given execution strategy.
5. **Executor** speaks native binary to our **Order Gateway** which both maintains connectivity to every remote exchange and also converts messages to the exchange-specific formats (and vice versa for responses).
6. Fills flow back into **Clearing** which handles individual and aggregate trade reporting back to the user.

See Figure 4 for a detailed diagram of our Smart Router flow.

7. Architecture Overview

Our architecture, like most other high-performance exchanges, is ring based. At the innermost core of our infrastructure are the set of matching engines that perform the singular task of matching orders.

Around that heart is a ring of **Internal Gateways** that speak only our native protocol — they speak to the **Data Plane**, which is a tiered database system that handles atomically locking and freeing user funds. There is no limit to the number of **Internal Gateway** instances we run; they are agnostic to product and scale linearly in performance.

Outside that *infinitely* scalable ring is the ring of **External Gateway** boxes. These scale with the number of users we're supporting. They perform the task of converting remote messaging standards such as Rest, FIX, MT5 to our local, terse, binary format. Figure 6 shows the latency distribution of these conversions.

For greater detail, please refer to the Glossary for definitions on each component system.

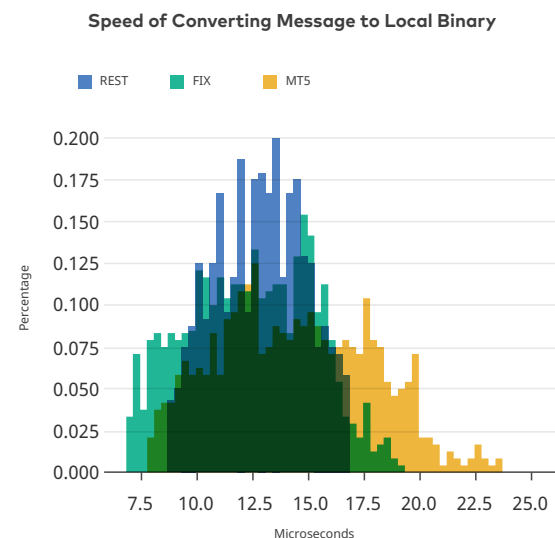
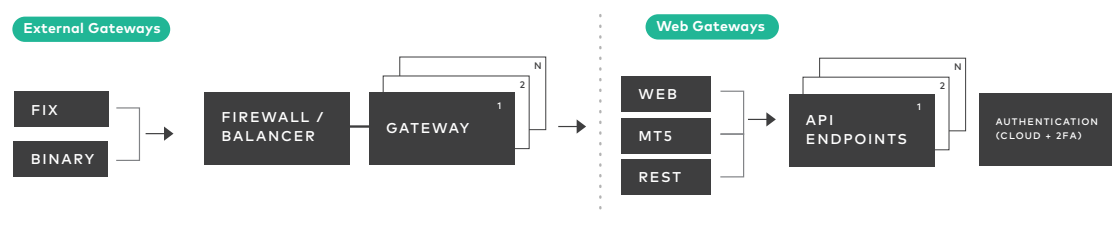
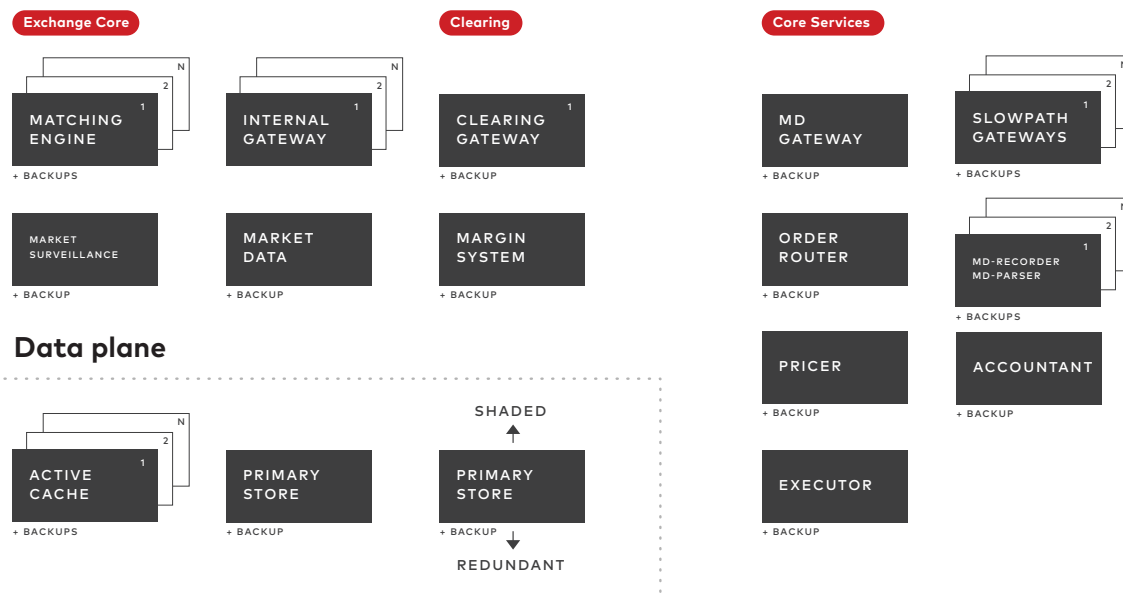


Figure 6: Cost of Message Conversions

External Architecture



LXDX Core Services Architecture



Blockchain

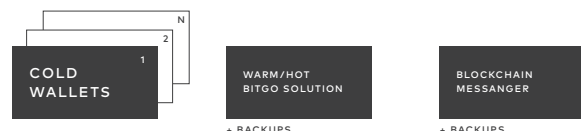


Figure 5: LXDX Overall Architecture

8. Liquidity Model

The **Liquidity Model** is the result of many years of engineering similar solutions in algorithmic trading; we solve for optimal trading policy by solving a multi-layer optimization problem.

It's worth briefly touching on the fact that all smart routing logic draws significant inspiration from the following simple heuristic formula¹¹:

$$\Delta P = \text{spread.cost} + \alpha \sigma \sqrt{\frac{Q}{V}}$$

Where ΔP is price impact, σ is daily volatility, V is daily volume, Q is the number of shares to be traded and α is the constant *cost of liquidity* factor to minimize.

This formula degenerates to the simple approximation for market impact:

$$\alpha \sigma \sqrt{\frac{Q}{V}}$$

For example:

We would like to purchase 200,000 USD worth of a token with a daily volatility of 4% that trades 5M USD per day on a given venue. We should expect an

approximate cost of 80 basis points ($0.04 * 0.20$).

As we bring additional venues into the picture and fragment our orders accordingly, we improve execution quality roughly as a function of this square root market model. If we double the available volume V , we should expect the cost to execute to decrease by $1 - 1/\sqrt{2} \approx 30\%$. At 4 venues, we should expect an improvement of 50%; at 8, nearly $2/3$.

*Why bother with all this fragmentation and routing? It drives down cost to execute. **Significantly.***

We term our **Smart Router** hybrid-dynamic. We use a static-policy first pass to search for optimal execution size, but for execution of that unit risk, the policy is fully dynamic — it utilizes current order book state information.

Unlike most other approaches, we solve for the optimal execution unit through modeling the per-exchange liquidity conditioned on price action. By stripping out lead-lag effects from price moves, we get a more accurate representation of how much *back-and-forth* true price bounce exists per exchange, and how much liquidity per unit time this can tolerate.

We next train via walk forward simulation the optimal execution policy per venue per unit. Primary inputs to this model are:

- Trade arrival and crossing frequencies (conditioned on time of day effects and local instantaneous volatility)
- Price action on other exchanges
- Standard order book features; book pressure, mean reversion features
- Each exchange's fee structure

The mechanics of these models are quite intuitive. Order flows are highly auto-correlated.

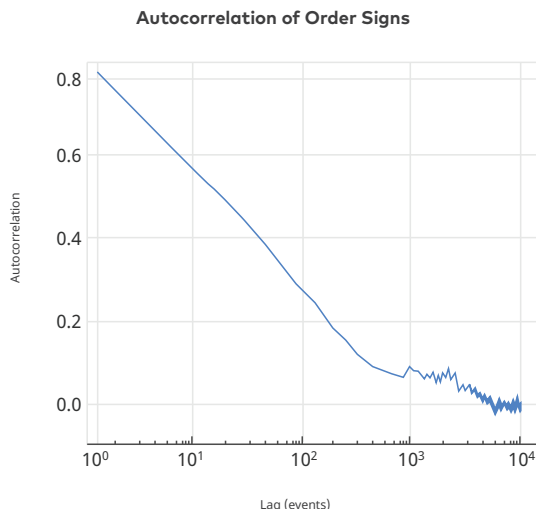


Figure 7: GDAX February, 2018 (BTCUSD)

Autocorrelation in signed flow leads to autocorrelation in liquidity, yielding one of the simplest driving heuristics in any good smart routing model: **the best future indication of hidden liquidity is recent hidden liquidity.**

There are tradeoffs when designing any execution system. Urgency and risk avoidance are at odds with optimal expected price. Our system is designed to capture the interplay of these dynamics. Aggression (the degree to which you seek to execute quickly and take liquidity) and risk-avoidance (the penalty by which you penalize variance in execution outcomes) are two meta-parameters that feed into the simulations for all models. By tuning these parameters, the distributions of outcomes per execution can be molded.

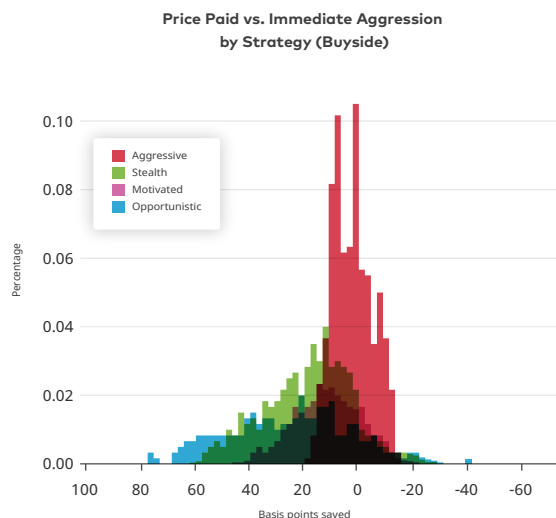


Figure 8: Distributions of Execution Outcomes by Strategy

In the Execution Algorithms section, we discuss the varying execution algorithms in greater detail. Each is designed and tuned to stay in line with the distributions in Figure 8.

9. Execution

Probabilistically modeling where to source liquidity is critical in delivering the lowest cost executions, but, especially in crypto, minimizing fees is often of similar necessity. Members benefit from both negotiated fees with partner platforms and the economy-of-scale effects of having all orders trade out of common account.

The net effect of all of these optimizations is substantial. Simulations indicate savings of 10-15 basis points on average per trade **after** our 10 basis point smart router fee, with substantially greater savings in either less liquid coins or trades of larger size.

Our members also receive the substantial benefit of not facing credit risk with the exchanges to which we route their orders. We deploy our own balance sheet to shield users from risk of hack, theft, or seizure.

On the technical side, **Executor** is responsible for the execution of all child orders. **Executor** is a high-performance order management system (OMS) to satisfy the transactional needs of the Smart Router. As with all core systems at **LXDX**, **executor** is written in optimized C++ and follows standard low-latency best practices. **Executor** benefits from all the bells and whistles of a highly performant 'Quoter' utilized by proprietary trading firms.

10. Balance Sheet Management

Accountant handles the challenge of assuring we've got sufficient fiat and coin reserves at our accounts across all the venues we service. It is a fully automated system that moves assets optimally between venues depending on our current and anticipated needs.

Balance sheet needs are one of the primary drivers for our token sale. Our automated **Accountant** is able to magnify the liquidity we can work with, but ultimately, due to the limited leverage opportunities in the current markets, we'll be dedicating a significant portion of the capital raised through our token sale

for the liquidity reserves that back the **LXDX** accounts across remote exchanges.

We will commit a minimum of **3M USD** equivalent exclusively to balance sheet. The assets will be held in an optimal way to service the anticipated user flows. Where possible, we'll hedge these balances to limit the total directional exposure of the balance sheet portfolio. Preliminary models show us holding the majority of reserves in USD, BTC, and ETH.

Beyond the capital raised through our token sale, we will re-invest 10% of all fees collected through smart routing back into reserves — until the total routing reserves reach at least **30M USD** equivalent.

Other optimizations that facilitate running a smaller balance sheet include:

- Keeping FIAT accounts at the banks where on-ramp exchanges also operate
- Proprietary retail dark product with significant inner crossing
- Leveraging our own exchange's liquidity in stablecoins to minimize dependency on slower FIAT transfers

11. Trading Operations

Our team — and not just our core team — has had long, successful careers in algorithmic trading across hundreds of products and markets. Much of the aforementioned technology is nearing completion, but our ambitions extend to leveraging the technology and team along other axes as the businesses grow.

Much of **LXDX's** technology, while built for blockchain markets, is directly applicable to traditional markets. Traditional exchanges frequently are looking to upgrade to better technology, institutions are always on the market for better execution tools, and the vast majority of the technology under development here at **LXDX** is an exact fit.

12. Fundraising Goals

We seek to raise funds to facilitate the following primary objectives:

1. Provide USD and coin reserves for our **Smart Router** product
2. Provide USD capital to help market the exchange products
3. Finance legal and operational requirements for obtaining licenses, compliance staff, and ongoing auditing and accounting expenses related to our product line
4. Finance R&D efforts both on the exchange technology and blockchain side

13. Token Economics

LXDX Tokens are an investment in **LXDX** and their value is fully contingent on the success of the **LXDX** exchange.

13a. Revenue Share

LXDX will distributed 10% of adjusted gross revenue to token holders on a quarterly basis pursuant to the conditions discussed in the Offering Document.

13b. Equity

Tokens represent equity ownership of **LXDX p.l.c.** and have the right to receipt of 25% of gains made upon sale of business or receipt of 25% of gains made upon a distribution of profits upon liquidation. Shares contain no voting rights.

14. Token

LXDX Tokens are security tokens, designed for integration with current and future secondary markets for secondary market token liquidity.

We'll be reserving a fraction of our collected ETH for stabilization via smart contract. We will use this to provide interim liquidity while secondary markets for security tokens mature and to provide a "floor" value for our token in the meanwhile.

We're building the best execution platform for trading cryptocurrencies. Those that support our vision share

in our success.

15. Recap

LXDX will redefine user expectations for product innovation and performance. Our team is committed to bringing our expertise in technology and products from traditional financial markets to crypto, but we're equally committed to innovate, experiment and seek out ways to evolve and improve how capital markets will function in years to come.

16. Disclaimer

This material is provided by **LXDX**, p.l.c. ("**LXDX**", the "**Company**"), for informational purposes only, and is not an offer or a solicitation to buy or sell any securities or other financial instruments. This white paper shall not and cannot be considered as an invitation to enter into an investment.

This material is of October 5, 2018 may not be complete or final, may be estimated, is subject to change and does not contain all material information regarding an investment, including specific information relating to an investment's risks.

The offering of the **LXDX Token** has not been registered, qualified, or approved under any securities, futures, financial instruments, capital markets, or exchange control legislation, regulation, or ordinance of any jurisdiction.

The offer to sell and solicitation to purchase **LXDX Tokens** is directed solely to qualified institutional investors, qualified professional investors, and those other sophisticated persons to whom offers and solicitation may be made without any licensing, registration, qualification, or approval under applicable law (collectively, "**Qualified Persons**"). These Materials do not constitute an offer, solicitation, distribution or marketing to any non-**Qualified Person**, and is not an offering to the retail public in any jurisdiction where such offering is unlawful. You should disregard this information sheet if you are a non-**Qualified Person**.

Before deciding to invest in a **LXDX Token**, an investor should carefully study and review **LXDX's** offering documents and consult with his own advisors. The

LXDX Tokens will only be offered pursuant to such offering materials. Any investment in a **LXDX Token** is speculative and involves significant risks, particularly that **LXDX Tokens**, if issued, may fluctuate in value and be volatile, which any potential investor should understand prior to making an investment.

Opinions, predictions, assumptions, statements or the like regarding future events or which are forward-looking, constitute only subjective views, beliefs, outlooks, estimations or intentions of **LXDX**, should not be relied on, are subject to change due to a variety of factors, including fluctuating market conditions and economic factors, and involve inherent risks and uncertainties, both general and specific, many of which cannot be predicted or quantified and are beyond the control of **LXDX**. This paper lays out the current vision of **LXDX**. While we endeavor to achieve this vision, recognize that it is dependent on a variety of factors and subject to many risks. The platform under construction may never be widely adopted, and shifting market conditions may require significant adjustments to the aforementioned plans. Interested parties further acknowledge that the **LXDX**, as described herein, may never operate as intended

LXDX makes no representation nor warranty as to the accuracy or completeness of the information contained in these Materials. **LXDX** has no obligation to update or keep current information or projections contained in these Materials. **LXDX Tokens** are not for speculative investment. No promises of future value have been made or will ever be made concerning their future value. **LXDX Tokens** are designed for experts in both blockchain technology and trading software.

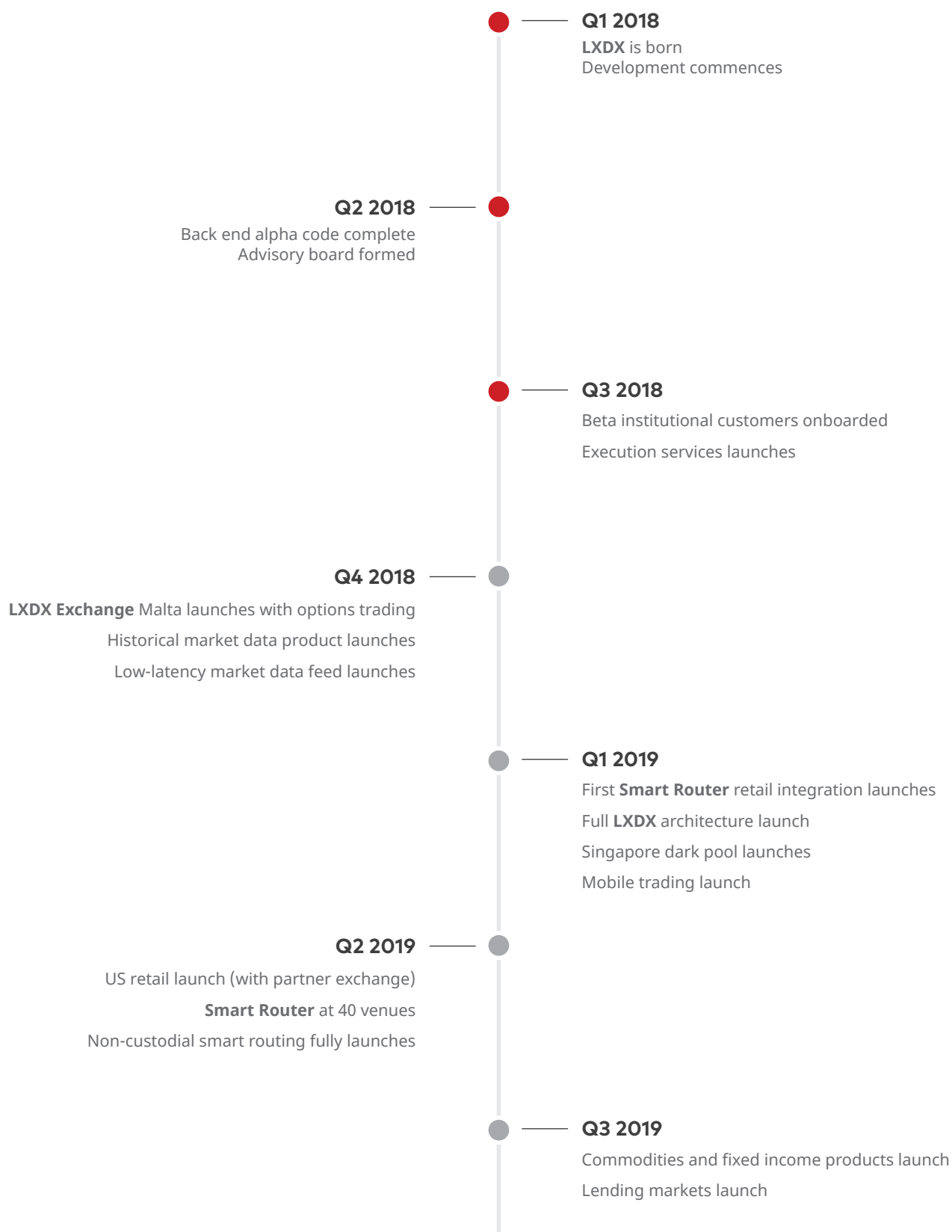
Token holders shall not be entitled to any utility functionality as part of the Token. **LXDX** expects to endeavor to provide certain additional benefits to holders of **LXDX Tokens** in the future. Such benefits will not be a part of the terms and conditions of the **Tokens**, but rather benefits voluntarily provided by the Company to Token holders.

17. Arbitration

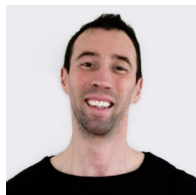
Any dispute or disagreement arising out of or in connection with the descriptions of the **LXDX** platform set forth in this whitepaper shall be settled by arbitration as appropriate to the rules and regulations

of Malta. All disputes will be resolved solely through individual arbitration and will not be brought as a class arbitration, class action or any other type of representative proceeding. Further, a dispute cannot be brought as a class or other type of representative action, whether within or outside of arbitration, or on behalf of any other individual or group of individuals.

Roadmap



Leadership



Joshua Greenwald

Chief Executive Officer

For over a decade Josh has been head of desk and/or a major participant in algo trading businesses. He led an equities group at DRW before running research for Asia and heading up KOSPI trading. Josh founded GLT and later ran high frequency for Laurion Capital Shanghai before working on automation and propulsion at SpaceX.



William Roman

Chief Operating Officer

Will has spent fifteen years building digital product companies and consulting with Silicon Valley startups on user experience and customer development. Will most recently built the Solutions team at Parsable, selling and deploying global companies such as Schlumberger, Nestle, and Larry Page's flying car company, Kitty Hawk. He was previously Head of UX for a Google Ventures project and lead product management of the platforms at OwnLocal that processed a billion events monthly.



Steven Thomas

Chief Technology Officer

Steven recently led Performance Engineering at Tower Research Capital. He worked with both John and Josh at GLT where he led the most advanced projects at the firm. Before joining the high frequency world, Steven spent a decade in information security, including the development of a custom hardware solution for high performance nation-state-secure encryption.



John Hazen

Chief Financial Officer

John has over twelve years of experience building high frequency trading operations in cash, futures, and options products in equities, fixed income, FX, and commodities on over 30 exchanges worldwide. He wrote and headed the group that developed DRW's highly successful low latency market-making system mentioned in Michael Lewis' book *Flash Boys*. He later co-founded GLT Trading with Josh before running high frequency trading of millions of options on 4500+ tickers across 20+ US equity and equity option venues for Grace Hall Trading, a member of Simplex Investments.

Advisors



Arianna Simpson

Autonomous Partners, BitGo, Facebook

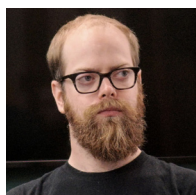
As managing director at Autonomous Partners, Arianna has deep experience investing in and advising crypto and early stage companies. She helped build BitGo as employee number three and previously did a tour in global marketing at Facebook. Arianna frequently speaks on tech related topics, particularly bitcoin, and contributes to a number of publications such as TechCrunch, the New York Times, and CoinDesk.



Richard Geary

Skylake Capital, PDT Partners, Tower Research Capital, Morgan Stanley, Microsoft

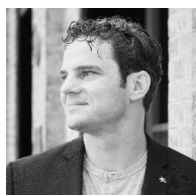
Technology advisor and early stage investor. Richard has a diverse background in cutting-edge finance and tech for industry innovators including PDT Partners, Tower Research Capital, Morgan Stanley and Microsoft. He has over a decade of experience coding low-latency markets, building rapid development tools and intuitive risk systems for financial professionals.



Alex Disney

Cumberland, DRW

An expert in smart contract and ethereum ecosystem development, Alex bridges the gap between traditional finance and the cryptocurrency world. He spent 10 years at DRW, including two at Cumberland where he developed their enterprise-grade mining operation as well as developed, maintained, and supported their automation strategies.



Justin Litchfield, PhD

ProChain Capital, BTC Labs, Po.et Foundation

Justin's unique background spanning chemistry, financial technology, and now blockchain make him an invaluable resource for guidance on product as well as market-related challenges. Justin is CTO at ProChain Capital and previously founded Obsidian, a hybrid cryptocurrency exchange and mobile-centered bank in Latin America.

Core Team



Bill Caputo
Principal Software
Architect



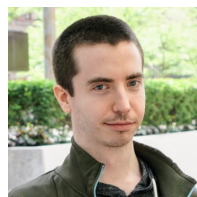
Jeremy Seith
Principle Software
Architect



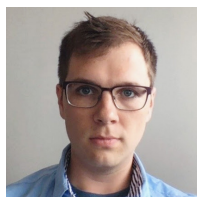
Anatoly Shikolay
Lead Frontend Engineer



Cody Solomon
Director of Marketing



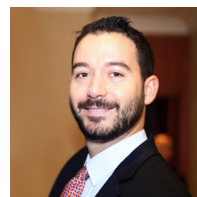
Shane Woodcock
Senior Software Engineer



Riley Rook
Senior Software Engineer



Elliot Plant
Lead Frontend Engineer



Samuel Hertz
Business Development

With Help From



Dymon Asia Capital is an alternative investment manager headquartered in Singapore with approximately US\$4.9 billion under management as of June 29, 2018.



DLA Piper is a multinational law firm located in more than 40 countries and is the largest law firm (revenue) in the world.



Commonwealth Crypto, founded by Sharon Goldberg, enables traders to maintain custody of their coins while trading at centralized cryptocurrency exchanges.



Consolidated Trading is a proprietary trading firm that uses technology to provide liquidity in agricultural, currency, energy, ETF, equity, fixed income and index derivatives.



The Malta Financial Services Authority (MFSA) is the single regulator for financial services activities in Malta.



Credit Suisse Group AG is a Swiss multinational investment bank and is a leader in blockchain and cryptocurrency strategy for financial services companies.



Aon Plc, headquartered in London, is the world's second largest insurance brokerage. with reported revenue of \$11.61 billion in 2016.



DF Advocates is a leading Malta-based law firm, specializing in finance and blockchain advising for international clients.



Autonomous Partners is a cryptocurrency hedge and venture capital fund focused on investing in cryptocurrencies, digital assets, and blockchain-based companies.



ProChain Capital is a crypto multi-strategy hedge fund.

Execution Algorithms

| Liquidity Sourcing | | | | |
|--------------------|---------------|---|------------------------------|------------|
| Strategy | | Tactics | Relative probability of fill | In English |
| More aggressive | Aggressive | Aggressively sweeps the market to the limit price. Posts remaining shares at limit price. | 100% | Do |
| | Stealth | Preferentially executes in dark pools; never displays child orders on exchanges. | 80% | Seek |
| Less aggressive | Motivated | Balance market impact with urgency. Attempts to avoid taker fees as much as possible with still high probability of execution | 75% | Try |
| | Opportunistic | Aggressively sweeps the market to the limit price. Posts remaining shares at limit price. | 40% | Explore |

| Benchmarking | | | |
|--------------------|--|-------------|----------------------------|
| Strategy | Tactics | Proprietary | Reported Every Smart Order |
| Local Microprice * | Instantaneous microprice at LX at time of order arrival | No | Yes |
| Aggregate Price ** | Calculated mark price across all exchanges | Yes | Yes |
| VWAP | Volume Weighted Average Price from time of order to final fill | No | Yes |
| TWAP | Time Weighted Average Price from time of order to final fill | No | Yes |

Common Questions and Answers

Why is LXDX offering a security token?

LXDX requires capital to support Smart Routing, market and promote the exchange, and expand into new markets. A security token offering provides a way to bring on capital to support our objectives while giving investors enhanced liquidity and functionality.

Security tokens cut to the heart of the matter: investment is about ownership. We're offering a share of our revenue and the right to shares in the company.

Why do an ERC20 token?

We love Cardano. We have high hopes for the Graphene based chains. However, as of Q4 2018, Ethereum is both the easiest blockchain on which to safely develop audited smart contracts and also the safest chain on which to custody assets. There is the greatest liquidity across centralized and decentralized platforms for ERC20 compliant tokens.

How many users can LXDX support?

LXDX is built to support 10s of millions of users sending billions of orders per day. Our infrastructure is fully horizontally scalable with the ability to laterally scale gateway rings and database caches with the number of connected users. We test our systems at loads of well above 100k messages per second. Our third-party integrations are best-in-class and are used in places already supporting millions of users.

Why Malta?

Malta is becoming the epicenter of cryptocurrency trading. There is both the regulatory clarity and administrative will to facilitate building a safe, fair, and modern financial ecosystem for cryptocurrencies. We are proud to be in the first group of exchanges to receive a license to operate in Malta and look forward to their guidance and stewardship as the environment evolves.

Is LXDX only for "sophisticated" traders?

LXDX is for anyone who wants to trade innovative products and get the best prices in the simplest, fairest possible way.

What makes your Smart Routing different than other Smart Routing solutions such as Omega-One or Xtrd?

We've all reached the same conclusion: for spot

trading, abstracting the user from the specific exchange platforms is a better model. In comparison to others, we are more focused on the specifics of optimizing execution quality and have a team with significant experience in both designing and using smart routing solutions in traditional markets.

We think the quality of executions will bear out. Beyond that, we are an exchange operator on the dark and lit side as well as a router.

Is it not extremely high risk to hold a balance sheet of cryptocurrency assets to facilitate user trading?

Our diversified cryptocurrency assets will be professionally managed as a portfolio. The composition of our asset portfolio will be annually reviewed by outside expert counsel.

Will you offer Security Token trading as well?

Yes, but we're not striving to be a first mover in this space. We want to ensure that there are strong standards; we'd like to be involved in conversations as much as possible and we're delighted to provide technical and strategic guidance.

That said, our focus over the next year is to make the LXDX exchange the greatest place to trade the products we cover. We look to bring millions of new investors into the space and build up the global user base of those interested in trading crypto assets learning from our users in the process.

Glossary

Accountant – Retrieves balance information across all exchanges and manages keeping each exchange's balance sheet at its target levels. Additionally, keeps fee information up to date for each remote exchange.

Active Cache – Sharded in-memory ultrafast cache that atomically locks user balances and margin adjustments. Synched to the Primary Store.

API Endpoints – Set of authenticated API Gateway points that AWS manages to ensure user has rights to API resource.

BitGo Warm/Hot Solution – Pair of Hot Send/Receive wallets that speak to a warm wallet for handling real-time automated deposits and withdrawals. Messages are passed to the Slow Path Gateway which checks all requests with our redundant Blockchain Messenger.

Blockchain Messenger – Speaks to our local blockchain clusters; handles confirmation counting as well as sending raw transactions to various blockchains.

Clearing Gateway – Passes order state messages back from the matching engine to end users. Responsible for atomically unlocking funds as matches occur or orders are cancelled.

Cold Wallets – Wallets which have no automated capabilities and require manual intervention to move assets from.

Executor – Order management system for working and placing orders on all remote exchanges.

Internal Gateway – Performs risk checks and balance verification for all orders placed. Sits between the External Gateways and either the SmartRouter or a Matching Engine.

Liquidity Model – Trained nightly; responsible for providing meta parameters to Executor to assist in its decision making.

Margin System – Set of connected components that handle marking and liquidation when necessary for user's margin trading accounts. Speaks to Pricer.

Market Data – Broadcasts out current book state to all connected components. Passes market data messages back through our direct backbone to AWS to the cloud MD Publisher.

Matching Engine – Horizontally per-product-sharded order-matching engine and book state. Clearing messages pass to the Clearing Gateway; the incremental changes in book state are sent to the Market Data service.

MD Gateway – Aggregated market data handler that handles translating market data messages from other exchanges into our native market data format.

MD Parser – Converts files from MD Recorder into our native format for use in internal research and for consumption by users of our data products.

MD Publisher – Listen to market data messages from our colo facility. Maintains a list of connected users from the internet and publishes market data events out to users via Websockets.

MD Recorder – Redundant highly distributed cloud recording solution with hundreds of containers listening to market data across all exchanges.

Order Gateway – Converts internal order representations into 'street' orders for each connected exchange. Handles the reverse flow of converting clearing messages from external exchanges into our native format.

Pricer – Strips out triangular arbitrages from the aggregated external market data feeds. Adjusts prices by fee information provided by Accountant. Additionally, performs marking for all products tied to external indices (leveraged products). Pricer includes make/take fees, withdraw/deposit fees, etc.

Primary Store – Master set of databases that store all user, order, and transaction information. Redundant and replicated off site.

Smart Router – Set of systems that are responsible for handling smart orders: Accountant, MD Gateway, Order Router, Executor, and Pricer.

References

1. Ribes, Sylvain (2018). Chasing fake volume: a crypto plague. Available at: <https://medium.com/@sylvainartplayribes/chasing-fake-volume-a-crypto-plague-ea1a3c1e0b5e>
2. Bloomberg. (Current level 2 top of book data)
3. History of Stock Exchange Failures (2017). New York Times. Available at: https://www.nytimes.com/interactive/2015/07/08/business/dealbook/history-of-stock-exchange-failures.html#/#time380_11061
4. Introducing Chaos Engineering (2014). Netflix Tech Blog. Available at: <https://web.archive.org/web/20141008152549/http://techblog.netflix.com/2014/09/introducing-chaos-engineering.html>
5. Coinbase Is Getting Sued for Insider Trading. Motherboard, Vice. Available at: https://motherboard.vice.com/en_us/article/pam4xn/coinbase-insider-trading-lawsuit-gdax-bitcoin-cash
6. Robinhood Rule 606 Disclosures. Available at: <https://d2ue93q3u507c2.cloudfront.net/assets/robinhood/legal/RHF%20PFO%20Disclosure.pdf>
7. BitMex Perpetual Contracts Guide. Available at: <https://www.bitmex.com/app/perpetualContractsGuide>
8. Bonart, Julius (2017). What is the Optimal Tick Size? A Cross-Sectional Analysis of Execution Costs on NASDAQ.
9. CME Documentation. Threshold Pro-Rata.
10. NYSE ETP Monthly Flash 2018-01-01. Available at: https://www.nyse.com/publicdocs/nyse/products/etp-funds/NYSE_ETP_Monthly_Flash_2018-01-01.pdf
11. Grinold, R. C. and R. N. Kahn (1999). Active Portfolio Management (2nd ed.), Chapter 16, pp. 473–475. McGraw-Hill.

Community

The lifeblood of our network is our active community and we would love to engage with you directly. We encourage discussion around our mission, model, and the entire platform.

To join the **LXDX** community or to find out more:

- Join our Telegram
<http://t.me/LXDXchat>
- Follow our Medium
<https://medium.com/lxdx>
- Follow us on Twitter
<https://twitter.com/lxdx>
- Subscribe to our subreddit
<https://reddit.com/r/lxdx/>
- Visit our website
<https://lxdx.co>
- Send us an email
inquiry@lxdx.co