ENERGY LEDGER

ELX: A CryptoCommodity Solution for Petroleum Storage to Substantiate Value Within Energy Trade

12/26/2020

Mission & Purpose

Energy Ledger Inc. seeks to make ELX the standard software development platform for energy value trade on the blockchain. The goal and intent of creating this generalized crypto-commodity is to (i) create a cryptocurrency that can be utilized by the energy industry to manage oil containers, and (ii) to incentivize the long term storage of crude oil through investment in the ecosystem. The idea for ELX was originally conceptualized in 2018 by founder and CEO of Energy Ledger Inc., William G. Pete, who identified the potential for Crude Oil markets to fall into contango or backwardation due to the lack of a computer system such as blockchain being developed to manage and understand the scarcity of storage for crude oil. As of April 2020, oil indexes such as WTI briefly fell negative because of contango patterns "Oil prices have been trading in a pattern known as contango this year, where spot prices and near-term futures are worth less than futures expiring several months from now" (Salzman, A., 2020) and "But suddenly this week, the super contango pattern shifted into a pattern called backwardation, if only briefly. Backwardation means oil today is worth more than oil in the future." (Salzman, A., 2020). With this issue coming to fruition, Energy Ledger was formed to prove the concept and eventual execution of a deployed blockchain solution for crude oil storage units. Smart contract process characteristics portend potential business process continuous improvement for supply chain processes. The potential for supply chain business process improvements can be situated in blockchain information that may capture performance metrics in ledgers; linking them to agree upon processes (S. Saberi, M. Kouhizadeh, J. Sarkis & L. Shen., 2019).

The robust ecosystem available for smart contract development within the Ethereum Solidity Ecosystem, and IBM Hyperledger platforms became the catalyst for the development of Energy Ledger's proposed solutions: i.) A public blockchain on Ethereum for developers to launch open source energy software utilizing the ELX token, ii.) A business, Energy Ledger Inc., whom will act as a consultancy firm for private enterprise blockchains, iii.) Development of tamper proof IoT flow meters & liquid level sensors for containers.

Impact and Scope

The supply of Energy Ledger's token is set at 714 million tokens, this supply figure was chosen to relate to the number of barrels that can be realistically stored in the Strategic Petroleum Reserve. Although the value of the tokens is not predicated off of this reserve, it provides a realistic expectation for the upper-limit of oil storage on earth currently. By truly understanding from a conceptual perspective what the upper limit of storage is, it is hypothesized that supply chains will be able to predict and adapt to instances of contango and backwardation more readily. The most basic function of building a crypto-commodity surrounding oil is to deal with these events which lead to negative index prices. Negative prices mean you are actually *paying* the person with the oil to **not** give you the oil (Manoukian, J., 2020). ELX by design can not go negative, henceforth representing a market that operates on the deflationary financial nature of limited storage - attributing a higher premium to storage when demand for petroleum products falls.

Blockchain Applied to the Energy Sector

Energy Ledger offers a patent-pending solution for public and private enterprise blockchains to utilize on top of our ELX token. The purpose of pursuing a patented solution was to substantiate value through a company [Energy Ledger Inc.] to act as a focal point within the blockchain industry that can foster the adoption standardized decentralized services [dApps], smart contract enabled IoT devices, and utility metrics for cumulative representation of crude oil services in the midstream oil & gas ecosystems that currently exist. *Figure 1.* below from our patent-pending solution outlines a rudimentary blockchain-capable solution for attributing an electronic coin, digital currency token, or blockchain smart contract oracle datapoint to a container's potential and actual crude oil contents. Through providing guidance to corporations and independent suppliers, our goal is to create a more transparent energy industry that can easily track and compound the value they offer throughout the scope of services offered within their business model.

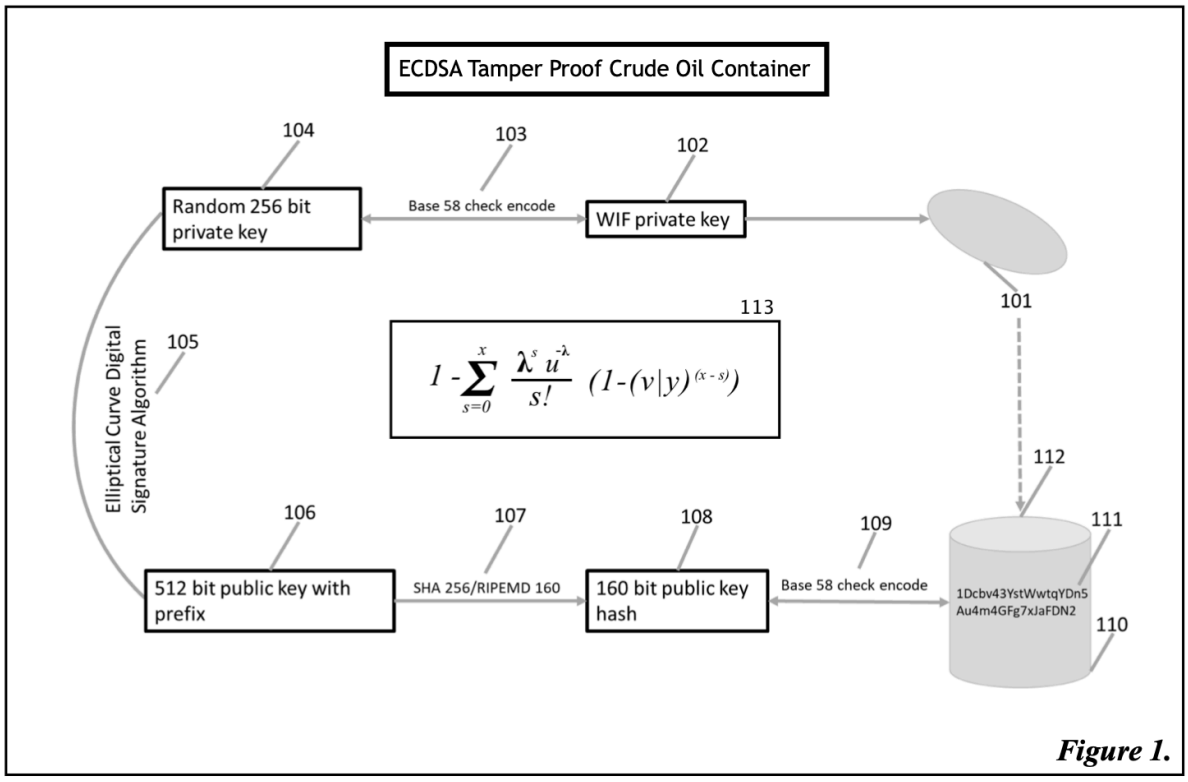

Figure 1.

Applying our ELX token to this model as shown in *Figure 1.* - we have purposefully used the ERC777 token standard to allow tokens to be sent from external contracts using ***send(dest, value, data)*** these external contracts could exist in the form of private or public blockchains operated by other companies who have committed to using the ELX standard to develop their own blockchain solution. Contracts and addresses building on top of ELX can control and reject tokens sent through the ***tokensToSend*** hook, and also exert the same authority over tokens received through the ***tokensReceived*** hook. In both use cases, the ***revert*** hook can be used to reject transactions. Another key reason the ERC777 token standard was selected is for the ***data*** and ***operatorData*** byte fields in each transaction conducted using ELX which can be used to pass data between the holder and the operator.

The clear utilitarian opportunity presented by the ELX implementation is for an external actor to utilize ***data & operatorData*** within ELX transactions to create a relationship between their products and on-chain transactions. Although the token operates on a fixed supply of 714 million, it is possible to utilize analysis of covariance (ANCOVA) models such as the one

represented in ***Figure 2a.*** to construct external smart contracts in relation to the ELX ledger that are able to assign proportional market value through naturally occurring arbitrage that may occur in the global market for crude oil receivables and deliverables. The end goal is to be able to analyze data from ***data & operatorData*** fields within transactions to colligate data into groups of sequitur and non sequitur transactions. An example of a sequitur transaction would be those who include ***data or operatorData*** indicating a certain type of crude oil; e.g. *light-sweet* crude oil which would have an API gravity of 31.1 °API or higher, and a sulfur volume lower than 0.42%. An example of a non-sequitur transaction would be simply one that does not contain sufficient data within these fields. Both types of transactions offer value to data scientists who may use this data to substantiate industrial, logistical, and fiscal decisions on the basis of the data they gather from their organization's use of ELX, or their own proprietary solution developed by Energy Ledger Inc.

Figure 2a.

$$Cov_q = \sum_{z=0}^{3} v_{q+1-z}^{Petrol} \times DefAssay_{q-j}$$

Through longer term analysis data issued on top of token transactions, we seek for ELX to be a benefactor to the renewable energy revolution. Ideally, an electronic currency substantiated by legacy energy asset supply chains, such as crude oil, would be utilized and redeemable for renewable services - such as charging station subscriptions for electric vehicles. Environmental sustainability is also a factor in the motivation behind ELX as the market value of plastic products derived from petroleum polymers should be strictly monitored at a resource production level [crude oil], to dictate an economically and environmentally sustainable price equilibrium for plastic products such as No. 1, PET (Polyethylene Terephthalate), which is typically used in consumer products such as bottles, No. 2, HDPE (High-Density Polyethylene) which is used to make stiff plastic, No. 3, PVC (Polyvinyl Chloride), which is used to make pipes and plumbing parts, No. 4, LDPE (Low-Density Polyethylene) which is used for shrink-wrap & malleable plastic bottles, No. 5, PP (Polypropylene) which is found in cereal box liners

and disposable diapers, No. 6, PS (Polystyrene) which is used for foam cups and food containers, and No. 7, 'Other' Plastics (BPA, Polycarbonate, and LEXAN) - these plastics are non-recyclable. By identifying opportunities to properly incentivize recycling and find an environmentally-friendly price equilibrium for the petroleum products that plastic polymers.

ELX Tokens & Data Analysis

The primary purpose of ELX tokens is to carry data that pertains to transactions within the Energy industry. The mint, send and burn processes can all make use of a ***data*** and ***operatorData*** fields which are passed to any movement (mint, send or burn). Those fields may be empty for simple use cases, or they may contain valuable information related to the movement of tokens, similar to information attached to a bank transfer by the sender or the bank itself (Dafflon, J., Baylina, J., Shababi, T., 2017). The usage of these fields can be standardized through including IPFS strings within the Hex Data field of a transaction. This mechanism can be either programmed to execute automatically as needed, or be manually included in a transaction. IPFS hashes data into a simple string that can be included in a transaction to attribute energy industry data.

Data Oracalization

When it comes to monetization of data, we will provide a solution that utilizes a bonding curve price discovery system. There are points within the midstream supply chain that can be analyzed and positioned as valuable data to other organizations. In order to monetize this data - a front end platform will be developed to provision the graphical representation of oil currently above ground in a given supply chain using a Zap Oracle. The price discovery portion of this analysis would happen on-chain through an Ethereum smart contract, while the raw data will be processed off-chain using a mechanism that draws in outside data directly from proprietary sources derived from energy organizations directly.

When considering the scenario of an IoT flow meter being equipped to work as an off-chain mechanism of data aggregation, ‘dots’ will be generated within the Zap Oracles Ecosystem to represent ever-changing supply within a given container or system of containers that may exist above-ground within the midstream ecosystem. The primary functionality of this relationship is to provide a graphical user interface for both internal use by energy companies and their affiliates, as well as their customers and investors. Through the use of Zap protocol there will be truly decentralized multi-party oracle system that allows the network to provide a means to monetize data surrounding the oil & gas industry that will be most beneficial when predicting the price of cryptocommodities. This provides a truly specific multi-party pricing oracle of oil that is derived from it’s geographical location, quality, and demand. This fosters a price discovery market where oil in certain geographical locations will be prioritized and valued higher due to it’s utility potential being higher to a specific refinery, polymerization plant, or other industrial use-case. By defining a higher value for oil that is properly stored, transported, and utilized - companies will be able to monetize their data while assuming best practices will translate to higher profit margins.

Zap Oracles & ELX

The relationship between Zap Oracles and ELX token will be substantiated through an on chain relationship through a colloquial dApp that receives data from an oracle and then embeds the data within pertinent transactions using the hex data field as provided by the ERC777 standard. The dApp interface will provide a graphical user interface for companies within the energy industry to conduct transactions that carry data pertaining to their industry specific function(s). Building upon oil & gas supply chains there is the potential to substantiate value backing for other types of energy transactions including kilowatt hours produced by solar, nuclear, hydro, wind, and other mechanisms of electricity production. This is the foundational aspect that positions ELX to be a viable solution within the energy industry at large.

When utilizing Zap software oracles to substantiate a decentralized price indexing solution to provide utility & value to organizations which are storing or producing oil in geographically decentralized areas. Assuming different quality of oil, e.g. “sweet” vs. “sour”, “light” vs. “heavy” - each quality of oil can be logged when it comes out of the ground and then presumably hold a higher value the longer it is discernible within the supply chain. This constitutes a solution to the problem with contango and backwardation that was observed with WTI in late April 2020, the ultimate cause of the negative oil prices was attributed to centralization within the supply chain surrounding Cushing, OK deliveries and shipments. Ultimately, with above-ground storage limited - there is only so much space to fill in the form of train cars and terminals. By being able to predict these storage capacity needs weeks or months in advance through streamlining the upstream, midstream, and downstream data using a blockchain - this provides a financial incentive for decentralizing storage of crude oil to meet specific geographic needs as they arrive.

Currently, it has been universally acknowledged that oil futures market has played an important role in oil pricing and risk avoidance. And in a general way, price discovery and risk transfer are considered to be the two major functions of a futures market (Y.J. Zhang, Z.Y. Wang., 2012). To effectively streamline crude oil supply chains using blockchain technology, it is necessary to represent specific grades with their own pricing oracle index. This works to the benefit of private and public institutions looking to analyze the markets based on actual movement of product within a supply chain. When investigating price discovery in the case of predicting the price fluctuations in futures markets, open and transparent data provided through software oracles provision a unique mechanism for i.) dictating the amount of oil within a supply chain ii.) dictating the amount of oil in specific containers iii.) dictating the amount of oil entering or leaving a supply chain iv.) dictating the quality of the oil at various points in the supply chain.

End User Interface

Price discovery data and predictive modeling can be descriptively viewed within the Zap Oracle interface, dots will be issued on the main-net release to coincide with the approximate number of metric liters within a supply chain. As per the example currently produced through the Zap Platform Portal, the goal is to represent an increased or decreased amount of oil within a supply chain per the number of containers. For this example, there has been one dot issued to generate a test example - however the contents of each container are bonded in relation to the previous car. Each train car contains 30110 gallons, and with each addition of a train car there is 30110 (gallons) added to the curve (i.e. …60220, 120440, 240880). Assuming that there are 4 total cars in this example - there would need to be a total of 113978.75 dots issued on a main-net supply chain to accurately represent this movement of product chain in metric liters. As a car is removed or re-routed at a station, there is the opportunity to unbound from that supply chain's curve. This data will be drawn into the platform portal provided on Energy Ledger's website, and subsequently included within the transaction data.

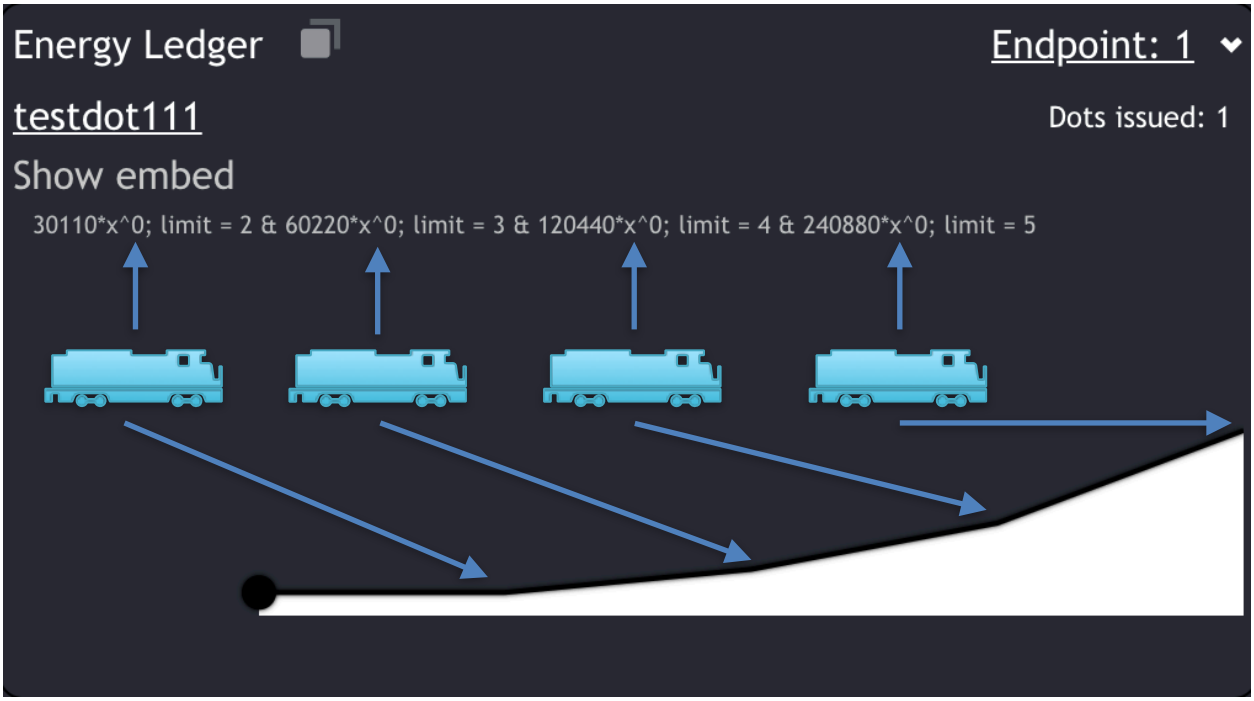

Figure 3.

Business Model

Energy Ledger Inc. seeks to derive profits from development and maintenance of industrial supply chain solutions on top of our platform, ELX. The business opportunity is clear as, according to the research report titled 'Blockchain Technology in the Energy Sector Market Share, Size, Trends, Industry Analysis Report By Type; By Application; By End-User (Oil and Gas, Power, Others); By Regions, Segments & Forecast, 2018 - 2026', available with Market Study Report LLC, global blockchain technology in the energy sector market is expected to grow with a CAGR of 52.9% during the study period, reaching a valuation of USD 10,287 million by the year 2026 (Market Watch, 2020). This provides a clear growth opportunity for Energy Ledger to take advantage of in the consulting space as we garner revenue through corporate consulting, patent royalties, and ongoing maintenance of third-party blockchains utilizing our solutions. There is currently limited competition in our space given the current landscape, and this provisions a unique opportunity to innovate while building on traditional business principles.

Financial Ratios

We can theorize that our Cash Ratio would find equilibrium as we hire / contract out development work for incoming projects and begin to offer the remainder of our token supply to this group of investors. When it comes to the remaining 80% ELX supply being analyzed within the confines of an Absolute Liquidity Ratio - we are aiming for our cash to come from consulting arrangements with energy companies, combined with our remaining supply becoming a marketable security *within* the United States; our net receivables and debtors would obviously be considered to fall under consulting payment plans as well as patent royalties. Assuming the prior elements are considered assets, we can figure in our current liabilities to stay constant in the realm of software engineering and potential hardware integration tasks accruing as we pay employees to execute incoming contract obligations to our customers. When it comes to Capital Turnover Ratios - our firm will presumably be able to find a price point for our enterprise

blockchain solutions that equates to net sales being relatively high, with capital employed (software developers and hardware integration specialists) being proportionately lower to ensure a high Capital Turnover rate which would equate to amicable efficiency for those holding a stake in Energy Ledger Inc.

One of our presumable weaknesses out of the gate however would be Asset Turnover ratio. We seek to commit 30% of revenue to providing market liquidity for 10% of ELX token supply with sOil & iOil tokens provided on the Synthetix platform: “As usual, there will be two versions of this token available: sOIL will enable users to capture a long position while iOIL will enable users to capture a short position (Synthetix, 2020).” This would trim off of our gross sales as we seek to provide ELX liquidity in stable coins [sOil & iOil] pegged to Brent Crude indexes. The selection of Brent Crude oil indexes, which substantiate sOil & iOil is an important factor to this being an amicable business decision for those transacting in ELX as a currency. When factoring in the negative prices of WTI in April 2020 we can begin to understand why Brent is the better choice for the interim: WTI contracts are settled with physical barrels, while Brent is settled with cash. WTI expires late on Tuesday [April 21st] and Brent will expire on April 30 (Payne, J. 2020). Once we have fulfilled the obligation of staking this 10% of the ELX supply against sOil & iOil, 5% each respectively - we will be able to see a higher net sales figure to divide against average total assets: henceforth a higher Asset Turnover Ratio.

Energy Ledger Inc. AML & Compliance Toolkit

Our secondary interest in ELX will involve the development and licensing or simple usage of an already available analyst product of a proprietary toolkit for NGO, other NON-NGO organizations, DOD, DOJ, DOS, and corporate agencies to utilize. This toolkit will be designed or used to identify various compounding problems that many of these agencies face in the energy sector today from unlawful exploitation of natural resources. This division of Energy Ledger Inc.

will operate as a liaison in online cybersecurity as well as a physical presence of the current active market of international crude oil in the drilling, storage, operations, management, information security, and also private sectors. The goal set forth within this element of our product is to partner or utilize data to reduce loss, fraud, and mismanagement within the oil industry.

Elaborating upon AML & Compliance from a technical perspective - we seek to monitor non-sequitur transactions (those without ***data*** or ***operatorData***) utilizing Neural Architecture Search (NAS), the process of automating architecture engineering, is thus a logical next step in automating machine learning (T. Elskenm J., Hendrik-Metzen, F. Hutter, 2019) . There will be substantial human capital savings achieved in the long-term through the capital allocation of developing an implementation of basic Neural Architecture Search in the short-term to serve the blockchain industry.

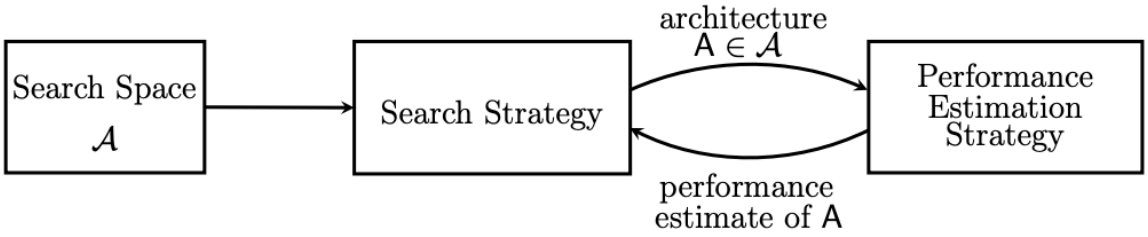

Figure 3. (T. Elskenm J., Hendrik-Metzen, F. Hutter, 2019)

When we analyze the basic abstract illustration of NAS in *Figure 3.* we can place ***data*** *&* ***operatorData*** within the search space bucket using a CIFAR-10 architecture which places data into a set of ‘Normal Cells’ and ‘Reduction Cells’. Cell-based representation is chosen here because it most closely resembles the blockchain data search space which the algorithm will be designed to analyze. We can implement a strategy of reinforcement learning that obviously flags non-sequitur transactions first, and then works back from there to train the child network with

architecture A to get reward R - for example. We are looking to foster a proxy task evaluation solution to that acts as a performance estimator of the child network - this is cheaper and faster to calculate as we can train on smaller datasets, fewer epochs, and evaluate on a down-scaled model. Google provides a clear benchmark for NAS called NASBench within a Colab notebook that will be the basis for our ongoing research in the application of this process for our compliance Toolkit: https://colab.research.google.com/github/google-research/nasbench/blob/master/NASBench.ipynb.

Long Term Prospectus

Our long-term goal is for the adoption of ELX as the premier standard for deflationary energy asset trade, and the goal is to build a network of solutions on top of the original contract that are able to i.) manage tokens through sending and receiving ii.) produce decentralized applications to allow corporate customers to visualize their supply chains using blockchain technology iii.) attribute value to containers of crude oil and downstream petroleum products based off of the value of ELX iv.) reduce waste and environmental impact of the crude oil industry. These ideals will be achieved through compartmentalized action to target and address the weakest areas within the market in its current form, and build upon the industrial strengths and utilities that crude oil offers the world at present. The future of this product will be dictated by it's usage as a transactional currency that enables energy companies to fluidly transact using the internet as a conduit.

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Team & Advisory Council

William G. Pete *started his career as a developer at age 12 with a computer program that tested various industrial lubricants, for this success he was honored with the naming of 22786 Willipete, a main belt asteroid, by NASA JPL. By age 16 he became involved with the Thiel Foundations summit program and secured internships from all the way in Silicon Valley at a Y-combinator startup called CircuitHub, to becoming a founding member of New York City's first Bitcoin center. He holds a Master's in Business Administration from Capella University, graduating in 2020.*

Lucas Hoath *has served 5 years as a United States Infantryman and 3 years as a Civil Affairs Specialist in service of the United States ARMY. He was deployed as an Infantryman collaboratively supporting U.S. forces in Afghanistan for OEF 2010-2011 with multiple levels of management and diverse cultural audiences in visibly high-tempo environments in the middle east as well as across the European Command area of operations. Lucas is a Security / Operations Manager and Military Veteran with a Secret Security Clearance and over 8 years as a corporate steward interacting and collaborating with multiple levels of management and diverse cultural audiences in visibly high-tempo environments across the European Command area of responsibility. Russian speaking capabilities as well as cultural proficiency. Corporate steward*

with 6 years of experience in business continuity planning and disaster recovery plans. Frequently tested documented disaster recovers strategies and plans. Analyzes impact on, and risk to, essential business functions and information systems that identify acceptable recovery time periods and resource requirements for the organization. Developed over 25 emergency management plans for recovery decision making and communications or temporary shutdown of non-critical departments to ensure continuity of operation and governance. Accomplished measurable results in meeting deadlines and objectives and led numerous teams of over 10 personnel in both the civilian and military sectors. Skilled in training and development, process improvement, logistics, strategic planning, policy management, and records management. Recipient of multiple awards for outstanding performance and professionalism in the United States Army. Lucas also has experience in the following: Command and Control, Internal and Domestic Operations, Motorcade Procedures, Practical Mission Package Preparation, Vehicle Personnel & Space Searches, Law Enforcement/First Responder Tactical Casualty Care (NAEMT), Combatives for Security Professionals, Practical Advance Work & Route Selection, Mission Planning Computer Labs, Non-Permissive Environment Procedures, Unlawful Detention Procedures, SERE-C High Risk (Survive, Evade, Resist, Escape), Surveillance, Practical Exercises in TSCM Searches on Residences, Residential Security Assessments, Threat & Vulnerability Assessments, Surveillance Detection Route Planning, and Advanced Security Driving. Lucas is also fluent in speaking, reading, and writing Russian, he is attending the University of St Thomas in Saint Paul, Minnesota to finish his undergraduate degree in International Business.