1 Introduction

1.1 Mission Statement
1.2 Overview
1.3 Our Philosophy

2 Market Overview

2.1 Existing Market and Platforms and their Problems
2.2 BEXAM

3 PoR

3.1 Directed Acyclic Graph (DAG)
3.2 Layered Node Hierarchy and Task Sharing
3.3 Sequential Block Generation
3.4 Low Energy Consumption

4 Our Solution

4.1 Platform Architecture
4.1.1 Flexible Chain Structure
4.1.2 Cross Platform
4.1.3 Node Overview
4.1.4 Startups
4.2 BXA Token
4.2.1 Description
4.2.2 BXA Token Uses
4.3 Security
4.4 Dual Wallet

5 Implementation

5.1 Why BEXAM for enterprise solutions
5.2 General Implementation Process
5.3 Use Cases
5.3.1 P2P Electricity
5.3.2 Gaming
5.3.3 Automated Ticketing Gate System
6 Proof of Concept
   6.1 Centralized vs Decentralized Exchanges  32
   6.2 Features Overview  32
   6.3 Speed & Scalability  34
   6.5 Dual Wallet Protocol and Security  35
7 Our Team
   7.1 Our Team  39
   7.2 Our Advisors  44
8 Roadmap  46
9 Legal Disclaimer  47
10 References  50
1 Introduction

1.1 Mission Statement

BEXAM believes that the possibilities for blockchain are limitless, yet unrealized in the current market. Centralized systems are by nature not secure and suffer from high costs while decentralized systems based on the current technology available in the market are far too slow to be practical solutions. With this in mind, the team at BEXAM recognized that the solution would be created using a “best of breed” approach. By developing a blockchain/DAG hybrid platform that utilizes the advantages of both types of existing systems, BEXAM aims to deliver a secure and stable solution to businesses everywhere and to unlock blockchain's boundless potential.

1.2 Overview

Our society has been transformed in recent decades, with technological advances soaring at unprecedented rates; however the threats to our security in these times have also increased and changed in nature. News of major hacks, identity/asset thefts, and ransomware attacks barely trigger a response given their frequency. These threats have not gone completely ignored, though.

Current blockchain technology has emerged as a significant potential in the realm of data management, but its shortcomings have also been exposed. The slow speeds and lack of flexibility mean widespread blockchain implementation in the modern business world is still unrealistic.

However, BEXAM did not lose hope; instead, we saw an opportunity. After months of development, we now proudly present the fruits of our efforts: a revolutionary blockchain/DAG hybrid platform with high speeds of 0.2s block time, full scalability with no delays, and world class security from hacking and data manipulation.
We believe that BEXAM will not just revolutionize the blockchain industry, but the technology and data management sector as a whole, and will enable a future of reliable and unprecedented expectations in cyber security and efficiency. By addressing the needs of businesses, we envision that BEXAM will uncover and illustrate to the world the various applications and potential uses of blockchain, which can then be translated to the world and everyday life. We hope to have you join us on this journey together, as we push the boundaries of a new era.

1.3 Our Philosophy

At BEXAM, we are proud of our Japanese roots which play a significant role in our philosophy as a company.

When we think of Japan as a “Brand”, we often think about quality. In order to understand this impression, we need to look at what sets Japanese inventions apart from others.

Most Japanese inventions have a common characteristic: they are not new inventions, but rather perfections of existing inventions. Such examples include Sony’s portable radio – the Walkman, Toyota's hybrid vehicles, or even the foldable fan, which improved upon traditional Chinese fans.

Another key essence of Japanese inventions is the continual improvement of existing products through small steps, no matter how good the current product is. This focus on continual improvement is what the Japanese call “Kaizen”, which is a globally recognized philosophy. It is with this methodology that Toyota went from a production time of four hours to 15 minutes, then to 3 minutes; their efforts to reduce this time is unwavering.

At BEXAM, we believe in an attitude of progressive development, with each day serving as an opportunity to be better than we were the day before. This is why we’ve partnered
with Early Works Co. Ltd.*, a Japanese technology company who also shares these same principles. In this white paper, we would like to present the fruits of our labor while also providing assurance that this will be a constantly evolving project aiming to fulfill the needs of our clients in a better way, every day.

*Early Works Co. Ltd. is an algorithm development company based in Japan. BEXAM has a partnership agreement with Early Works to have exclusive rights to build a platform based on Proof of Rounds. This agreement includes consultation and individual business Proof of Concept development for applicable BEXAM blockchain solutions within a business.
2 Market Overview

2.1 Existing Market and Platforms and their Problems

In our high-tech society, system and data tampering have become an unfortunate daily occurrence. Enterprises are forced to pay millions of dollars to protect their assets, data, and customers; yet no definite preventative solution for this global issue exists. Data and network management costs businesses a fortune, as reports show that badly managed data costs the US around $3.1 trillion dollars a year. It doesn't stop there, however. Consider the costs (Redman, 2016) below:

- Knowledge workers waste 50% of their time searching for data, finding and fixing errors, and verifying questionable data.
- Data scientists spend 60% of their time simply refining and organizing data.
- An estimated 75% of costs are attributed to errors in data creation and distribution in simple operations.

With this in mind, it's no wonder businesses are extremely wary of who they choose as partners. As a result, trust as a commodity has become hard to come by. To top it all off, brokers, intermediaries, and other middlemen create further delays and costs.

Almost all businesses utilize a centralized system structure, in which a central server controls and stores all company data and assets. However, Bitcoin's introduction to the world in 2009 brought to light a new base technology, blockchain, which drew attention due to its significant strides in security measures, specifically achievable due to its decentralized network structure. In addition to Bitcoin, companies like Ethereum and NEM have also created platforms that use consensus algorithms like PoW and PoI. These platforms allow customers to utilize this technology in a decentralized, yet secure way.
However, both types of structures currently encounter significant issues. Existing centralized databases are:

- Susceptible to hacking. They are easy targets for hackers looking to tamper with corporate/customer information and assets.
- Untrustworthy. Data is vulnerable to internal data forgery, corruption, and theft.
- Costly. Operation costs, such as server maintenance and security costs, are expensive.
- At risk for downtime. Any maintenance or damage to the central server means all operations are shut down.
- Lacking data accountability. Data is difficult to track and trace, thus making data recovery difficult and making stored data a liability.

Existing blockchain platforms are:

- Slow. Due to their lack of speed and scalability, they are unable to handle high-transaction use cases which many successful businesses require.
- Expensive. High transaction fees suppress the economics of adoption.
- Restrictive. They cannot simultaneously support Public and Private blockchains, meaning their capabilities are limited as are their business solutions.

Many businesses and enterprises are faced with a difficult choice: do they structure their businesses on a centralized, yet unsecured system, or do they sacrifice speed and scalability for the sake of security with current decentralized platforms?

While the security provided by blockchain is appealing to governmental organizations and corporations around the world, the current technology’s speed and scalability constraints force such businesses to continue using their vulnerable, centralized systems. In addition to scalability problems, time lags and information volume unreliability are also big reasons why enterprises avoid decentralized networks. As these reasons are major issues which need to be addressed before companies will take the step towards blockchain, BEXAM seeks to overcome these challenges to make the technology applicable and beneficial for wide scale adoption.
2.2 BEXAM

*Empowering businesses with innovative blockchain solutions*

Existing blockchain technology does not meet the specifications required by large-scale businesses, and, as such, cannot be adopted as a genuine solution. It is these shortfalls that BEXAM aims to resolve.

The BEXAM team has come from all sectors in the business world and understands these issues personally. So, BEXAM decided to provide a practical solution to the above issues faced by both systems.

Having looked at the needs of the industry and the existing solutions trying to cater to those needs, the next step is quite simple: create a platform that utilizes the security aspect of blockchain without compromising scalability and the speed needed for high-frequency transactions.

BEXAM provides:

- A stress-free user experience. High speeds and scalability improves the quality and performance of daily operations.
- Cross-platform operations. This enables a wide range of business use cases.
- Immutability. The network is cryptographically secured, thus providing superior integrity.
- Fraud security. Multiple layers within the distributed protocol protect the network against malicious acts, both internally and externally.
- Perfect performance. With ZERO downtime, operations are never interrupted and are ceaseless.
- Operational cost reductions. Businesses can say goodbye to server maintenance and security costs.
Reliability. High-level data security ensures the trust of your customers.

The key factors considered when designing BEXAM were robust security, high speeds, and scalability. To achieve these ambitions, our partner company, Early Works Co. Ltd., has created a brand new consensus algorithm, Proof of Rounds (PoR).

With a block time of 0.2 seconds and 40 million Transactions per Second (TPS)*, the results are not only remarkable, but also maintain a balance of three key factors: speed, scalability, and security.

*In a test environment for a Proof-of-Round network with 3 Master Nodes and X parameter of connections equal to 3, and with industrial hardware (3GHz quad-core, 16GB RAM) used as a platform for every node in the test network, the maximum achieved TPS was equal to 300,000, or 100,000 TPS per Master Node.
PoR

Proof of Rounds (PoR) is a new consensus-building algorithm that reconciles high speed with high security. PoR solves the current challenges of existing protocols such as slow block times, low transaction speed and reduced scalability, while maintaining data distribution fairness, zero downtime and anti-counterfeit measures. PoR has significant advantages over other blockchain platforms:

- **0.2 second block time:**
  - The omission of nonces bypasses arithmetic processing and shortens processing time dramatically
  - Node hierarchy and role sharing enables high speed block generation
- **Scalability:**
  - A flexible network structure allows an unchanging user experience during times of high traffic
  - The number of Master Nodes and Super Nodes increase or decrease in accordance with network traffic
- **Uniform information volume distribution:**
  - Information is distributed in the same exact way even when handling a global network of significant scale

PoR has 3 unique characteristics:

- Approval of transactions by permutations
- Optimization of processes by assigning roles using a node hierarchy
- Construction of a unique network that distributes information efficiently

These unique characteristics together build an ultra high-speed and safe network structure.
3.1 Directed Acyclic Graph (DAG)

Scalability is a key element in enabling real-world adoption of blockchain technology, and clearly existing blockchain protocols are not capable of handling large-scale networks.

The key technology behind BEXAM that allows this stability and scalability is DAG - it automatically increases the number of nodes in each layer, thereby allowing information to be transmitted without any speed reduction. For more information on DAG technology, please refer to our PoR whitepaper.

3.2 Layered Node Hierarchy and Task Sharing

To distribute information evenly and efficiently, PoR arranges nodes in a hierarchal, annular manner. This structure includes four types of nodes: Normal Nodes (NN), Super Nodes (SN), Master Nodes (MN), and the Root Node (RN). At the center of this annular structure is the RN, surrounded by MNs, SNs, and NNs, in this respective order.
In addition to nodes being fixed in a calculated order, different nodes perform specific roles within the system, thus creating a hierarchy. The action of appending a block onto the blockchain cannot be performed by any node, as would be the case in consensus algorithms like PoW. With PoR, only the Root Node can add blocks. Additionally, the Root Node is not a fixed entity in the system. It is chosen out of all existing Master Nodes according to their priority ranking and rotates within a period of time (approx. 1 second).

<table>
<thead>
<tr>
<th>Node</th>
<th>Node Rules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Node (RN)</td>
<td>Gives transaction consent</td>
</tr>
<tr>
<td></td>
<td>Appends to Blockchain</td>
</tr>
<tr>
<td>Master Nodes (MN)</td>
<td>Distributes transaction to Super Nodes</td>
</tr>
<tr>
<td></td>
<td>Confirms transaction consistency</td>
</tr>
<tr>
<td></td>
<td>Monitors the Root Node and Master Nodes</td>
</tr>
<tr>
<td>Super Node (SN)</td>
<td>Distributes transactions to each Node</td>
</tr>
<tr>
<td></td>
<td>Confirms transaction consistency</td>
</tr>
<tr>
<td></td>
<td>Discards unnecessary transactions</td>
</tr>
<tr>
<td>Normal Node (NN)</td>
<td>Create transaction</td>
</tr>
</tbody>
</table>

Fig. 3.2a: Task List

Fig. 3.2b Node Structure
Master Nodes not actively filling the role of Root Node will monitor the Root Node, and have the ability to eliminate Root Nodes that generate abnormal blocks. Master Nodes transmit information to a network of Super Nodes, which are then relayed to the lower Normal Nodes. The number of Master Nodes and Super Nodes are automatically scaled in accordance to the number of Normal Nodes and the number of blocks added to the blockchain. This methodology enables flexible scalability of the network. The existence of Master Nodes and Super Nodes with their assigned roles optimizes processing and allows for fast and smooth data transmission. By maintaining a hierarchical structure of roles, the path for data never increases even if the network does.

3.3 Sequential Block Generation

The incredible processing speed of PoR is achieved by bypassing the calculation of hash values typically needed for block confirmation and generation.

Previously, a tradeoff of speed was security but this is not the case with BEXAM. With BEXAM, security measures are ensured by:

- Only authorizing the Root Node (RN) to append the blockchain.
- Allowing only Master Nodes (MN) to confirm blocks.
- Restricting transparency on RN sequence and assignment.

The order/role of the nodes are calculated based on:

- Node age
- Historical number of blocks approved by the node

Fairness is maintained by mutually sharing distributed information among these nodes.
3.4 Low Energy Consumption

In order to operate the BEXAM platform, Super Nodes and Master Nodes need CPU power. Since BEXAM does not rely on complicated calculations (nonce) for block appending, the system will not require the excessive amounts of electricity consumed by other blockchains nor does it affect the platform’s performance. The nodes require minimal computer specifications in order to run the nodes efficiently:

- **Processor:** 1 GHz 1 Core
- **Memory:** 512 MB RAM
- **Storage:** 64 GB available space

For more information on PoR, please reference our technical white paper.
4 Our Solution

4.1 Platform Architecture

BEXAM provides a revolutionary blockchain solution for major enterprises wanting to completely or partially replace their centralized databases with a superior solution. By implementing BEXAM’s technology into businesses, we envision the revelation of blockchain’s potential not just in the business sector, but in the everyday world. By superseding the core database structure, which is the ‘heart’ or ‘engine’ of each business and thus its greatest vulnerability, enterprises will gain trust and integrity by securely storing and transferring both corporate and client data assets through BEXAM’s network. Our node design architecture allows the ‘engine’ to connect to the entire business chain via blockchain for secure, speedy, and scalable daily operations.

4.1.1 Flexible Chain Structure

Blockchain technology research focuses mainly around two category types: Public chains and Private/Consortium chains. Each chain has their own unique characteristics, and considering the complexities of each business’s needs, offering both chains as options on the platform makes perfect sense. The flexibility of BEXAM’s PoR network allows enterprises to choose between Public and Private/Consortium chains. This allows BEXAM to fulfill each business’s unique needs and motivations.

A single PoR network consists of Master Nodes (MN), Super Nodes (SN), and Normal Nodes (NN). However, unlike many other blockchain platforms, BEXAM can offer tailored solutions through assignment of nodes, with specifications, based upon a business’s needs.

BEXAM aims to establish a node sharing economy for a more efficient and optimized distributed computing process on our platform.
4.1.2 Cross Platform

The node sharing protocol of BEXAM enables cross-platform operation for truly borderless interactions among Public, Private/Consortium chains.

For example, a produce vendor might decide to take his or her business online. By implementing BEXAM, the vendor can maintain a Private chain in which all data relevant to his or her business is stored for reference. This might include inventory count, finances, and business communications. On the other hand, the vendor may also wish to have a Public chain, which would be a virtual storefront for the produce. This Public chain would communicate directly with the Private chain to present relevant data to a customer in this storefront, such as produce origins and tracking. This storefront would also include purchasing options with payment being collected with BXA tokens.

BEXAM is a borderless platform that envisions the support of unlimited business use case opportunities while maintaining the value of efficient, secure, and speedy data transactions.

4.1.3 Node Overview

Within the BEXAM platform, nodes serve an immensely important role. Due to the importance of their role, each node type serves a specific task within the generation of a block on the blockchain. As Normal Nodes are the lowest in the hierarchy within the BEXAM ecosystem, there are no prerequisites for participation. Essentially, by participating on the network, the user’s computer/hardware will serve as a Normal Node. For Super Nodes and Master Nodes, due to their more powerful role within block generation, node ownership is more scrutinious and a user will need to undergo a KYC process and stake a correlating amount of BXA tokens (refer to section 4.2, 4.3). Lastly, the Root Node, which sits highest in the hierarchy, is randomized every second so as to preclude an attack on the Root Node.
These nodes can be tailored to suit the needs of a business. That is, the amount of nodes needed for a chain on the BEXAM platform is customizable so as to ensure smooth operations for a business, whether its needs be big or small. The node capacity can be customized, although roles themselves will not change. This adaptability means that unique networks can be established on Public and Private chains within the BEXAM platform for any businesses need.

4.1.4 Startups

Although our main focus is enabling mass adoption of blockchain with large enterprises, we will also welcome a variety of other potential users, such as startups, small and medium enterprises, and individual programmers. With our hopes of exemplifying blockchain’s scope in the real world, BEXAM is eager to welcome and support all genuine users to our technology.

4.2 BXA Token

4.2.1 Description

In conjunction with the release of BEXAM and the BEXAM Exchange, we will also be releasing our very own token, the BXA token. The BXA token represents the value of BEXAM’s ecosystem in that it is the underlying lifesource that will keep the platform vibrant and thriving. It will be a functioning cryptocurrency that can be used in a variety of ways and it will be the main transaction currency within the platform. As the public chain grows, the utility of the BXA grows with it.
Primary uses of BXA within BEXAM are:

- Transaction fee payment
- Forming enterprise PoR networks*
- Master Node and Super Node staking and rewarding
- Functional cryptocurrency

*Enterprise payment options will include FIAT payment and BXA token payment. In order to incentivize BXA token usage, we will offer a 10% discount when payment is made with BXA tokens.

4.2.2. BXA Token Uses

The BXA token as referenced previously will be the sole means of transaction within the BEXAM platform. For individuals that aren’t looking to specifically use their tokens as a means of payment within the platform, the ability to lock their tokens and create a Master Node or a Super Node may be an attractive option. Since MNs and SNs are used to verify transactions, these nodes are rewarded with the associated transaction fees paid by the individuals using the platform. Users that have cleared the KYC process and wish to create a Master Node or Super mode may do so by locking up the corresponding amount of BXA tokens which can be turned back into BXA tokens at any time. Once appropriate BXA tokens are locked up, owners will be able to create their Super or Master Node with a one-click setup.

<table>
<thead>
<tr>
<th>Node Type</th>
<th>BXA Lockup Amount</th>
<th>Transaction Reward</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master Node</td>
<td>500,000</td>
<td>80%</td>
</tr>
<tr>
<td>Super Node</td>
<td>100,000</td>
<td>20%</td>
</tr>
</tbody>
</table>
In this way, if the verifying nodes are owned by two separate individuals, the associated fee received is distributed accordingly, none of which is taken as a fee or commission by BEXAM unless one of the nodes is specifically operated by BEXAM.

BEXAM, being a dynamic network, requires a fluctuating number of Master Nodes based on the size of the active network. When the active network shrinks, Master Nodes are temporarily demoted to Super Nodes, and superfluous Super Nodes become dormant (chosen randomly). When this need arises, Master Nodes to be demoted are chosen by a priority list based on their age and transaction history. Conversely, when the network expands, Super Nodes are released from dormancy, and Super Nodes that clear the Master Node installation conditions are automatically promoted to Master Nodes. In short, when the network becomes more active, so too do the Master Nodes (and Super Nodes), resulting in their owners earning more rewards, which serves as the incentive of our Super and Master Node program.

BEXAM can also create Super and Master Nodes under the same conditions as users. This may be necessary during special occasions, such as at launch time to maintain balance of the node ownership. Needless to say, it is in our own best interest to have these nodes built predominantly by users to co-support the BEXAM ecosystem. Due to the hierarchical aspect of BEXAM, Super Nodes and Master Nodes continuously perform crucial functions on the platform, and as such, it is imperative to provide a more stable service by having more nodes in the higher hierarchy.

### 4.3 Security

The ‘Know Your Customer,’ or KYC, process is an extremely important step that allows BEXAM to curtail malicious intentions and acts and to identify the individuals who intend such acts. This identity recognition process allows BEXAM to also monitor and limit the amount of Master Nodes an individual maintains. This helps prevent a single individual from becoming a majority holder of Master Nodes, thus monopolizing and controlling the network.
In addition to the KYC process, the checks and balances within the node hierarchy also adds a level of security within the platform. If the monitoring Master Nodes detect a Master Node with malicious intent within the system, the suspected MN will be excluded from the system and its activities and permissions suspended. After conducting an investigation, the owner of the accused Master Node may lose their locked-up tokens and also be banned from being able to build a Master Node in the future. This provides a very strong deterrent against persons with ill intentions trying to join the BEXAM environment.

For more in-depth information on additional security measures implemented in the BEXAM platform, refer to the PoR White Paper.

4.4 Dual Wallet

A wallet is a secure place to hold BXA (and potentially other) tokens and as such, requires a high level of security measures. For enterprise partners, the wallet is a place to store BXA tokens to transact using our BEXAM platform. For community members, it is a place to store BXA tokens and other cryptocurrencies safely. BEXAM’s ultimate goal is to foster the co-existence of the freedom of choice and assured security and protection for our partners and users from hackers and external threats.

To this end, BEXAM will provide two types of wallets. The initial wallet provided at the launch will be secured under the server prepared by BEXAM. This will then be followed by the choice to switch to a “user responsible” wallet. For more information on wallet security, please refer to section 6.5.
5 Implementation

5.1 Why BEXAM for enterprise solutions

BEXAM offers significant advantages for businesses looking to adopt blockchain technology, especially in terms of high speeds and scalability. Part of BEXAM's value proposition to large-scale enterprises is security enforcement and cost reductions gained through decentralization of their networks. BEXAM's node structure, which is inspired by existing network structures, allows for the smooth transition and transfer from existing database systems to a blockchain-based system. Additionally, BEXAM's flexible chain structure bridges the gap between private, internal data and customer-facing Public chains to ensure pleasant customer experiences. This also allows full integration of the BXA token into the network, from the company backend to the end user's payment method. By implementing BEXAM's revolutionary technology, enterprises will see the realization of their full potential.

5.2 General Implementation Process

How can a company that stores a massive amount of data that is constantly being written implement blockchain technology through BEXAM and how can this system harmoniously interact with external, customer-facing systems?

First consider the composition of the most commonly used database structures. A central database, which stores all of the data, links to sub-database branches. Computers at each of these branches write onto the database. Even when data is stored in a sub-database, this information is synced to the central server to ensure that all information is uniform.

In order for this information to interact with outside systems, companies must employ an extranet which allows specified individuals to interact and communicate with some of their internal data; however, this creates an unnecessarily disjointed system in which multiple
networks and systems are interacting, which can lead to delays or poor user experiences for consumers. BEXAM’s flexible network structure solves this issue by allowing Public, Private, and Consortium chains to integrate freely, so that operations are fluid and uncomplicated.

The implementation of BEXAM into this type of framework is quite simple and does not strain the hardware. The sub-database branches act as Master Nodes, while their computers serve as Normal Nodes. The Normal Nodes, or computers, transact data onto the blockchain, while the Master Nodes authorize the transactions and update any data.
Once BEXAM is implemented, the central database will no longer exist. Instead, the Master Nodes will share and store the data, thereby decentralizing and securing the data held in the previous database structure.

With decentralization achieved, the company can enjoy superior security, as well as zero operational downtime and cost reductions through the removal of the central server, and its associated maintenance and administration costs. Furthermore, integration with BEXAM allows companies to connect their BEXAM Private chain with their Public chain in order to further streamline their operations. This can be seen as a company putting sensitive customer or internal data on their Private chain so that they are the only ones that can change and view this information. At the same time the company can choose to put certain information on the Public chain which will be accessible to all customers. This information can include product availability and inventory; additionally, if a public user wanted to purchase an item from the Public chain, he or she could do so with BXA tokens.
With a block time of 0.2 seconds, a TPS rate of 40 million, and a layered, hierarchical node structure, BEXAM is a superior solution for industry-leading enterprises looking for blockchain adoption within their business.

### 5.3 Use Cases

Our robust technology can unlock many blockchain business usages which were previously considered unrealistic due to the limitations of current available platforms. As shown in the table (Fig. 5.3), BEXAM’s speeds are exceptionally high, and matched with its scalability, it is the perfect platform to introduce better security and cost efficiency through blockchain to high-transaction industries.
In this section, we will illustrate the possible solutions that the BEXAM platform can provide through a few hypothetical use cases within high-transaction industries. These cases are just a few examples of the ways in which the BEXAM platform can be implemented. BEXAM can be tailored to suit a number of needs that go beyond what is illustrated in these use cases, and will continue to find new ways to innovate.

### 5.3.1 P2P Electricity

P2P markets for energy liberalization, specifically electricity, present an excellent opportunity for blockchain implementation. Several projects already exist and have developed PoCs with power companies in exploring blockchain P2P trading platforms. However, there are issues in the existing platforms:

- **Decentralized Microgrid P2P Platform** - Microgrid structures are limited in physical reach, meaning that users on the P2P platform are significantly limited with whom they can trade. Essentially, microgrid structures only allow users to trade with their neighbors. This means that city- or countrywide implementation is unrealistic.

- **Centralized P2P Platform** - The inherent vulnerabilities of centralization, such as server downtime and hacking susceptibility, make these platforms risky. Again, this is far from ideal.
Nevertheless, the ultimate issue for the implementation of blockchain for the electricity industry in liberalized countries is that **millions of users will access the platform for trade.** As we’ve seen before, current blockchain solutions are not scalable, and thus, heavy traffic means significant slowdowns and delays (Fig. 5.3.1a).

![Fig. 5.3.1a: Existing P2P Electricity Model](image1)

![Fig. 5.3.2b: Bexam Electricity P2P Model](image2)

However, with BEXAM’s high speed and scalability (Fig. 5.3.2b), we can provide a two-tier solution to this global issue:

**Tier 1:** Decentralize existing databases with a private PoR blockchain.
- Electricity production data, including electricity produced by home solar panels, will be authenticated and verified through smart meters on the blockchain.
- Blockchain technology will protect user data and corporate data from cyber attacks.

**Tier 2:** Create a public PoR blockchain-based P2P marketplace through BEXAM.
- Data stored in the database mentioned in Tier 1 can connect to the P2P marketplace, which is built on the Public chain of BEXAM’s platform.
- Marketplace users are protected from hacks and security threats, thereby instilling a sense of trust on the platform.
With both tiers combined, BEXAM brings:

- An extremely secure P2P platform connected to authenticated supply data.
- Millions of users together to swiftly and securely trade their electricity.
- A decentralized business model supported by a network of users.
- No operational delays for both backend and trade platforms.
- Data integrity protection, even in instances of physical server damage during natural disasters.
- The elimination of price gouging through transparent price history tracking.
- The freedom of choice for consumers, with options of green energy and traditional energy.
- Opportunities for utility companies to maintain and continue use of existing power grids through flexible chain integration.

5.3.2 Gaming

The gaming industry is a common target for DDoS attacks. A large-scale attack which targeted Sony's PlayStation network in April 2011, led to a massive information leak and forced Sony to suspend its services for three months. Despite these numerous and damaging attacks, the gaming industry has yet to find a viable solution to these weak points as its necessary volume capacity and speed requirements are very high, considering the multitude of players accessing the network simultaneously.

The PlayStation network is not the only target. Another common target is MMORPGs. This game genre tends to attract a high volume of players, and consequently, malicious attacks. Not only do MMORPGs garner malicious attention, they also:

- Suffer from server downtime due to maintenance and updates/patches.
- Experience service interruptions due to server overloads.
- Cannot abolish Real Money Trading which is a discouraged practice in which players offer to sell their in-game assets for real money off-platform.
- Make player cheating simpler since player data is vulnerable to alteration.
Considering these major shortcomings, blockchain technology seems to be a significantly superior solution. However, MMORPGs see a large number of players, with some titles seeing the player count in the millions at any given time. Unfortunately the limitations of current blockchain technology, specifically in low TPS and lack of scalability, mean that MMORPGs cannot currently implement blockchain in their platforms. However, with the introduction of the BEXAM platform, this will no longer be the case.

BEXAM can provide the first ever blockchain solution to provide high-quality MMORPGs:

- Fast speeds and scalability ensures seamless real-time experiences to satisfy online players.
- A blockchain distributed network structure protects both network and data from DDoS attacks.
- No server maintenance means there will never be server downtime.
- No server overload due to BEXAM’s flexible network structure.
- Application of hard forks will minimize downtime during updates. Tracking and tracing data linked with the KYC system will protect enterprise’s digital assets from RMT.
- Extinguish opportunities for cheating by prohibiting data tampering through blockchain.

Furthermore, utilization of the BEXAM token to enhance the game ecosystem of our future clients is an added value we can design and offer. BXA can act as a bridge between the virtual and the real world!
5.3.3 Automated Ticketing Gate System

Current System

A typical automated ticketed gate system uses an IC (integrated circuit) card for entrance and exit. Entry is recorded when the IC card is initially scanned, and the scanned data is sent to a storage server located in each train station. This data is then transferred from the local server to a central data storage server, which can then communicate the information to additional local servers.

After scanning his or her IC card at the entry gate, the passenger is then able to transit until exiting at a different automated gate. The central data storage server can communicate with the local server at the exit point, meaning the passenger need only tap the IC card to settle transportation fees due.
BEXAM envisions the implementation of blockchain within this network by transforming the automated gates into Normal Nodes, and local servers into Master Nodes in the construction of a distributed "central" server.

**Implementation of BEXAM**

As previously mentioned, the automated gate will serve as a Normal Node on a Private chain. When a passenger scans their IC card at the gate, a transaction ID will be issued. The Master Nodes (local servers) will verify and authorize the transaction (thereby replacing the central server) then transmit the authorized transaction data to the Normal Nodes. Normal Nodes established at each station with then be able to detect the transaction ID stemming from the IC card when the passenger exits, and the settlement transaction will be complete, allowing the user to exit the gate.
Furthermore, with BEXAM’s unique and flexible chain structure, integration of IC cards and third-party shops can be joined into a single system. In Japan, a common IC card is the Suica card. This card was introduced for the train transit systems, but can now be used as a payment method at convenience stores, vending machines, and other establishments. When a Suica owner uses their card to purchase something at a convenience store, the convenience store’s payment gateway has to communicate with Suica’s database to ensure that sufficient funds are available. This navigation of separate systems can have a negative effect on a customer’s purchasing experience through time delays or data transfer errors. However, by integrating BEXAM’s platform, Suica could create a Consortium chain, in which third-party shops (such as convenience stores or vending machines) access the chain for needed information, such as a Suica card’s balance. This means that the third-party shops now have direct access to this information. This allows for smooth operations as there is no downtime while waiting for data to send and receive from separate databases, thereby impacting the customer’s experience.

With PoR’s transaction approval time of 0.2 seconds, BEXAM’s block time actually exceeds the speed of the Japanese automated ticket gate system (0.3 seconds), considered to be one of the most advanced systems in the world. With these speeds, BEXAM can process 40 million TPS, meaning the high traffic volume of the Japanese train systems can be easily managed. Additionally, this blockchain solution will also produce a countermeasure against server tampering and hacking, and even against damage from natural disasters. Lastly, the benefits of zero downtime provided by BEXAM will be an instrumental benefit for any organization, especially one such as the Japanese railway industry.
6 Proof of Concept

Before a product is launched, it is essential that its capabilities are first proven. With this in mind, decentralized exchanges, or DEX, are a perfect opportunity to study a case in which existing algorithms cannot solve its current problems due to speed and scalability restraints inherent to its design.

To illustrate the practical application of our technology, BEXAM intends to utilize PoR in a blockchain-based cryptocurrency exchange, called the BEXAM Exchange. The exchange will serve as our proof of concept, a live use case of BEXAM’s capabilities, and will be a part of BEXAM's ecosystem. It will also solve current issues experienced by DEX in terms of speed and scalability.

The BXA token will be integrated within the BEXAM Exchange. BXA tokens will serve as a functional cryptocurrency, and exchange users will receive discounts in their transaction fees when paying for these in BXA. BXA tokens will also provide voting rights for new coin listings.

BEXAM Exchange, our PoR blockchain-based cryptocurrency exchange, will launch during Q4 2018.

6.1 Centralized vs Decentralized Exchanges

Decentralized cryptocurrency exchanges are one of the most popular uses of blockchain worldwide. This is because blockchain-based trade platforms maximize the security features of the technology, which protect user assets and data from malicious attacks and tampering.

Centralized cryptocurrency exchanges, on the other hand, are based on traditional database systems and are vulnerable to hacking and tampering, and therefore provide less reliable data. Even if the cryptocurrency itself is a very secure technology, the platform on its own must be just as secure to ensure customer safety, which is not the case with centralized databases.
Most users continue their trust in centralized exchanges due to the speed and scalability constraints of current DEXs, which in turn creates a stressful user experience - it is not ideal to wait many minutes for a high value transaction to complete. The slow and stressful transaction experiences of existing DEXs are a serious problem. For businesses, existing DEXs inhibit a good customer experience and, as such, are not a realistic option.

Yet centralized exchanges also have serious issues with security and control, despite them providing a better quality of service for trading. Because they rely on a single central server where all data is secured, they become extremely attractive to hackers and are always under threat from attacks. Server downtime also becomes a major issue. During times of server maintenance or damage the platform must shut down, losing valuable time and money. Many customers can relate to the frustrations of these types of events as it is not as uncommon as it should be.

The BEXAM team has designed a solution for the cryptocurrency exchange industry solving these issues with our next generation technology combined with our team’s professional knowledge and experience in the financial and commodity trading sectors.
6.2 Features Overview

- **PoR-based Exchange**
  Tamper resistant and zero operational downtime

- **Instant Transactions**
  0.2 second block time allows for near-instant transactions

- **Multi-layer Protection**
  Numerous security protocols will protect user data

- **Scalability**
  Hybrid design allows an impressive 40 million TPS

- **Cooperation of Networks**
  Master Nodes unify the BEXAM Exchange and BEXAM

- **BXA Token Usage**
  BXA token use on the BEXAM Exchange rewards users with discounted fees and voting rights

- **Energy Efficiency**
  PoR eliminates mining, and thus requires minimal energy

- **Customer Service**
  BEXAM Exchange provides multilingual customer service and support
6.3 Speed & Scalability

In existing DEXs, nodes pass along information to neighboring nodes. If the network itself is small, this does not pose a problem. However, if a large number of users access the network simultaneously, the network expands, and so too does the transit time for information. BEXAM solves this problem by restructuring the network itself into a circular format. By restructuring the network in this way, the linear path for information and its resulting transit time remains consistent, no matter how large the network becomes. This process is further optimized by organizing nodes in a hierarchy and assigning relevant roles. By delegating the tasks of node matching and blockchain updates to lower-level nodes, Master Nodes can concentrate on processes with higher priority, such as block approval and Root Node monitoring. If this were not the case, delays would certainly occur which is evident by the performance of existing platforms.

In P2P systems, data transmission times can become slow depending on the physical location and distance between nodes. This can also result in inequality of data disbursement. BEXAM prevents this by applying a node hierarchy and task sharing methodology. Additionally, a directed acyclic graph (DAG) reacts to a growing number of users to properly scale the network and provide consistent speeds.

6.5 Dual Wallet Protocol and Security

While current wallets in DEX’s provide security in anonymity, individuality, and self-responsibility, too often users lose their private key and as a result completely lose access to their assets. This is often due to differences in IT literacy among individuals, and/or system interfaces being user-unfriendly (Peterson, 2018). Recent incidents of cryptocurrency thefts prove that there is still a way to go until a secure DEX becomes reality.

Key features like reliable customer support, and system monitoring, are necessary to include for consumer peace-of-mind. While these qualities exist within current centralized
exchanges, their wallets are often stored within the same server as their public URL (Khatwani, 2018). This is ill-suited for cryptocurrency exchanges as the data itself is an asset and these funds could be directly threatened by external hacking. Considering all of the requirements and threats, it becomes clear that there has not been a single definitive solution to address these issues, until now.

Each exchange provides its own benefits, despite the deficiencies. Considering this, a dual option makes sense in order to get the best of both worlds. BEXAM will offer two types of wallets with the user having a choice on how they want to manage their assets. The first wallet (that will be available at launch) will store assets on a BEXAM-prepared server that is separated from the exchange server. The second option will come soon after, but will be considered a “self-responsible” wallet. This is called our Dual Wallet Option Protocol, which was designed with our users’ safety in mind. The first wallet will be the only option upon launch, which will assist our users in getting used to both the wallet and the exchange platform. When the second wallet is launched, users will be able to choose if they want to store their assets in a more autonomous manner.

This freedom of choice is our interpretation of the meaning behind decentralization. Both options cater to the satisfaction and safety of our users.

To ensure the safety of our users, BEXAM implements multiple layers of security within the wallet protocol.
Wallet Node Impersonation
BEXAM uses the P2P network structure to input Wallet Nodes disguised as Normal Nodes. This ensures that the Wallet Nodes are indistinguishable from other nodes from an outside glance.

Unspecified IP Address
In addition to disguising Wallet Nodes, proxy servers will be used to hide IP addresses. This provides a secondary security measure against outside threats. If a Wallet Node were ever to be identified, the attacker would have difficulties ascertaining its location, thereby thwarting the attack.

Connection Port Barrier
Lastly, in addition to disguising Wallet Nodes and hiding IP addresses, the external connection port will block any attempts at access. This is because the Wallet Node is actually unnecessary for an exchange to take place, as all the data is taken from the blockchain. The blockchain then updates the wallet and adjusts the amount of funds held accordingly.
Additional security measures utilized in BEXAM are similar to those used by financial institutions (e.g. ID verification). Furthermore, in the unlikely event that a Wallet Node was compromised and assets were lost, other user available options such as paper and hardware wallets can minimize impacts.
7 Executive Team

7.1 Bexam

Rong Shan Lim

Rong Shan graduated from Nanyang Technological University and soon after began his career in banking. For the last 9 years, Ron Shan has been working for several Fortune 500 companies in Singapore where he was specializing in building new business relationships within the Asian markets.

Rong Shan has been fully equipped for his role by living and working in the commercial hub of Asia. He is a seasoned professional of the modern-day Asian trade and banking sectors and has an extensive network of reliable business contacts within the region making him a fitting person for Director of Singapore.

Shinji Kawase

Shinji has 20 years of experience in Finance working management roles in investment banks and trading houses. He has spent nearly half of his life outside of his home country, growing up in Canada and having lived in South Korea, France and Singapore throughout his professional career.

Outside of work, Shinji has been an independent researcher and an advisor of blockchain implementation for businesses with Bexam as one of his clients. Through those advising sessions, Shinji was introduced to the technology and team behind Bexam which matched with his views of what blockchain should be, which led to his decision to join the team. “The combination of disruptive technology and professional business skills are key elements of success for start-ups.” Shinji stated with confidence in Bexam fulfilling such elements.
Yuki Sakaori

Yuki earned a Bachelor’s degree in Business and Commerce at Keio University and is bilingual thanks to his childhood spent in the U.S and his residency in Singapore for the past 10 years. Yuki has worked in the energy sector for 15 years as a head of international commodity trading for Fortune 500 companies. Subsequently, he set up a new commodity trading desk for a German company, and single-handedly grew the business to an annual trading volume of one million tons, equivalent to 600 million USD.

While he was working with million dollar companies and assets, he noticed the high volatility of crypto trading, but, at the same time, noticed the unlimited potentials of blockchain. Using his business skills and international mind, Yuki voluntarily advised and supported blockchain projects in B2B marketing and community building. With his professional business skills and corporate and investor knowledge of blockchain, Yuki brings to BEXAM a user-oriented and global-scale perspective.

Mario Yearwood

Mario holds a Master’s degree in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology, and an MBA concentrated in Financial Engineering from the MIT Sloan School of Management. He is also a CFA® charterholder.

Mario has over 9 years of experience as a senior software developer and technology consultant. During this time, he has designed and built mission-critical solutions for companies of all sizes, ranging from startups to members of the Fortune 500, across multiple industries. His areas of expertise include technology strategy, optimization, data science and artificial intelligence (machine learning, deep learning, natural language processing). Additionally, he is a Google Certified - Professional Data Engineer.

Mario has worked in several major cities around the world including New York, Boston, Houston, Singapore and London. Previously, Mario spent a combined 8 years as a derivatives trader at Goldman Sachs and Shell.

With his unique combination of technical and financial skills and experience, Mario can provide comprehensive solutions to BEXAM clients.
Dean Morris

Dean holds an Economics degree from the University of Technology Sydney, a Master's of Applied Finance, and is a CPA-qualified accountant. Dean has spent 20 years heading up risk, treasury, securitization, and finance functions for several global companies. His career includes being the global CRO of Fortune 500 commodity companies, and his roles have seen him spend time in Hong Kong, London, Singapore, and Sydney.

His experience and knowledge gained from being a C-level executive for global companies, as well as his experience as an entrepreneur, adds tremendous value to the BEXAM group. Prior to joining BEXAM, Dean was one of the original founders of a commodity trading company based in the UK. The startup was established by a small team in 2013 and rapidly became a significant global trading house, employing over 800 staff members across 18 countries with annual revenues exceeding 9 billion USD.

As a seasoned professional in risk and finance, Dean has been studying blockchain adoption in commodities and trade finance. It was during his review of viable blockchain solutions for large scale businesses that Dean discovered BEXAM. He is now determined to help the BEXAM become a successful global company.

Kanako Into

Kanako began her career as a financial analyst at an international investment bank. With six years of experience as J.P. Morgan’s Tokyo branch VP, she relocated to Singapore and expanded her customer coverage base, as well as her Southeast Asian corporate clients. Since 2012, she has served as VP and Director for a myriad of world-class investment banks and commodity traders, such as Deutsche Bank, Shell, and Engie.

In her experience, she has focused on marketing and on tailor-made financial solutions for market risk minimization for blue chip corporate clients across the East of Suez region. As a professional in the financial sector, Kanako has earned certificates like Financial Markets and Regulatory Practice, Security Sales Representative, and Securities Internal Control Manager.
Someone who understands fundamental risks/rewards and financial impacts for managing funds and assets is essential for any international business. Concurrently, commercial skills are needed to meet with investors and stakeholders to explain financials. There is no doubt that Kanako holds these skills and experiences, and will bring to BEXAM financial control and corporate governance on par with those of world-class corporations.
7.2 Our Advisors

Hiroki “Boko” Yamamoto
CEO, Early Works

Hiroki, a.k.a “Boko”, is the developer of the new consensus algorithm, Proof of Rounds. He began self-learning programming when he was 12 years old. As a middle school student, he programmed and built robots, winning prizes in multiple national robot competitions. He then studied robotics at a technology school, where he first noticed the hardware-related limitations of his field of studies, changed his focus to software and database development and soon became an expert on parallel processing.

After graduation, Boko started his career as freelancer, developing databases for large automobile companies, and also constructing business tools and P2P networks for enterprises across the region of Japan. As Bitcoin began to gain attention, Boko instantly realized the similarities and compatibilities of blockchain technology in his field of expertise. As a well-known engineer, Boko suddenly began receiving requests to build blockchain algorithms. Although he had already began to create PoR, he declined these invitations as he did not visualize them matching the potential of his disruptive algorithm. That was, of course, until he met Satoshi, who enlightened Boko with the idea of unlimited potential, now BEXAM.
Dmytro Budorin
CEO, Hacken

Dmytro was one of the top executives in Ukraine's military defense industry. As an ACCA, he worked for Deloitte for eight years in accounting, audit and project management.

Yacine Terai
CEO, StartupToken

Yacine is a serial entrepreneur and self-described Business Angel with nearly 20+ years of experience in business designing, capital raising, growth hacking, and startup ventures management. He is an experienced advisor for innovative startups in the blockchain and traditional space. A former VC at Consilium Group, Yacine founded StartupToken, a blockchain startup accelerator, in 2017. StartupToken focuses on investment, mass education, technology training, and event organization.

Hiromichi Niimura
Chairman, Ginga Petroleum Pte Ltd

After graduating from Keio University in 1975, Mr. Niimura started his business career in the energy industry and joined Idemitsu Kosan. In 1999, He founded Ginga Petroleum in Singapore to start a petroleum product OTC brokerage business. In the past 19 years, the company has grown to one of the top brokerage companies holding Major Oil, National Oil and world-class investment banks as clients. Ginga has offices in Singapore, Geneva, China and Japan and has over 100 employees, all with CME-certified brokerage licenses. Mr. Niimura’s vast knowledge and business connections will certainly be essential when building our worldwide business.

Legal Advisor

ICO Law Group
8 Roadmap

ROADMAP

Q1-Q2 2019
- Bexam Development test bed opens
- SDK beta release

Q3-Q4 2019
- P2P Matching engine release
- Wallet release

Q1-Q2 2020
- SDK v1.0 release
- General system upgrades

Q3-Q4 2020
- SQL API beta release
- SQL implementation
- SQL API v1.0

2021~
- BEXAM Bridge API
- Distributed functionality implementation
- Machine learning compatibility
9 Legal Disclaimer

This white paper is intended only for the provision of information and may be subject to changes. BEXAM Limited is not able to guarantee production or the accuracy of conclusions in this white paper. Furthermore, BEXAM Limited expressly disclaims all representations and warranties (both explicit and implicit according to law), including but not limited to the following.

- Representations and warranties related to merchantability, suitability for specific purposes, titles and non-infringement
- The accuracy and correctness of the content of the text
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BEXAM Limited shall not assume liability regarding losses or damages that have arisen as the result of referring to or relying upon the content of this white paper (direct, indirect, consequential, or other types of losses or damages), even if the possibility of such damages existed. This white paper may include references to data and industry publications of third parties. As far as we are aware, the reproduced information in this white paper is accurate, and the included estimates and assumptions are rational. Nevertheless, we do not guarantee the accuracy and completeness of the data. While the information and data stated in this white paper is believed to have been obtained from reliable information sources, the information and data from third parties stated in this white paper have not been verified, and the assumptions based on such information sources have not been confirmed. As of the time of issuance of this white paper, we do not guarantee already known or intended future use applications of the BXA token (with the exception of the BEXAM platform). We are not able to make any promises regarding the future business performance or price of the BXA token, and this includes promises regarding the intrinsic value, promises regarding the ability to use for payment, and warranties regarding the retention of a specified value. Token sale participants should not participate in the token sale unless they fully understand and accept the nature of the BEXAM business and the potential risks that accompany the acquisition, storage, and transfer of the BXA token.

The BXA token shall not be configured or sold as a marketable security. In regard to the BXA token, no rights related to the stock of BEXAM Limited shall be held and no equity shall be granted. As the future purpose of use, the BXA token shall be sold on the platform
of BEXAM Limited, and all tokens received during the token sale may be freely spent by BEXAM Limited on business development and foundational technology infrastructure.

This white paper does not constitute a prospectus or disclosure document, is not a sale offer, and is not a solicitation for investment in any jurisdiction or for offers to purchase a financial product. The BXA token should not be acquired for speculative or investment purposes with the expectation of investment returns. The information stated in this white paper has not been approved or licensed by a regulatory authority. Related actions will not be carried out based on laws, regulatory requirements, or jurisdiction rules. The publishing and distribution of this white paper do not mean that it complies with applicable laws or regulatory requirements.

Participating in the token sale carries substantial risk, and accompanying special risk, there is a possibility that all or a large part of one’s contribution may be lost. While activities will be carried out under the assumption that the token sale mechanisms and BXA token issuance are not in violation of applicable laws and regulations, a regulatory authority or other competent authority may demand revisions to token sale mechanisms or BXA token functions for compliance with regulatory requirements or other governmental or business obligations. As such, there is a possibility that the token sale and the BXA token could be affected by regulatory measures, including potential limitations, regarding the ownership, use, or possession of such tokens.

This white paper contains forward-looking statements and information concerning future events and the current expectations of BEXAM Limited (hereinafter collectively referred to as “forward looking statements”). These forward-looking statements can be identified by the use of words such as “could possibly,” “expect to,” “set a target to,” “estimate,” “intend to,” and “plan to.” BEXAM Limited has based these terms and other similar expressions intended to specify forward-looking statements, such as “seek to,” “believes that,” “potentially,” “will continue,” and “may do so,” on financial conditions, business performance, business strategies, or financial necessities, or statements concerning token sale results, future events and financial trends, current forecasts, or relevant future prospects.

In addition to the statements concerning matters that are shown, this white paper contains statements concerning operating models proposed by BEXAM Limited, and concerning the future. In the case of such models, the statements are only our targets, and are not forecasts of future business results. Forward-looking statements are based on certain assumptions and analysis carried out by BEXAM Limited taking into consideration past
trends, the current situation, anticipated future trends, and experience and knowledge regarding other factors believed to be appropriate, and therefore involve risk and uncertainty. Nevertheless, the forward-looking statements contained in this white paper are based on what are believed to be rational assumptions, so it is expected that risks, uncertainties, assumptions, and other actual results are expressed, implied, or recognized in the forward-looking statements. In the case that such risks exist, token sale participants should not place unreasonable trust in these forward-looking statements.
10 References

