# Validation Capital T661

### What technological obstacles did you have to overcome? 350 words max – 50 lines of 78 characters

Validation Capital exists in the blockchain market, specifically in secure node infrastructure. Blockchain stores information, executes transactions, performs functions, and needs trust in an open environment predicated on privacy. Our technical uncertainty is the configuration of infrastructures with secure nodes in a marketplace — blockchain — that is in a perpetual state of rapid evolution, and the innovation of setting up the infrastructure.

We are tasked with ground-level architecture consultancy in blockchain projects. We are given a set of criteria, operating parameters for a blockchain product, and we configure a secure system. Our configurations are solid, industry-leading, and, ultimately foundational standards as they map out to the open source community through GitHub publishing.

Blockchain is a perpetual state of research and uncertainty, demarcated by industry-standard adoptions — usually incrementally adopted by word-of-mouth after publishing to GitHub — as the final destination for all security configuration solutions is the open source world. An entire digital marketplace is being set up on the foundation of blockchain technology. Blockchain may be seen the same as continuous development, continuous integration (CD/CI), or as a process that is the product, as opposed to a process that produces something.

We worked with numerous clients throughout the fiscal year, creating secure node infrastructure. We set up Chainlink ©, which connects smart contracts on any blockchain to data providers, web APIs, enterprise systems, cloud services, IoT devices, payment systems, other blockchains, and much more. We developed the authority master node for VeChain ©, emphasizing enterprise usage and supply chain verification with particular emphasis on novel governance. We implemented a token-based bandwidth sharing guardian node for the *last mile* of video for Theta Network ©. We implemented a validator for Matic ©. We developed the foundational node for Harmony ©.

### What work did you perform in the tax year to overcome those technological obstacles?   700 words max - 100 lines of 78 characters

.. I did not hear anything about failures in the interview. Do they hit the mark every time? How much R&D time is fruitless?

CHAINLINK

Chainlink, which is an early entry into the blockchain world by Oracle ™, asked for our input on how to set up node infrastructure securely. Their blockchain product gets the prices of all cryptos involved in your contract in real-time, which is very important for decentralized finance (DeFi) platforms. We consulted on their Verifiable Random Function (VRF), a very important function in blockchain games and non-fungible tokens (NFTs), random assignment of duties and resources, for example, randomly assigning judges to cases, and choosing a representative sample for consensus mechanisms. Randomness creates greater security burdens, hence our consultation with Oracle for secure node infrastructure. With every new request for randomness, Chainlink VRF generates a random number and cryptographic proof of how that number was determined. The proof is published and verified on-chain before it can be used by any consuming applications. This process ensures that the results cannot be tampered with nor manipulated by anyone, including oracle operators, miners, users and even smart contract developers.

Chainlink required contracts that could access any external data source, through their decentralized oracle network: sports results, the latest weather, or any other publicly available data. The Chainlink contract library provides the tools required for a contract to consume it, thus connecting smart contracts to the outside world. Building smart contracts is difficult enough as it is, but making contracts compatible with off-chain data just adds to the complexity. We created a framework with minimal requirements and yet unbounded flexibility, so developers can focus more on the functionality of their smart contracts rather than what feeds them.

Chainlink’s decentralized oracle network provides smart contracts with the ability to push and pull data, facilitating the interoperability between on-chain and off-chain applications, and their ability to achieve this securely would not have been possible without our input.

AUTHORITY MASTER NODE

VeChain is an open source blockchain network. In the VeChain ecosystem, stakeholders with voting authority comprise three categories: Authority Masternodes, Economic X Nodes, and Economic Nodes. Each category has different voting authority. The stakeholders can be individuals, corporations, government agencies, non-profit organizations and other institutions with a stake in the VeChain ecosystem, additionally Authority Masternode holders must go through Foundation’s identity verification and background check. The stakeholder voting mechanism ensures the inclusiveness of all designated stakeholders in the VeChainThor Blockchain ecosystem.

We consulted on their Authority Masternode, the central node for their ecosystem. Authority Masternodes are network maintainers of the VeChainThor blockchain. Each of the node operators must hold at least 25,000,000 VETs at any given time. Currently, there are 101 active Authority Masternodes held by either corporations or individuals whose identities have been verified by the Foundation. Authority Masternodes are the only nodes that are authorized to pack blocks on the VeChainThor blockchain and they are rewarded by 30% of the transaction fee in each block.

The VeChainThor blockchain uses a Proof-of-Authority (PoA) consensus in which each transaction is validated by Authority Masternodes (AM), however, the VeChainThor blockchain node program is open source which means it does not require any permission to synchronize the full ledger of VeChainThor blockchain and initiate transactions on it. An AM is a network-connected server running the VeChainThor full node program which keeps a complete copy of the blockchain. Additionally, Authority Masternodes are the full nodes authorized via an on-chain whitelist to validate and produce blocks of the VeChainThor blockchain. The whitelist of Authority Masternodes is managed through the Authority built-in smart contract which requires multi-signature authorization of the VeChain Steering Committee members to make any modification.

VALIDATOR GUARDIAN AND FOUNDATION NODES

In the Theta blockchain, Validator Nodes propose and produce new blocks in the chain, while Guardian Nodes seal blocks and act as a check on malicious or otherwise non-functional Validator Nodes. Guardian nodes play important roles to protect the security of the Theta blockchain as they form a second layer defense against potential malicious attackers. We configured the Validator Node on Matic, the Guardian Node on Theta, and the Foundational Node on Harmony.

### What scientific or technological advancements did you achieve or attempt to achieve as a result of the work described in line 244? (Maximum 350 words)

We created secure node infrastructures in the blockchain space which then propagates out into the open source community. Our work provides security and best-practices for node uptime. The advancements we make are the node configurations. The emerging blockchain universe is going to be completely normalized in the near future. It is a distributed application network space which requires no novel invention, but, rather, novel configuration. Our work disseminates into this distributed application network space and defines best-practice secure node infrastructure. Our work is replicated and distributed. With blockchain set to become a go-to distributed network in the financial technology sector, most of the scientific research and experimental development rests in node configuration and security. Our expertise and experience in finance and secure transactions allow us the privilege of working with new, emerging blockchain companies to create new, trail-blazing secure node configurations that help pave the roads in the blockchain space. All of our advancements go into the open source community and benefit the advancement of blockchain, to be used and replicated by the open source community.