Report on Creating Smart Contracts for Government Use

The Paradox of Decentralized Finance: Government Adoption and the Reaction of Cryptocurrency Users

A Thesis Prospectus

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By

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

In 2022, as Russia's invasion of Ukraine escalated, Ukraine turned to an unlikely fundraising tactic. By opening two cryptocurrency wallets to accept donations, Ukraine raised $10 million through Bitcoin, Ether, and Tether, providing them with crucial funds through quick, real-time donations which bypassed traditional financial channels (Browne, 2022). Meanwhile in the United States, the Louisiana State Government has accepted its first cryptocurrency payment, marking a large milestone in the cryptocurrency space (Claghorn, 2024). By accepting Bitcoin and other currencies, Louisiana provided citizens with an alternative to fiat currency with a promise of lower risk of fraudulent transactions, along with increased security benefits.

These examples highlight a growing trend: governments are increasingly adopting cryptocurrency and blockchain technology as technological solutions. However, this trend promotes a contradiction, which my research question aims to address. If one of the main principles of cryptocurrency is decentralization, meaning there is no central authority to enforce policies or assign value, why do governments choose to adopt this technology and how do cryptocurrency users and developers reconcile the expectation of decentralized financial systems with increasing government involvement and regulation?

I hypothesize that governments see the potential in the security, efficiency, and transparency cryptocurrency can offer its users. Furthermore, I propose that users and developers of cryptocurrency are generally favorable toward government adoption of cryptocurrency as a technology, viewing the government as another user in this context. Yet, I believe while many users agree that some regulation is necessary, tension may arise with developers and users who prioritize security and anonymity — features that may conflict with government interests and regulatory requirements.

Through my technical work, I contributed directly to developing blockchain solutions for state governments, implementing decentralized programs to meet government requirements. As a developer working at the intersection of government and cryptocurrency, I have gained a unique dual perspective on both government and user views. My technical report will delve into my experiences and the impact of my internship, while my STS research project aims to analyze the potential outcomes of my research question.

Technical Project Proposal

Currently, in the Fall of 2024, I am interning at Innova8 LLC as a blockchain developer primarily focused on developing in the language Solidity, which is the coding language associated with the cryptocurrency Ethereum. At Innova8, we are focused on creating a product to transform record management systems for state level governments.

The need for a new record management system stems from the government's underlying reliance on paper verification. To illustrate, consider the following scenario: a spouse fleeing a domestic abuse case arrives at a hospital with nothing but their phone. They have no paper insurance, nor do they have any form of identification to prove who they are. Though the situation may seem grim, this state happens to have our technology, and the spouse happens to have our app. With our technology, the spouse will be able to verify their identity securely, and the hospital has a guarantee that the record on their ledger corresponding to the spouse is valid, has not been modified, and can be trusted. Our product hopes to encompass security, trust, and immutability[1] to record management in state level government, ensuring a wide range of use cases, such as identity, insurance, or car sales.

Our product boasts two separate options for verification and security, a non-blockchain option with cryptography and other security measures, and a blockchain option, opting to use an

[1] Unable to be changed

immutable blockchain on top of cryptographic security measures to ensure the utmost trust. Within the blockchain option, we offer another two options: a route where Ethereum, a widely popular cryptocurrency, is used for record verification, and a route where Hyperledger Fabric is used - a private, permissioned blockchain as a service.

To provide some context, a blockchain can be likened to a decentralized digital ledger where information is stored in a series of blocks, each linked to the previous one in a chain-like structure. Each time new data is added, a new block is created and linked to the chain. Lastly, the data is distributed across a network of computers (called nodes) rather than being held in a single, centralized location. Each node holds a copy of the entire blockchain, meaning the information is highly secure, resistant to tampering, and transparent. If someone were to alter information in a single block, it would no longer match copies held in other nodes, revealing inconsistencies.

My work revolves around developing programs known as smart contracts within these two blockchain technologies. The rationale behind each option is simple: Ethereum's public blockchain requires cryptocurrency transactions to post records, which ensures security but may present problems in cryptocurrency possession since Ethereum requires transaction fees in Ether. Alternatively, Hyperledger Fabric operates as a private, permissioned[2] blockchain, allowing users to control access, leading to more adaptability for cases where restricted access is essential.

My technical report will explore the transformative impact that a secure, blockchain-based record management system could have on state level government operations. Additionally, it aims to highlight the value of my contributions to both Innova8 and, by extension, to state governments through the implementation, testing, and refinement of these blockchain solutions.

[2] Requiring permission from an authorized authority

STS Project Proposal

Recently, it is clear that governments both locally and globally are taking interest in cryptocurrency. Louisiana's recent acceptance of cryptocurrency payments marks a historic step in integrating digital currency within government transactions, allowing users more economic freedom and higher security (Claghorn, 2024). Additionally, around the world, more countries are starting to either adopt cryptocurrency as a government sanctioned currency or create their own cryptocurrency. For example, El Salvador has adopted Bitcoin as a legal government sanctioned cryptocurrency, while Jamaica, Nigeria, and the Bahamas created their own digital currencies (Beyer, 2024). Furthermore, the war in Ukraine showcased the practical applications of cryptocurrency, with Ukraine raising millions in donations through crypto wallets to support their resistance (Browne, 2022). These examples demonstrate that as cryptocurrency gains traction in areas like e-payments and public services, governments are increasingly interested in adopting and regulating these digital assets. However, cryptocurrency, built on principles of decentralization, operates without central authorities, appealing to those who prioritize financial autonomy and digital freedom. This intersection of decentralized technology and government intervention raises important questions about the future of digital finance and the boundaries of government involvement.

This tension between government adoption and cryptocurrency's decentralized nature presents a complex socio-technical challenge. While cryptocurrency markets have historically operated with minimal regulation, leading to volatility, fraud, and price manipulation, completely centralized control threatens the fundamental principles of these technologies (Schaupp & Festa, 2018). Research also suggests that centralized, direct, command-and-control regulation of cryptocurrencies poses many limitations, implying the need for a more nuanced regulatory

approach that can preserve the benefits of decentralization while providing necessary oversight (Nabilou, 2019). This regulatory challenge is further complicated by cryptocurrency exchanges tending to over-report suspicious transactions due to inferior money laundering detection abilities, delegating more responsibility to government regulations due to unsatisfactory industry-side performance (Kim & Ryu, 2021). Though regulation of cryptocurrency may restrain its potential, studies of user attitudes reveal a contrasting perspective: due to fears of instability and volatility, users increasingly feel the need for regulation of cryptocurrencies (Campino & Yang, 2024).

While research has established growing government interest in cryptocurrency adoption and some limited user attitudes towards regulation, significant gaps remain in understanding why governments are adopting this technology and how cryptocurrency users and developers reconcile the expectation of decentralized financial systems with increasing government involvement and regulation. Filling these gaps in knowledge is essential for envisioning the future of cryptocurrency for a variety of reasons.

Users find themselves at a critical point in cryptocurrency's growth, caught between the technology's core value of decentralization and the emerging reality of increasing governmental involvement. Perspectives within the user community are divided. Some users view potential governmental integration as a necessary step toward mainstream legitimacy, as if governments see cryptocurrency as a tool for transparency and efficiency, they are more likely to develop supportive policies to encourage its integration in a controlled environment. Conversely, other users are wary of governmental interest, since if governments perceive cryptocurrency as a threat to existing economic structures, they may impose tighter financial controls or limit privacy features, causing difficulty in utilizing features users may value. Users who leverage

cryptocurrency's financial potential to build their wealth may find their strategies significantly impacted, depending on whether governments opt to regulate or restrict the space, potentially altering the market dynamics and user freedoms associated with decentralized finance. The future of cryptocurrency lies in a combination of both user interactions with the technology and the interests that governments take in it.

To answer my research question, I will employ a combination of three research methods. First, a meta analysis on studies regarding what are some challenges of government managed cryptocurrency and the need for regulation. I will be searching for said academic articles through search engines like Web of Knowledge. Second, a discourse analysis where research is performed on subReddits such as r/Cryptocurrency, government and cryptocurrency hashtags on Twitter, and opinion articles found on web3isgoinggreat, Cointelegraph, and other cryptocurry opinion blogs, focusing on differing perspectives between users who prioritize cryptocurrency for its technology versus those using it for profit. Lastly, I will conduct a content analysis where research is done on news articles on why crypto regulation is required and the leading use cases of cryptocurrency. Due to cryptocurrency being a relatively new technology, to ensure the relevance of the information, I will restrict the time frame of the research to the past 8 years.

Conclusion

In conclusion, as cryptocurrency's appeal grows globally, governments are increasingly exploring blockchain technology and digital currencies, bringing them into direct contact with a decentralized ecosystem originally designed to operate without central authority. Through my technical work developing blockchain solutions for government use, I have gained direct insight into the possible motivations driving government interest in this technology. This paradox of centralization within a decentralized framework highlights the importance of learning user and

developer perspectives on government involvement. The relationship between government objectives and user acceptance of regulation is crucial, as future policy decisions will significantly impact the role of cryptocurrency in public and private sectors. As governments work to regulate and integrate digital currencies, striking a balance between the core principles of decentralization, transparency, and security will be crucial for preserving the technology's foundational values. This research intends to provide a perspective on how these technical and social dynamics may unfold, providing possible insights to policymakers, developers, and users navigating the rapidly evolving nature of blockchain.

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