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Izak Chamoun

Saxion

Assessors: Jan Jaap Sandee & Timothy Sealy

Advice report

Blockchain for Egalitarian project



# Advice and recommendations

## Evaluation of blockchain solution

A hybrid implementation combining on-chain and off-chain components provides a balanced approach to integrating blockchain into applications that are not inherently decentralized (dApps). This setup leverages the speed and simplicity of traditional systems for less sensitive data while utilizing blockchain's secure and tamper-proof features for critical information through hashed blocks chained together. However, implementing blockchain in applications that do not benefit from its unique advantages may result in unnecessary complexity and inefficiency.

Using blockchain to handle sensitive data ensures tamper resistance and data integrity, while less sensitive data stored in faster, less complex traditional systems creates a well-rounded, efficient application. However, adopting a proof-of-work (PoW) consensus mechanism for blockchain introduces significant inefficiencies, as it relies on resource-intensive mining processes, making it unsustainable for most use cases. A more suitable alternative is the proof-of-authority (PoA) consensus mechanism, which offers better efficiency and sustainability.

The downside of PoA is its complexity and the specialized expertise required for implementation. Many traditional developers lack the skills to create or scale such systems, as blockchain development remains a niche area requiring targeted knowledge and experience. Balancing these trade-offs is crucial when determining the viability of blockchain integration in any given application.

## Conclusion: Added value or not?

Blockchain’s value depends on its alignment with an application’s needs. It excels in ensuring data integrity, transparency, and security, making it ideal for applications requiring high trust and decentralization. However, in cases where these features are unnecessary, traditional systems are often more efficient and practical.

The added value arises when blockchain solves problems traditional methods cannot. Forcing its use where it provides no clear advantage leads to unnecessary complexity. Ultimately, blockchain is valuable when purposefully applied to meet specific, well-justified requirements such as decentralization, data privacy and data integrity. These qualifications are tough to validify if its not for a big financial institute, tracking of expensive goods or an application where decentralization would be its selling point.

In context of the sustainable hub application the blockchain solution of on-chain and off-chain integration with smart contracts checking the states of the donation would **not** be beneficial as this implementation would not need decentralization or secured data privacy. It would work and with the PoA consensus mechanism it would be similar in terms of process speed and energy intensity, but it would be nothing more than just an overengineered application that is harder to scale and maintain.

## Recommendations for implementations or alternatives

Using Hyperledger fabric’s ecosystem to create this project is the more secure way of creating this application as it provides documentation and a path laid out by other applications utilizing blockchain for its needs. The platform supports various crucial parts such as solidity for creating smart contracts and a private and public channel the blocks give data access to as well as supporting centralized Databases for off-chain support. Although Hyperledger is known for having a steep learning curve. (Fabric)

# Summary of important findings

An important find is understanding what the blockchain technology actually is and why its getting the massive attraction and funding from the public. It can provide better alternatives to existing systems today, whilst providing a creative ecosystem for entrepreneurs looking for optimization of existing systems.

Different uses can be used found in blockchain like the use of smart contracts Ethereum is known for. Additionally the different consensus mechanisms to secure a safe way of completing transactions without compromising decentralization. These mechanisms also differ and optimize in terms of processing speeds and energy usage. Providing different mechanisms for different needs.

Able to point out the pros and cons blockchain give in terms of bitcoin’s use and individual use for applications. Understanding that it ultimately is a digital ledger that is tamper-proof and secure with no way of breaching as of today.