A CONCEPTUAL MODEL FOR BLOCKCHAIN-BASED PROJECT INFORMATION SHARING

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OUTLINE

• Introduction
• Project Data Collection Methods
• Blockchain
• Ideas Behind the Conceptual Model
• Benefits of Blockchain
• Conceptual Model
• Discussion
• Conclusion
INTRODUCTION

• We make estimations to improve software project planning and management processes.
• Accurate estimations play a significant role in the success of software projects.
• Companies should have sufficient number of past project data to establish software estimation practices accurate and reliable.
PROJECT DATA COLLECTION METHODS

• Within-company dataset from past projects:
  • The company needs time to collect enough data on past projects.
  • The company might have made changes on data for new projects, which could make their previous measurements not usable.
  • All data should be collected and kept consistently.

• Cross-company dataset
  • All users can access to the entire project database.
  • Companies that do not want to share all or part of their project information avoid data entry.
  • Privacy issues prevents the growth of such datasets.
IDEAS BEHIND THE CONCEPTUAL MODEL

- Stores project information on blockchain.
- Provides attribute-based access control mechanism for stored project information that can be managed by data owner.
- Shares stored project information with access control.
- Provides an incentive mechanism to motivate data owners to share their project information.
Blockchain is a distributed database that provides encrypted transaction tracking.
BLOCKCHAIN - II

Features;
• Immutability
• Decentralization
• Security
• Transparency

Types;
• Public
• Private
BITCOIN

• Decentralized, open source, p2p cash protocol
• Gold standard of blockchains
• Primary purpose is cryptocurrency
• Transparent transactions
• Primitive scripting language
• Mining process
• Public blockchain
ETHEREUM

• Ethereum is a decentralized platform designed to run smart contracts.
  • A distributed computer to execute code
  • Turing complete scripting language

• Has a native asset called ether

• Smart contracts: like autonomous agents that live inside of the network
  • Every node executes smart contracts
  • Ethereum virtual machine
  • Every code requires some gas in order to execute

• Mining process

• Public blockchain
HYPERLEDGER

• Hyperledger is an open source collaborative effort created to advance cross-industry blockchain technologies.
• Permissioned membership
• Confidential transactions
• No built-in cryptocurrency
• No mining
• Chaincode
• Private blockchain
RELATED USAGES OF BLOCKCHAIN

• Access control and authorization mechanisms
  • RBAC-SC: Role-Based Access Control Using Smart Contract (2018)

• Data marketplace
  • IDMoB: IoT Data Marketplace on Blockchain (2018)

• Medical record management
  • Medrec: Using Blockchain for Medical Data Access and Permission Management (2016)
  • MeDShare: Trust-Less Medical Data Sharing Among Cloud Service Providers via Blockchain (2017)
BENEFITS OF BLOCKCHAIN

• Decentralization feature and no central authority
  • Access and management controls can be performed only by data provider.
  • Enables the data provider to trust the system.

• Data is stored in a distributed manner
  • There is no risk of losing data.

• Immutable feature
  • Stored information can not be tampered without the consent of the owner.
CONCEPTUAL MODEL – I

• Data Provider
  • Inserts project information
  • Manages access controls
  • Earns tokens

• Verifier
  • Verifies project information
  • Increases rating value
  • Earns tokens

• Data User
  • Queries project information pool
  • Uses project information
  • Pays tokens
CONCEPTUAL MODEL - II

• Project Information Pool
  • Collection of all projects’ information

• Project Information
  • The data of a software project

• Project Attribute
  • A property of a software project

• Access Control
  • Authorization restriction enabled by data provider

• Token
  • Provides a win-win situation for all roles
EXAMPLE SCENARIO

1. The Data Provider inserts project information
2. The Data Provider defines access control for project information
3. The Verifier is informed to verify project information
4a. The Verifier verifies project information
5a. The Data User uses project information
4b. The Verifier is paid for completed audit
5b. The Data User pays token

Blockchain
## EXAMPLE MAPPING

<table>
<thead>
<tr>
<th>Proposed Concept</th>
<th>Sample Dataset (Excel format)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Attribute</td>
<td>A Cell</td>
</tr>
<tr>
<td>Project Information</td>
<td>A Row</td>
</tr>
<tr>
<td>Project Information Pool</td>
<td>All Rows</td>
</tr>
<tr>
<td>Data User</td>
<td>Customer of Dataset</td>
</tr>
<tr>
<td>Verifier</td>
<td>Dataset Repository Manager</td>
</tr>
<tr>
<td>Data Provider</td>
<td>Data Owner of a Row</td>
</tr>
<tr>
<td>Token</td>
<td>None. Only pain membership for Data User</td>
</tr>
<tr>
<td>Access Control</td>
<td>Centralized, repository-based</td>
</tr>
</tbody>
</table>
DISCUSSION

Currently we are dealing with operational issues of the proposed model. Then we will address tactical and strategic issues.

We stored some issues to our backlog:

• Malicious user can share displayed data by copying - operational level
• Standard data model is needed for estimation - tactical level

Determining blockchain technology is very critical decision while realizing a system with this model
FUTURE WORK

• A system will be designed and implemented by using the proposed model.

• An empirical study is planned with a research center in order to evaluate operational principles and validate the usability of the model.
CONCLUSION

• By defining an access control mechanism we encourage stakeholders for sharing and using project information.

• The features of blockchain technology make the model secure and reliable.

• This model can be adapted for other kind of information storing and sharing problems.
THANKS FOR LISTENING

- Questions?