Title :

The Development of a Secure Blockchain-based e-Voting System for Data Integrity

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Background :

Voting or election is a common mechanism which a population chooses an individual or a group to work on a specific purpose. The traditional method using paper and manual works could have some concerns related to data integrity that the results are attacked and modified, and time consumed for counting ballot papers. Online voting (or e-voting) has been introduced for a while but it is not widely accepted.

This is because the database system is designed using traditional client-server architecture; hence it could be a single point of failure where the data is risky to be attacked and modified, resulting in inaccurate results. Moreover, any modification of the data is not traceability. The adoption of blockchain in e-voting associated with a secure authentication mechanism is expected to promote data integrity and speedy of summarizing the results.

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Targets:

Targets in this project include:
- School, university, organization, and any community.
- Do not aim to replace the traditional election at the national level.

Proposed Method: Blockchain-based e-Voting

Blockchain Technology in e-Voting
- Promote data integrity and transparency
- Promote data availability
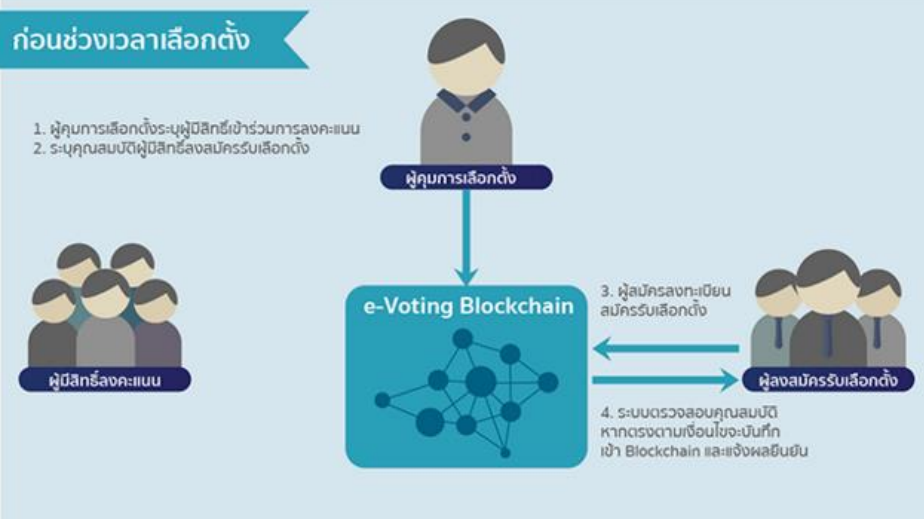- Promote data confidentiality

Implementation
- Blockchain platform architecture for e-voting
- Voter identification system
- Logging system
- Dashboard and front end
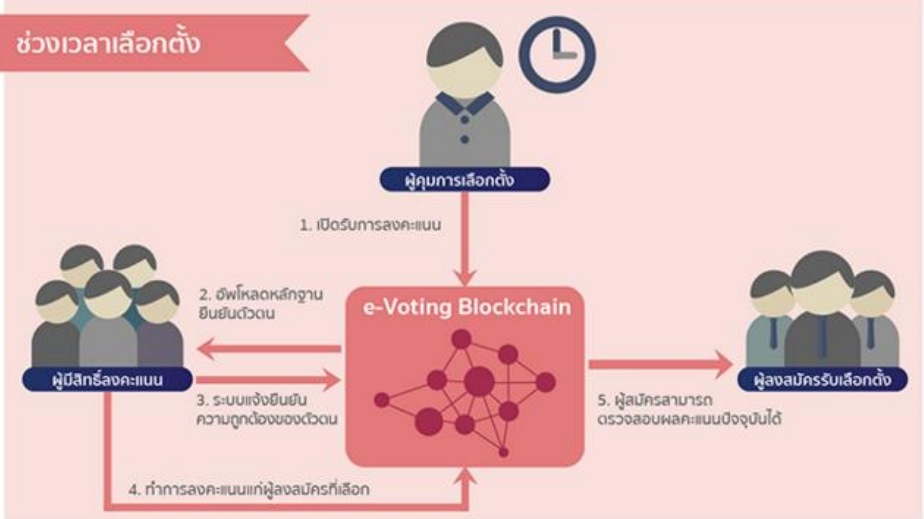- Security implementation

Field Experiment
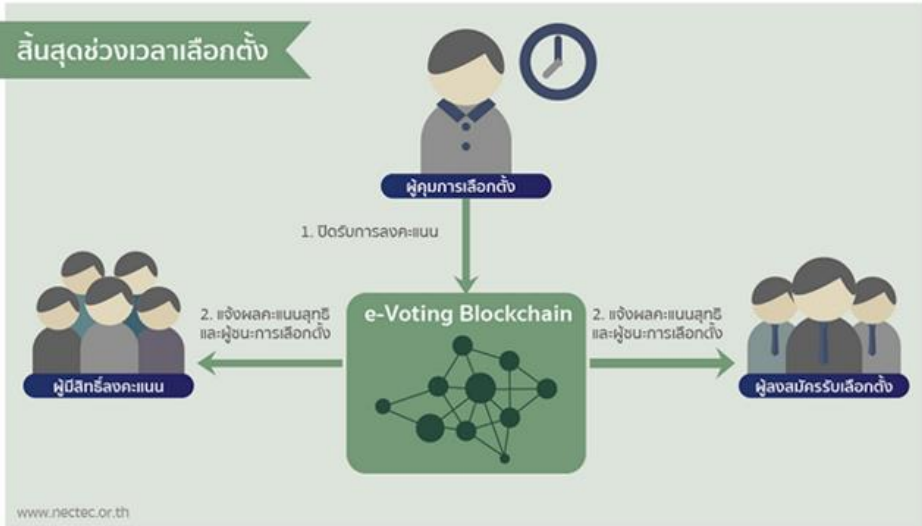- Pilot project at a student election in a school

Proposed Method: Blockchain-based e-Voting

Before voting

During voting

After voting

1. Scientific and technological

- Strengthen information security in terms of data integrity, confidentiality and availability
- Understand the additional requirements in e-voting to help improve trust by voters
- Determine the limitation of blockchain technology when is applied in e-voting

2. Societal

- Promote transparency in voting
- Narrow digital divide

3. Collaborative

- Formalize the collaboration of experts in blockchain and information security research in ASEAN and Japan

1. Scientific

- Design and development of a prototype, tested in a real environment
    - Blockchain platform architecture for e-voting
    - Voter identification system
    - Logging system
    - Dashboard and front end
- A demonstrator which is evaluated in different settings.
- Technical solution for e-voting which promote data integrity and privacy.
- Joint publications, workshops and new project proposals in this emerging area

2. Societal

- De facto standard or protocol for e-voting system to be used in ASEAN community.
- Trust in e-voting

3. Collaborative

- New partners in ASEAN countries and Japan
- Research collaboration through joint publications, workshops, and project proposals

Conclusion:

- This project aims to target at school, university, organization, and any community that do not cover political election at the national level.
- This project uses blockchain technology focusing on data integrity, not allowing any data modification. The prototype will be a self-service platform for voting.
- Research collaboration through joint papers, workshops and further project proposals is expected as a main impact in this project. Other impacts expected include promoting blockchain in ASEAN and trust and acceptance in e-voting, resulting in de facto standard and protocol.