



Blockchain-Based Blood Bank Eco-system for Improving Public Health and Encouraging Voluntary Blood Donors

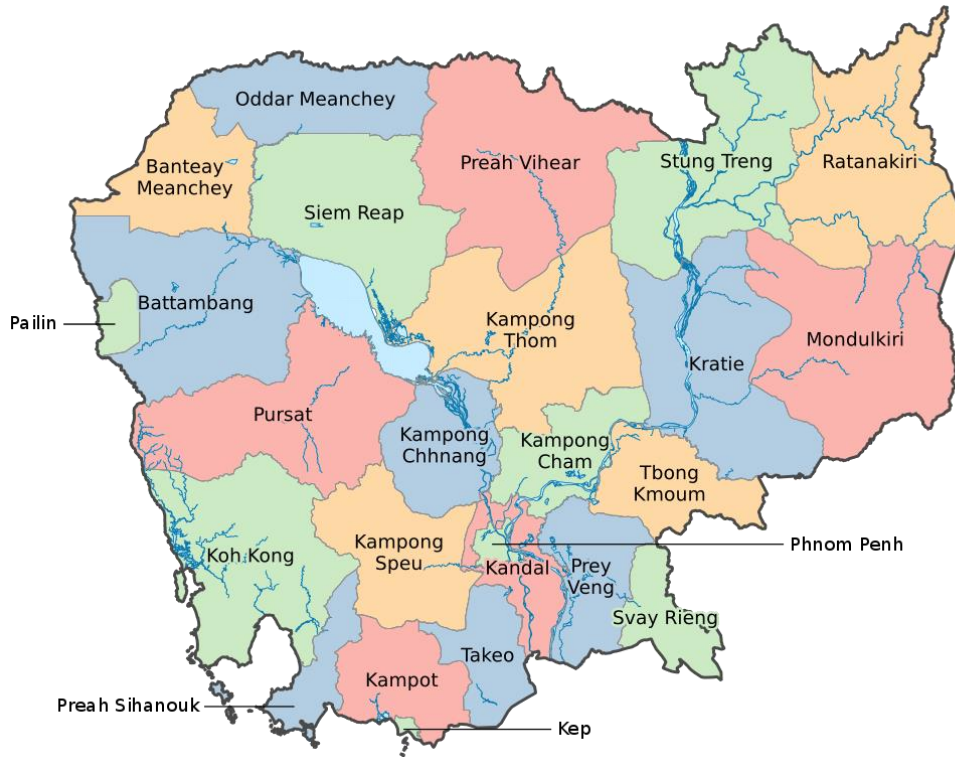
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Background :



<https://en.wikipedia.org/wiki/Cambodia>

- In 2018, National Blood Transfusion Centre (NBTC) of Cambodia supplied blood bags for more than 85,000 bags.
- The NBTC's ambitious target of 50% voluntary blood donations by 2020.

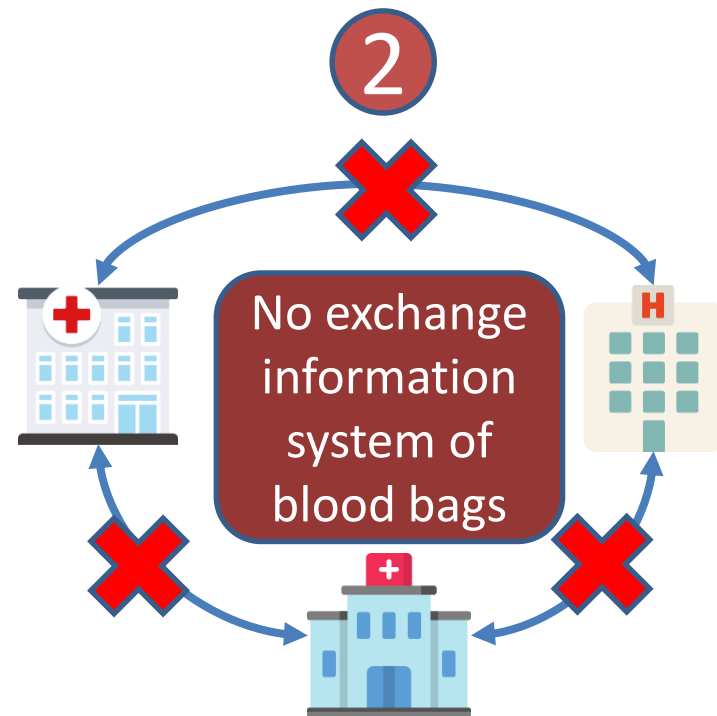
Problems:

1

Voluntary Blood donors

Cambodia
31% by 2016

Thailand, Vietnam
and Lao are about
80-90% by 2016



3



65% of blood donors [1] are single time donors, which have higher risk of carrying a transmissible disease [2].

[1] <https://cambodiatribune.com/nbtc-gets-over-35000-blood-bags-in-first-five-months/>

[2] <http://www.cambodiablood.com/media/1ecfa385/GuidelinesEdition2.pdf>

Problems:

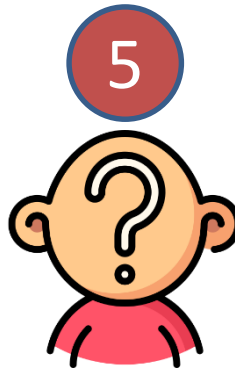
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Blood bags info. is not transparent to patients about the origin of the blood.

After donating blood, he does not know his blood is used in the right way or not.

5

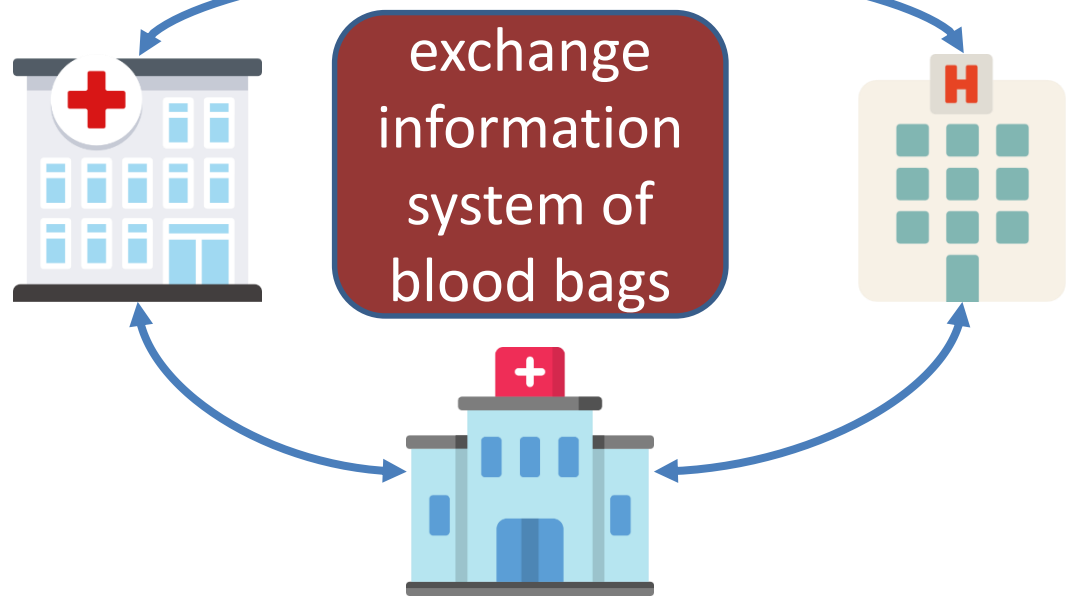


Voluntary blood donor

He gets a blood certificate, which is lost or damaged easily and has difficulty to give it to his relatives or friends.

Proposed Method:

1



2



Providing traceability and transparency of information in distributing blood bags

3

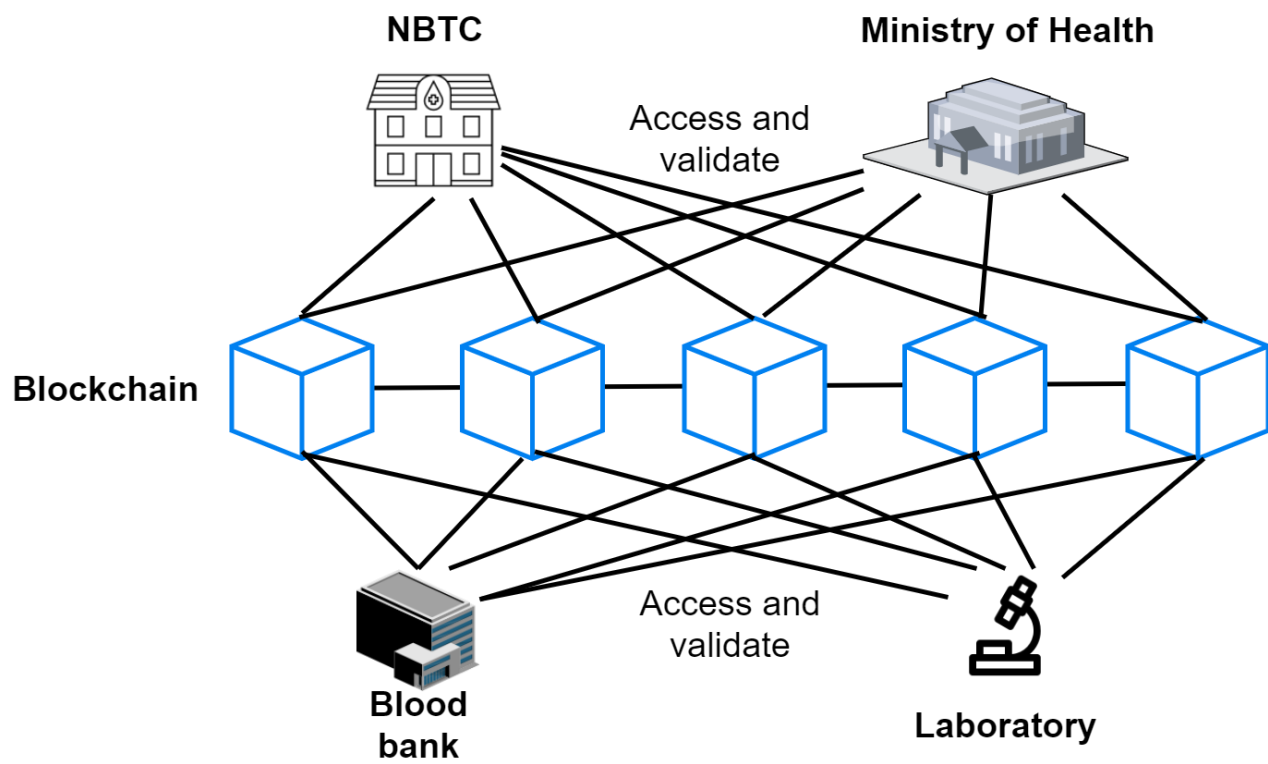


Encouraging voluntary blood donors to donate blood frequently

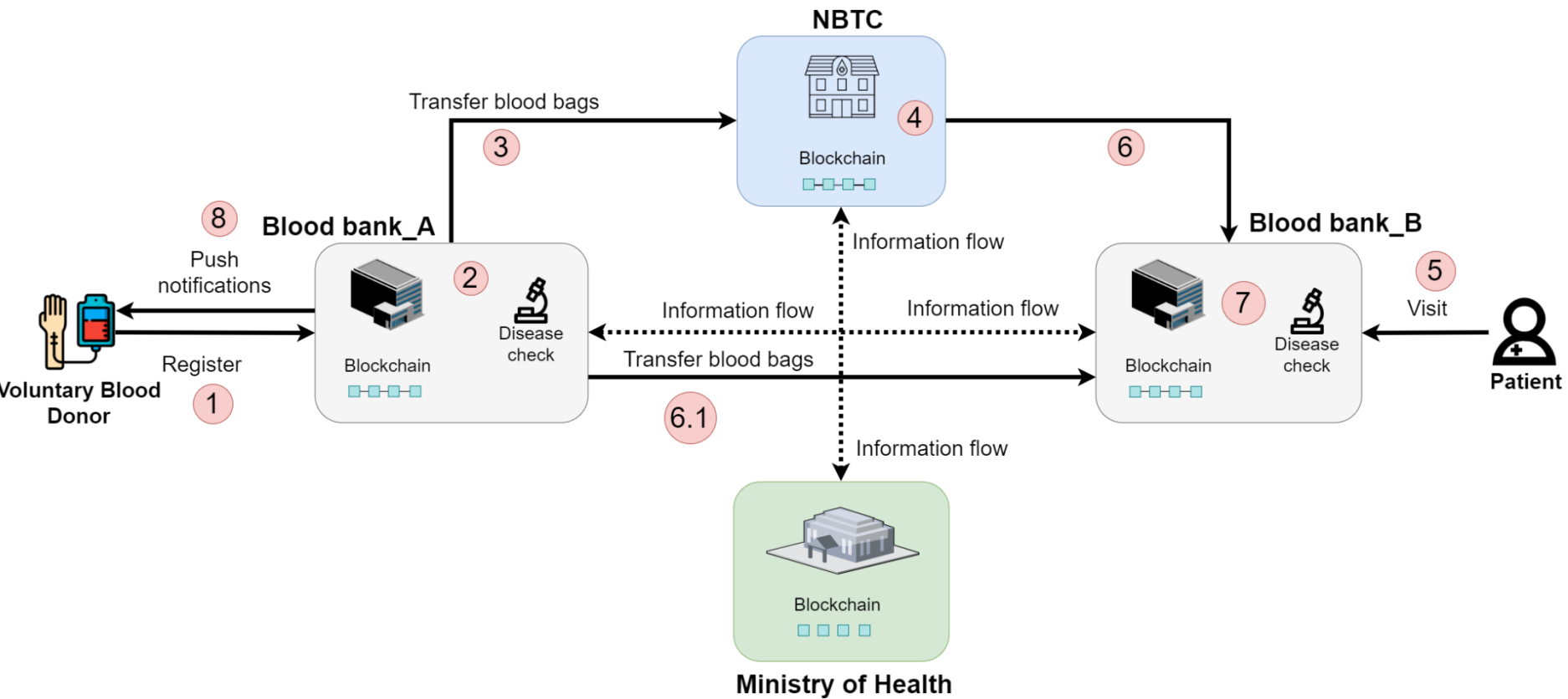
- We build a blockchain system, which is used for information sharing across institutions.

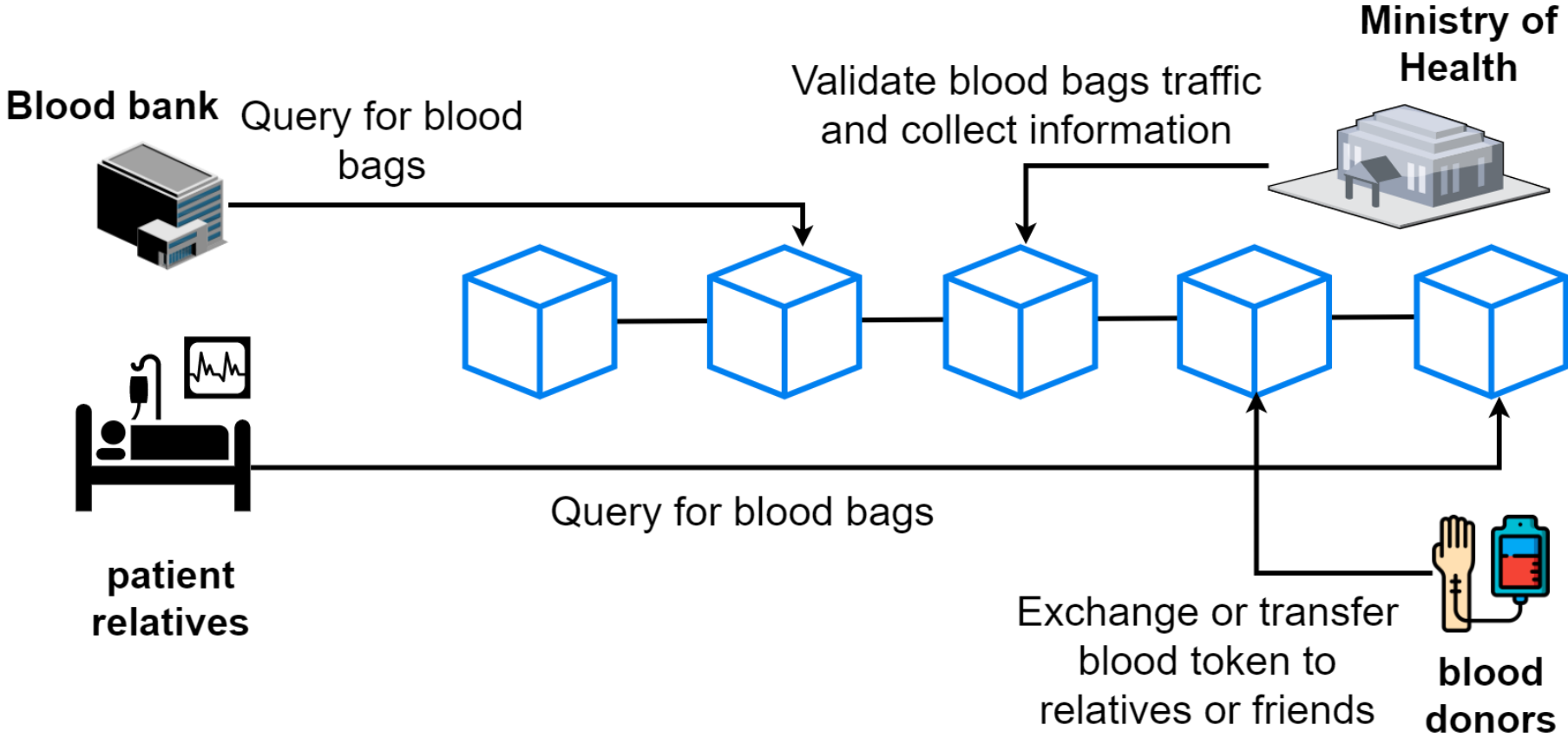
1. What is blockchain?

Blockchain is the immutable distributed database, which is shared among members in the network.



Proposed Method:







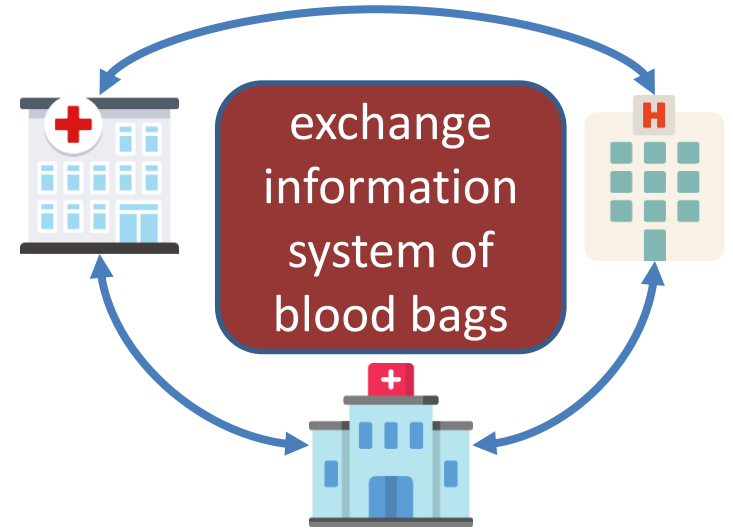
Digital blood certificate and token

- A serial number of blood donor certificate and token, which were issued by blood bankers, will be stored in the blockchain after donating blood.
- After the blood bags are used, blood donors will receive notification.
Ex: <Your blood bag with #serial_number was used in #hospital for #Purpose>

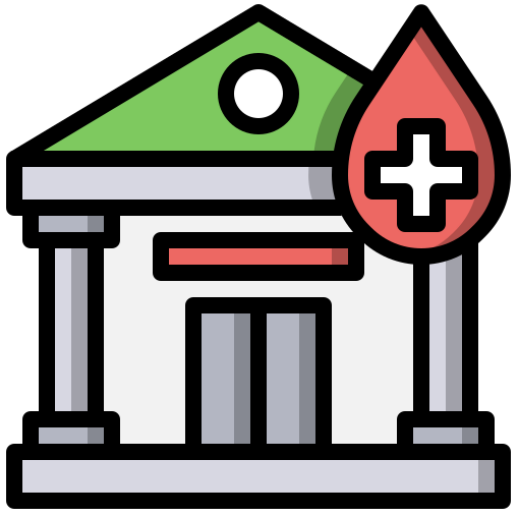
- Transparency, Security and Privacy preserving
 - Data in blockchain is immutable and disclosed to organizations in the network.
 - We do not store sensitive information in the blockchain such as: name, address, phone number or other sensitive information of voluntary blood donors and patients in the blockchain.
 - We use Public Key Infrastructure (PKI), data encryption and access policy checked for identifying user identity and protecting the privacy of data owners.

- Scalability

- It is Single Point of Failure proof and decentralized, so that it is suitable for the large-scale of information sharing (eg. National level, E-government).
- This system can be used in ASEAN countries for sharing blood bags across the border and voluntary blood donors can use their token in these countries.



- Cost effectiveness



- blood banks can share blood bags for:
 - Reducing cost in storing blood bags
 - Distributing the blood bags from the blood bank before blood components reduce quality

- Based on big data of blood bag in the blockchain, government can take these data to analyze for learning in order to generate new policy for enhancing public health.
- We provide a trustful system to any stakeholders to use especially, voluntary blood donors to feel more confident in donating blood and use the blood tokens conveniently.