

LOW LEVEL DESIGN

Blockchain Based Insurance System

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ABSTRACT

The project aims at leveraging the blockchain technology in the insurance industry to increase the security of transactions taking place in the industry typically settling claims, premium payment etc., and thereby increasing trust among the parties involved. The main use case identified has been to curb fraudulent transactions and minimize risk while at the same time reducing the administrative cost plaguing the industry.

This use case has been implemented using python programming language and Postman application. The algorithm includes creation and connection of three nodes (peers) establishing P2P network in which we embed the transaction details of the customer in an immutable digital ledger.

1. INTRODUCTION

1.1 Insurance Domain

Insurance is a way of managing risks. As individuals, we deal with a lot of uncertainties related to our life and belongings like house, car etc. Anything can happen anytime causing financial distress. Insurance is a form of risk management where one party (the insured) transfers risks to another party (the insurer) in exchange for a consideration (the premium). The insurance company is said to have provided insurance coverage to the insured.

Term insurance is the simplest and purest form of life insurance that provides coverage for a certain period of time or a specified "term" of years. If the insured dies during the time period specified in the policy and the policy is active, or in force, a death benefit will be paid.

A simple term insurance works as follows: Consider a customer A has purchased an insurance policy with nominee as next of kin B. In the case of an untimely death of A, B can obtain a death certificate and submit it to claim the insurance. The insurance company will verify the claim information and process it. This standard procedure can take up to 30 days in the current scenario.

1.2 Blockchain technology

Blockchain was introduced when an unknown person or groups of individuals going by the name of Satoshi Nakamoto, developed Bitcoin, a popular cryptocurrency. He created the first blockchain database using an algorithm that was to change the future of the financial landscape across the world.

A Blockchain is essentially a record, or ledger, of digital events, that is distributed or shared between many different parties. It can only be updated by consensus of a majority of participants in the system. And, once entered, information can never be erased. The blockchain consists of verifiable records for each transaction made in the system. In a blockchain system, an event is created and each time a change is made to the event, a new block is created with timestamps. Every transaction is securely linked to all the data related to the transaction

Given the potential of this technology to drive simplicity and efficiency through the establishment of highest security and immutability, it is rapidly gathering momentum withing several domains, especially finance, insurance and healthcare, where secure data is of utmost priority.

2. PROBLEM STATEMENT

Information is an insurance company's lifeblood. Properly acquiring, processing, sharing, securing, and using that information to make decisions in a timely manner is crucial—but some of today's transactions may take days (or weeks) to locate and process. Many insurers are using claims systems that were originally built more than 30 years ago. Maintaining these outdated technologies increases costs for insurers and may hamper their efforts to adopt new value-based payment strategies that will change the way insurers approach network development, provider contracting, and payments. Also, the imperative for insurers to cost-effectively maintain their administrative infrastructure is becoming more public and important. As a result, Blockchain can be implemented in insurance industry:

- To reduce frauds by decreasing human intervention in the process
- To help automate claims functions

3. PROPOSED DESIGN

The customer (insured) can use the insurer's web portal to register a new policy giving basic details like:

- ID Proof
- Insurance amount
- Premium/terms
- Maturity period or Term end
- Policy nominee ID Proof

This will initiate creation of a blockchain with these transaction details in the genesis block.

Payment of each premium will create a new block with premium amount and timestamp.

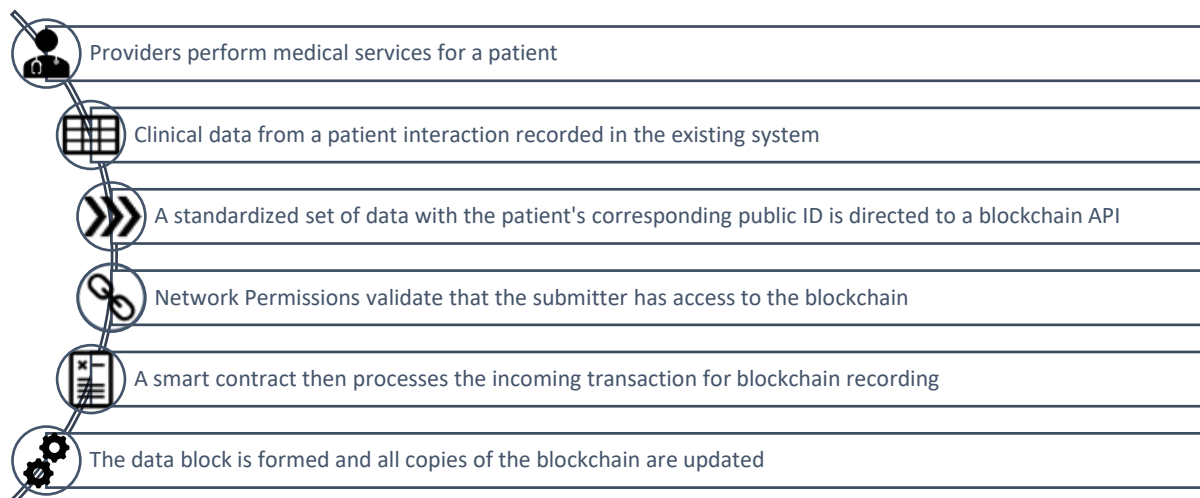
Maturity period or Term end will enable Nominee to raise a claim with following details:

- Claim Reason: demise or illness
- Death/Medical Certificate details

This will initiate a block with claim details and verification of claim will be done across the network and the hospital database/blockchain.

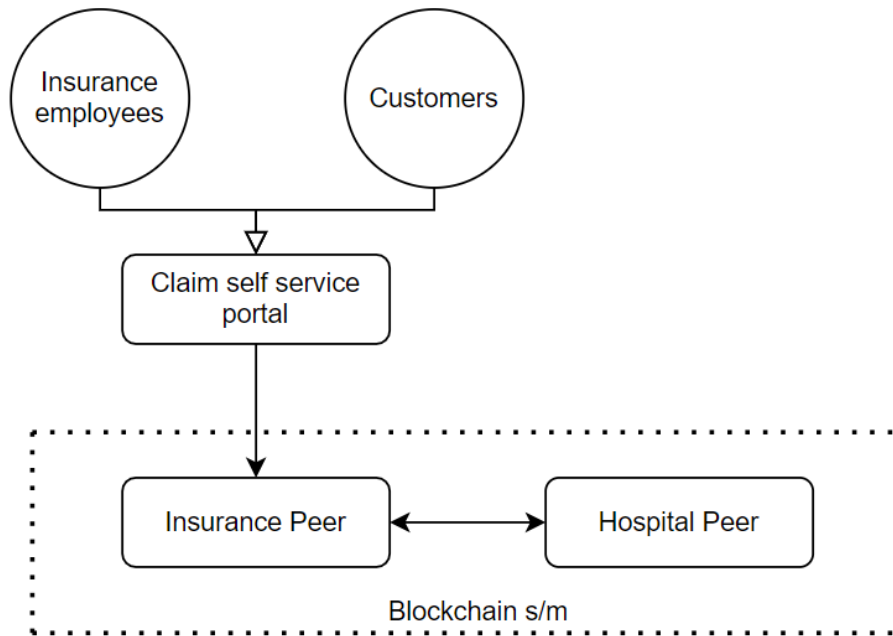
Claim disbursement will be the final block created where the Insurance amount is paid out to the nominee and the blockchain is terminated.

In case of claim not being verified, final block will be created with reason of declination.



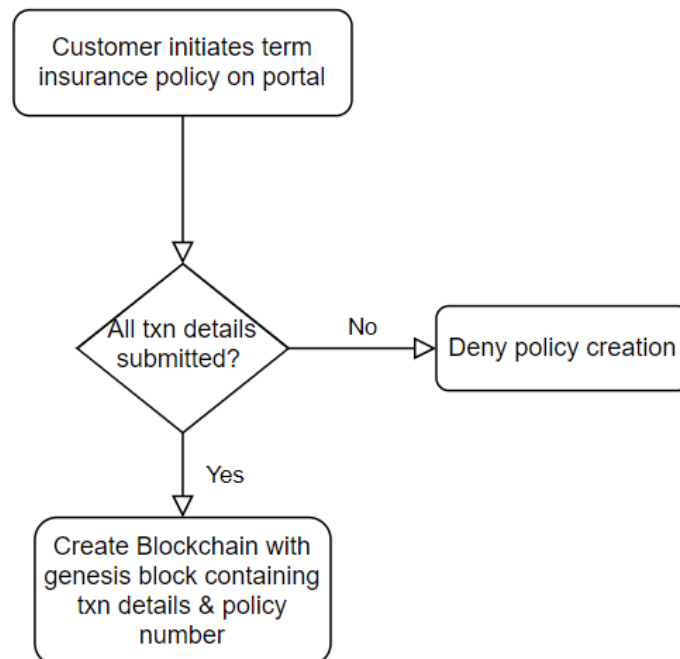
4. ARCHITECTURE

Project Architecture:

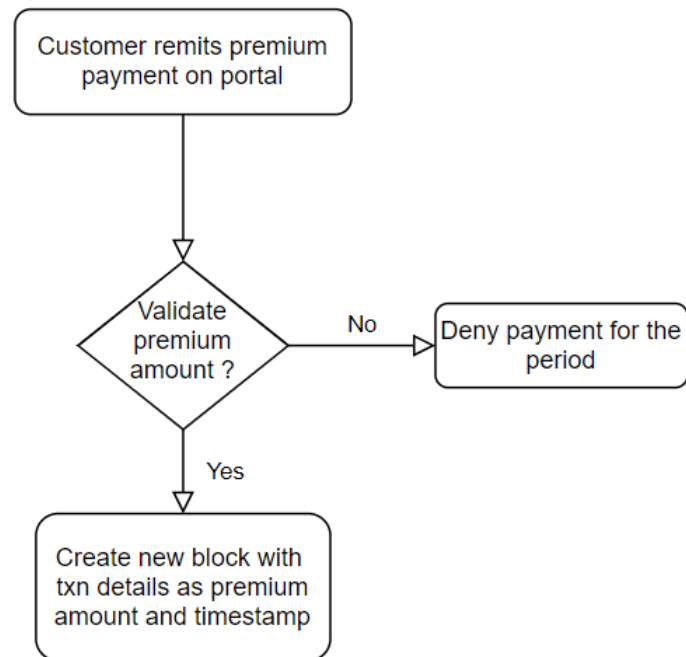


4.1 Process Flow

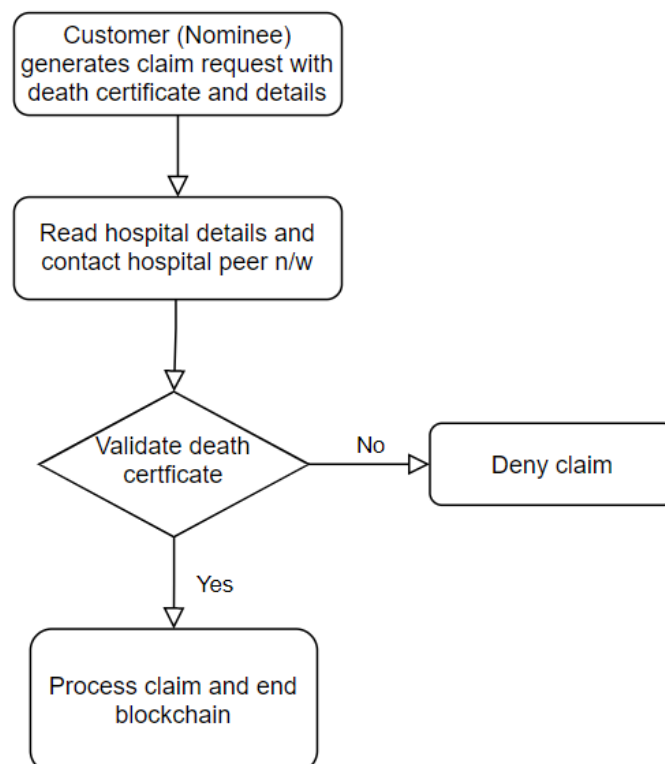
4.1.1 POLICY CREATION



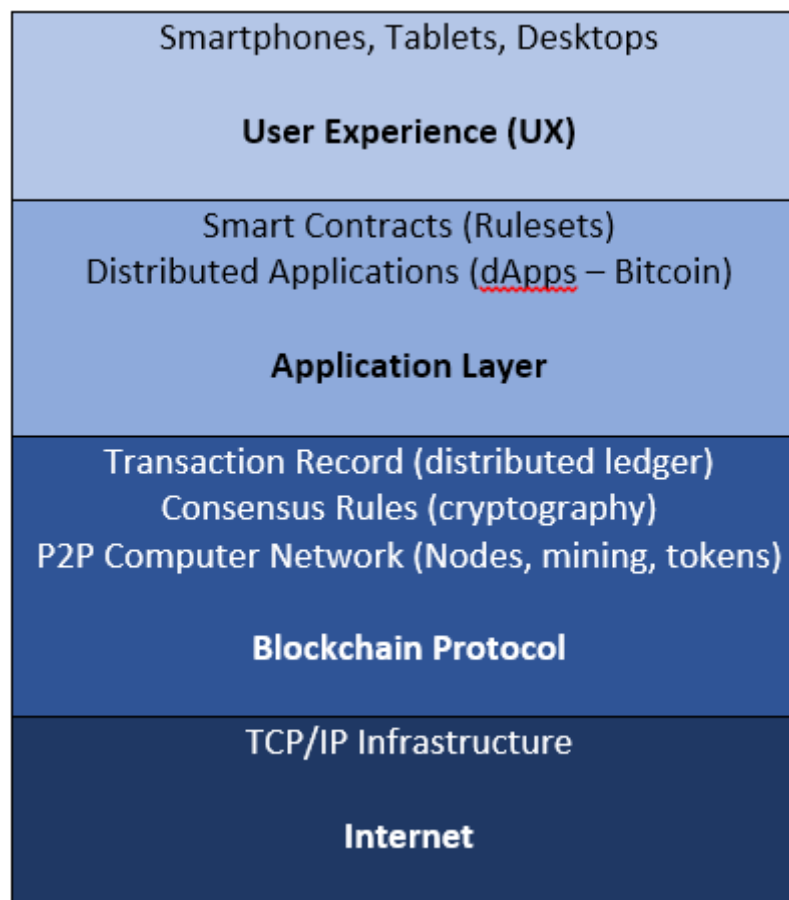
4.1.2 PREMIUM PROCESSING



4.1.3 CLAIM GENERATION



4.2 Technical Requirements -- Technology stack for blockchain



This is a representation of blockchain technology stack. There are different components of the technology stack which are:

- **The Internet**

The Internet is the foundational technology layer. It is a network of networks of global interconnected devices (computers, smartphones, IoT (Internet of things) devices, etc) that relies on the Internet Protocol Suite (TCP/IP) that defines how data should be packetized, addressed, transmitted, routed, and received.

- **The blockchain protocol**

The blockchain protocol operates on the Internet through a peer-to-peer network of computing devices (the nodes) that execute the protocol, completing transactions based on a cryptographic consensus algorithm on identical copies of the distributed ledger of these transactions hosted on this P2P network of devices.

The protocol builds an open, shared, and trusted public ledger of transactions that is not controlled by a single entity. These recorded transactions cannot be changed and can be inspected by anyone. The protocol provides sufficient economic incentives to the owners and operators (the miners) of the computing devices to sustain the cryptographic transactions in the distributed ledger. These incentives are represented in the form of tokens.

Smart contracts — applications that run as programmed on a P2P network that is not subject to fraud, interference, or downtime.

- **The User Experience**

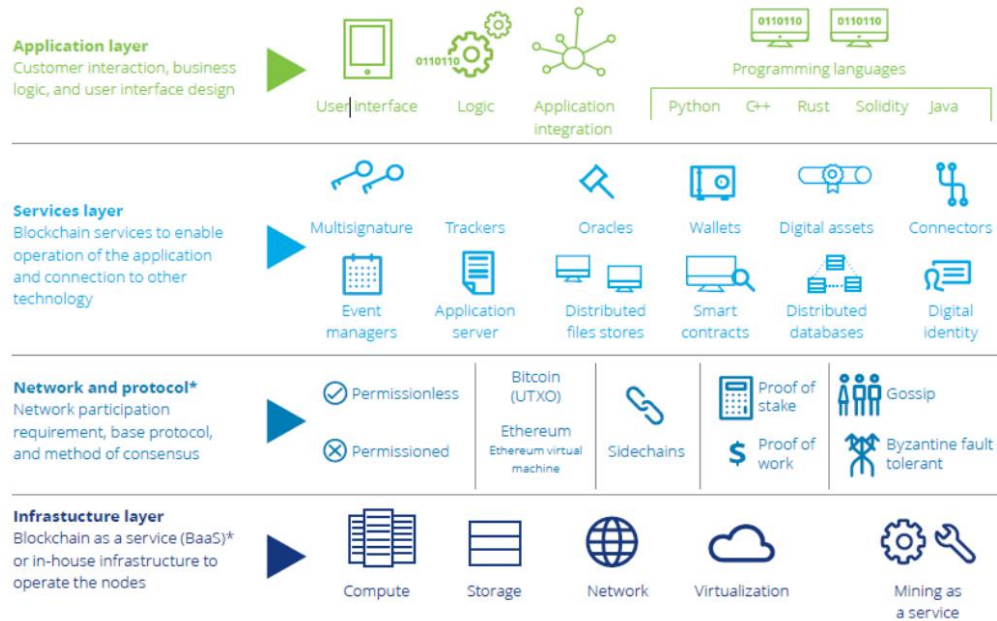
The underlying technology layers in the blockchain technology stack have supported the development of applications that we use in our day-to-day activities.

Postman: Postman is the collaboration platform for API development. The program runs the API on the user's localhost on port 5000. After the download and successful execution of the program, the user must have a way to make POST or GET requests to their API or another node's API for which we use the Postman API tool. Although the current scope does not include a database and uses json and other data formats, Mongo DB or other databases can be used to store customer and policy details.

Python: Python is used as the programming language to implement the blockchain here

The figure below is more detailed version of the technology stack that is used in blockchain.

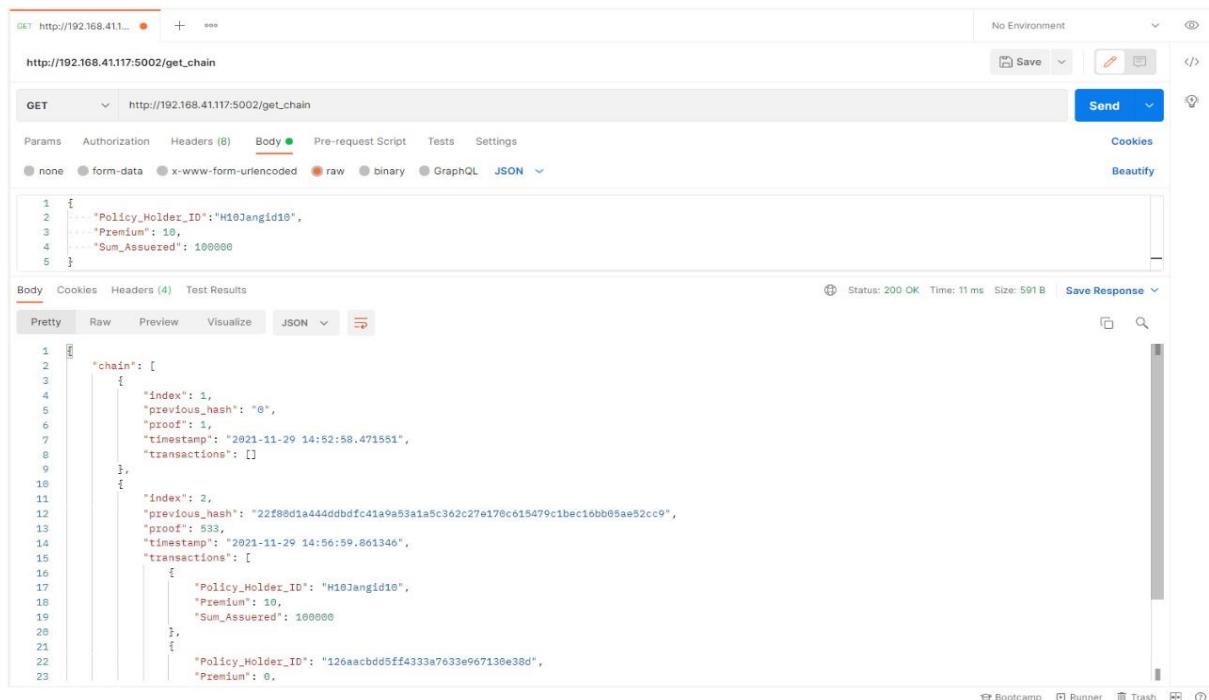
BLOCKCHAIN TECHNOLOGY STACK



4.3 Project Outcomes

Output from Postman:

1. get_chain Function



2.

2. connect_node function

The screenshot displays a REST client interface with a POST request to `http://172.20.10.2:5002/connect_node`. The request body is a JSON object with a `nodes` array containing two URLs. The response is a 201 Created status with a JSON body providing a message and a list of total nodes.

Request:

```
POST http://172.20.10.2:5002/connect_node
```

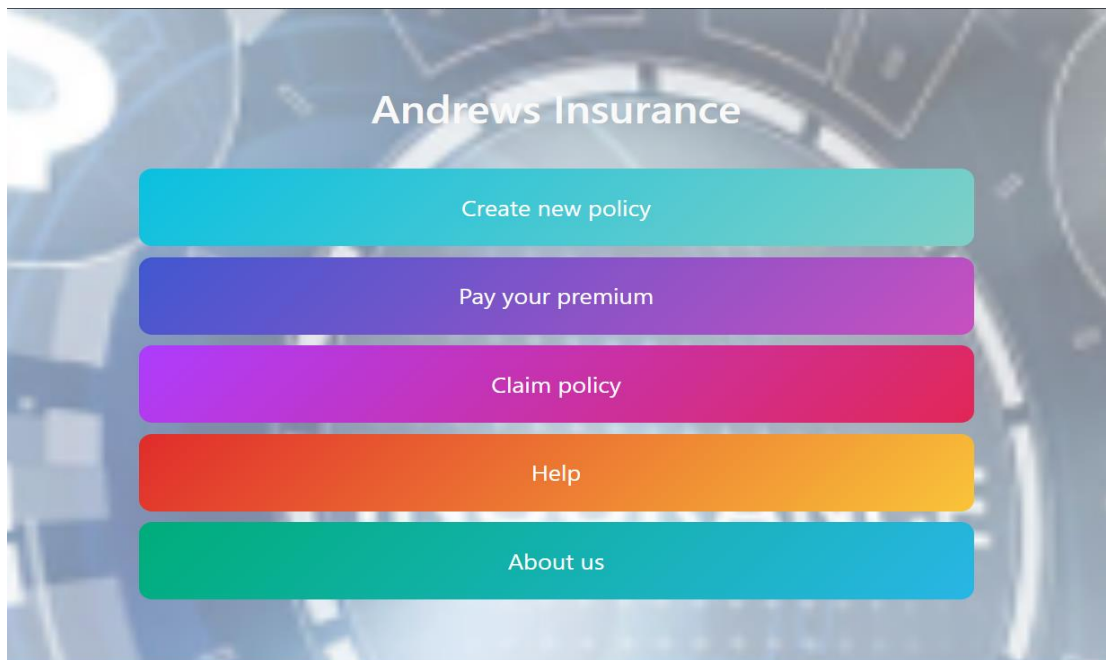
Request Body (JSON):

```
{  "nodes": [    "http://172.20.10.2:5001/",    "http://172.20.10.2:5003/"  ]}
```

Response: Status: 201 CREATED Time: 71 ms Size: 302 B

Response Body (JSON):

```
{  "message": "All the nodes are now connected. The Blockchain now contains the following nodes:",  "total_nodes": [    "172.20.10.2:5001",    "172.20.10.2:5003"  ]}
```

User Interface:

Register for new policy

Name (required)

Age (required)

Sex

☐ Male

☐ Female

Select Cover Amount

Choose one

- ☐ 50 Lakhs
- ☐ 75 Lakhs
- ☐ 1 Cr
- ☐ 2 Cr

Phone Number

PAN Number

Aadhar Number

Send

Pay Premium

Policy ID (required)

Premium Amount

Choose payment method

- ☐ Netbanking
- ☐ Credit/Debit Card
- ☐ UPI

Submit

Claim your policy

Policy ID (required)

Date

Upload death certificate

Submit

5. Conclusion and Future Scope

The main challenge faced in implementing blockchain technology is the lack of awareness of the technology itself. Each industry ends up having several blockchains created by several companies with lack of standardization. This defeats the purpose of using distributed ledgers.

In our current scope, the benefit of implementing blockchain technology extends to preventing fraudulent transactions in the case of term insurance. Blockchain technology could also be implemented by the government body in the issuance of birth-death certificate and to support tax database. This creates a link between the insurer, insuree and the government entity infrastructure and eradicates the need for excess paperwork and discrepancies.

With blockchain, the efficiency of data exchange can be significantly improved. Smart contracts can also further reduce human intervention in terms of claim settlement, indemnity payment, etc. which will significantly reduce the insurance companies' operating costs.

Smart contracts- and blockchain-based payments could enable new revenue sources, such as micro- and pay-per-use insurances. Though in the past micro-insurances were threatened by administrative costs, the exploitation of smart contracts could enable quick and cheap policy undersignment and management.