NANN MUDHALVAN
PROJECT REPORT

FARMERS INSURANCE CHAIN

TEAM ID-NM2023TMID1192

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1. INTRODUCTION

1.1 Project Overview

The Farmer Insurance Chain project aims to establish a tech-driven insurance system for farmers, mitigatingrisks associated with agriculture. Leveraging smart contracts, satellite data, and a mobile app, it provides transparent, efficient coverage, ensuring quick compensation for losses. The project fosters collaboration among farmers, insurers, and government agencies for resilient agricultural practices.

1.2 Purpose

The purpose of the Farmer Insurance Chain is to provide financial protection and risk mitigation for farmers engaged in agriculture. Leveraging technology such as smart contracts and data analytics, the project aims to streamline insurance processes, enhance transparency, and ensure timely compensation for farmers in the face of unforeseen events, ultimately fostering resilience in the agricultural sector.

2. LITERATURE SURVEY

2.1Existing problem

Limited Access: Many farmers, especially in remote areas, have limited access to insurance services, hindering their ability to protect against crop losses and other risks.

Lack of Data: Insufficient data on farming practices, weather patterns, and historical trends often hampers accurate risk assessment, leading to challenges in determining fair premiums and timely payouts.

Manual Processes: Outdated, manual processes for policy issuance, claims processing, and documentation contribute to delays, errors, and increased administrative costs.

Trust Issues: Lack of transparency in insurance processes and a history of delayed or disputed claims can erode trust between farmers and insurance providers.

Inadequate Technology Adoption: Many agricultural insurance systems lag in adopting modern technologies like blockchain and data analytics, limiting their ability to enhance efficiency and accuracy in risk management.

2.2 References

1. Deepak Panpatte, "Artificial Intelligence in Agriculture: An Emerging Era of Research", 2018.

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2. U. Kiruthika, S. K. S. Raja, V. Balaji and C. J. Raman, "E-Agriculture for Direct Marketing of Food Crops Using Chatbots", 2020 International Conference on Power Energy Control and Transmission Systems (ICPECTS), pp. 1-4, 2020.

   Show in Context View Article

   Google Scholar

3. Vandana Nayak, R Pranav, N Nayak, Aishwarya Sampoorna and N.H. Sowmya, "Agroxpert - Farmer assistant", Global Transitions Proceedings, vol. 2, no. 2, pp. 506-512, 2021,.

4. M. Momaya, A. Khanna, J. Sadavarte and M. Sankhe, "Krushi – The Farmer Chatbot", 2021 International Conference on Communication information and Computing Technology (ICCICT), pp. 1-6, 2021

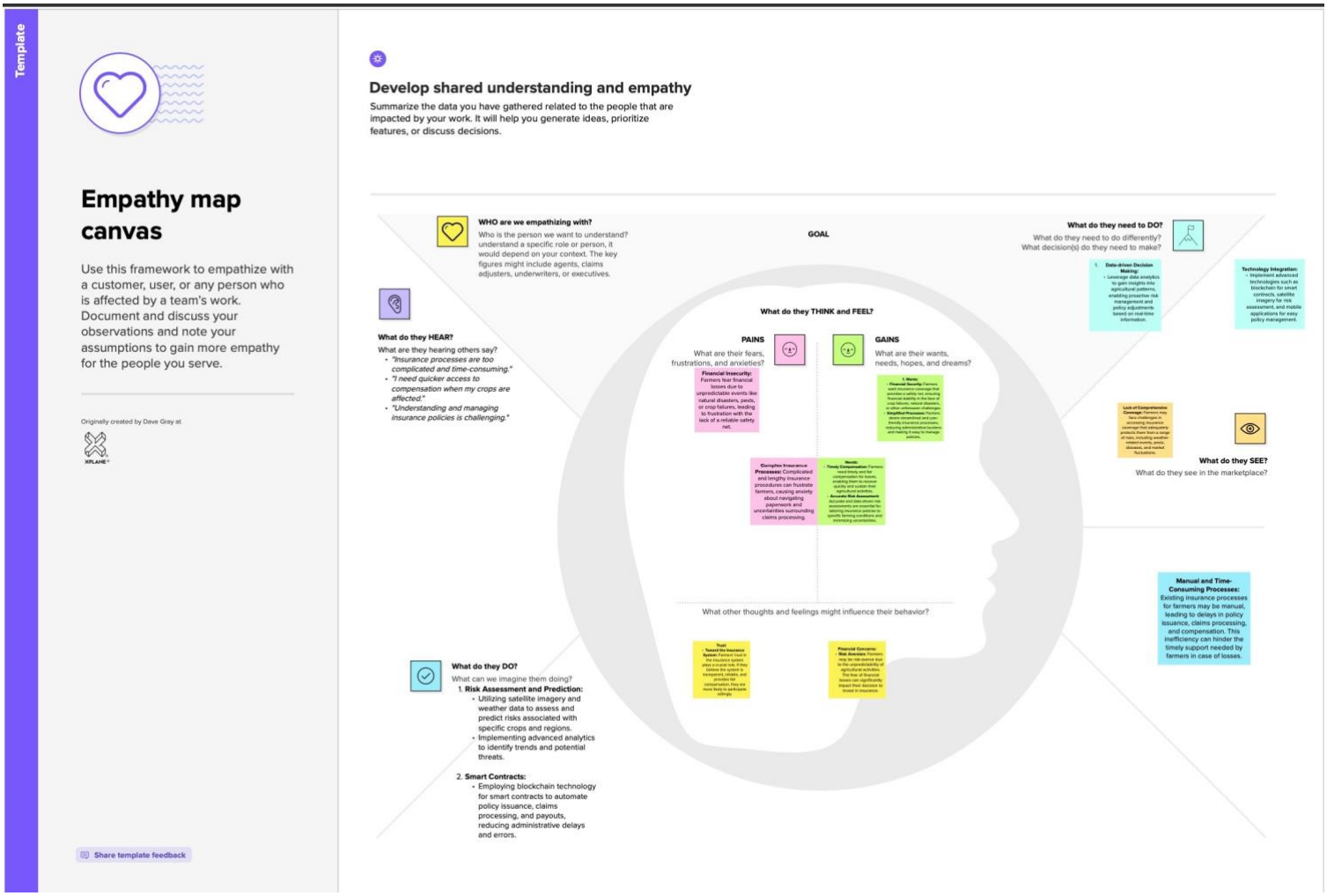
2.3 Problem Statement Definition

- ✓ The problem statement for the Farmer Insurance Chain is the lack of a robust and efficient insurance system for farmers, leaving them vulnerable to financial losses from natural disasters, pests, diseases, and other unforeseen events.

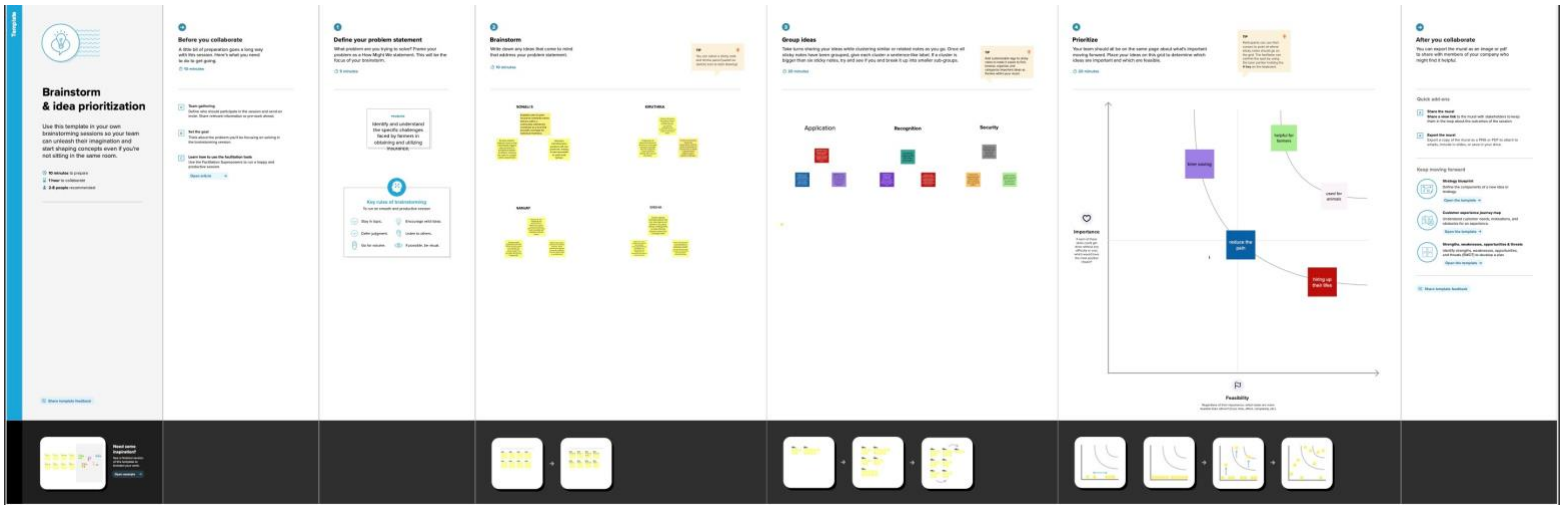
- ✓ Existing processes are often slow, opaque, and prone to inefficiencies. The project seeks to address these challenges by implementing a transparent, technology-driven insurance chain to safeguard the livelihoods of farmers and promote sustainable agriculture.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming .



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

1. Policy Management:

The system should allow agents to create new insurance policies for customers.
It should support policy modifications, such as coverage adjustments and policy endorsements.

2. Claims Processing:

The system should facilitate the submission of claims by policyholders.
It should automate the claims evaluation process, considering various criteria.

3. Customer Interactions:

The platform should enable customers to view and manage their policies online.
It should provide a communication channel for customers to contact agents or support.

4. Underwriting:

The system should support underwriting processes for assessing risks associated with insurance applications.

5. Integration with External Systems:

Integration with payment gateways for premium transactions.
Integration with third-party databases for risk assessment and verification.

6. Reporting and Analytics:

The system should generate reports on policy performance, claims history, and other relevant metrics.
It should provide analytics tools for agents and administrators to make data-driven decisions.

7. Compliance:

Ensure that the system complies with industry regulations and standards.

8. Security:

Implement measures to safeguard sensitive customer data and maintain the integrity of the system.
These are just examples, and the actual requirements would depend on the specific needs and processes within the Farmers Insurance chain.

4.2 Non-Functional requirements

1. Performance:

Specify the system's response time, for example, ensuring that insurance policy searches are completed within a certain timeframe.

2. Scalability:

Define how the system should handle increased loads, considering potential growth in the number of policies, customers, or transactions.

3. Reliability:

Establish the system's uptime requirements and mechanisms for fault tolerance to ensure uninterrupted service.

4. Security:

Outline the security measures to protect sensitive customer information, financial transactions, and other critical data.

5. Usability:

Ensure that the user interfaces are intuitive and provide a positive user experience for both customers and employees.

6. Compatibility:

Specify the compatibility of the insurance system with different browsers, devices, and operating systems.

7. Maintainability:

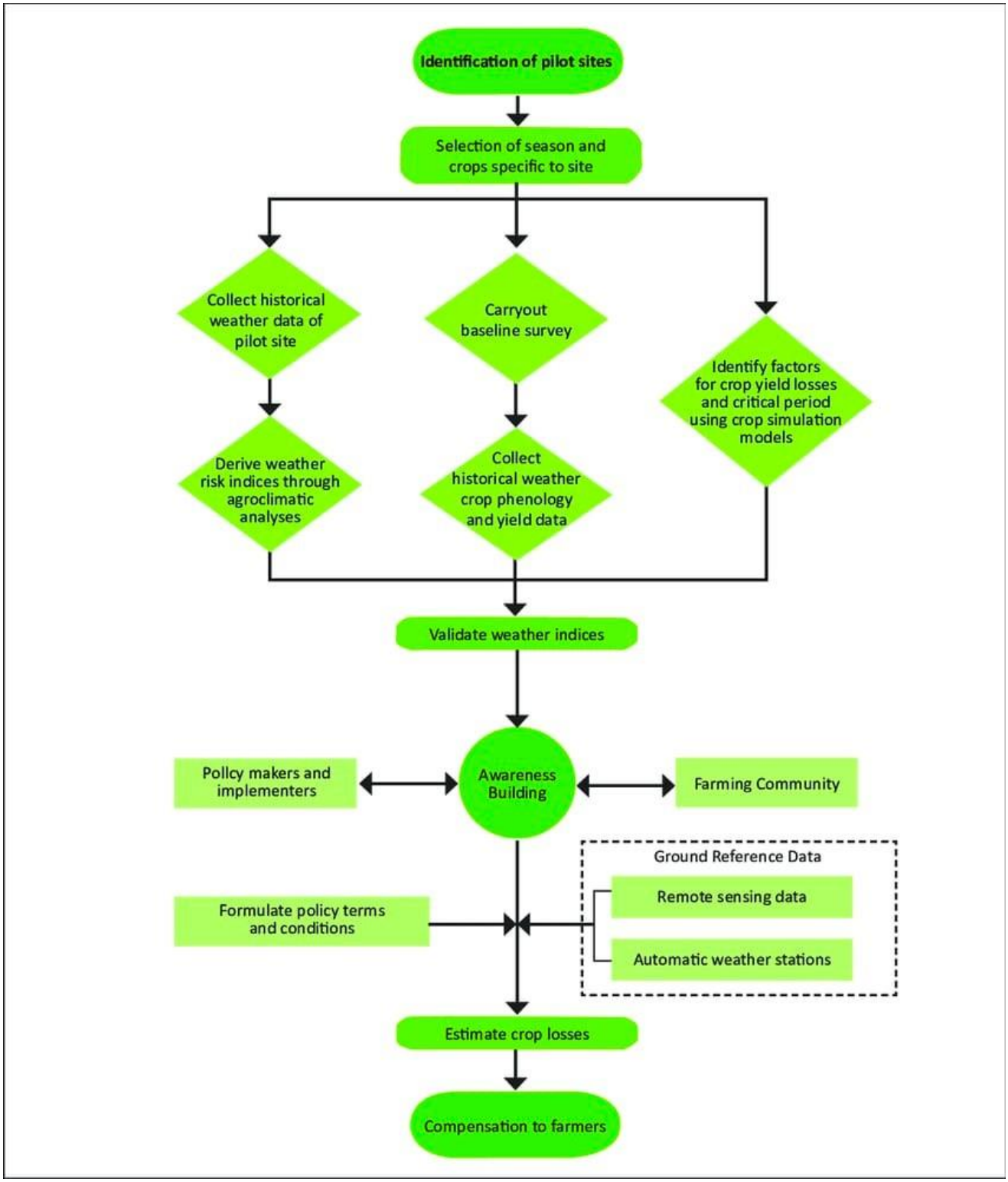
Define guidelines for system updates, modifications, and maintenance to ensure the system's long-term sustainability.

8. Compliance:

Ensure that the system adheres to industry regulations and legal requirements governing insurance operations.

5. PROJECT DESIGN

5.1Data Flow Diagrams



5.2User stories

- As a farmer, I want to easily access and manage my insurance policies online, so I can efficiently review coverage and make necessary updates.

- As a farm owner, I want to receive timely notifications about changes in weather conditions or other potential risks that could impact my crops or livestock, ensuring I can take preventive measures and file claims promptly if needed.

- As a farm manager, I want a user-friendly mobile app that allows me to report and track claims in real-time, streamlining the process and reducing the time and effort required to resolve issues.

- As an agricultural business owner, I want customizable insurance plans that cater to the specific needs of my farm, providing coverage for crops, equipment, and liability, among other aspects.

- As a farmer in a community, I want to connect with local insurance agents who understand the unique challenges and opportunities of agriculture, ensuring personalized service and support.

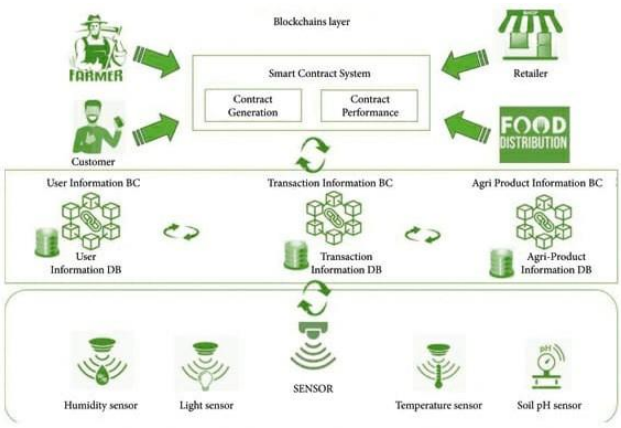
- As a farm operator, I want to easily integrate data from precision agriculture technologies into my insurance plan, enabling more accurate risk assessment and potentially reducing premiums based on proactive risk management.

- As a farmer with multiple locations, I want a centralized dashboard that allows me to view and manage insurance policies for all my farms, simplifying administration and ensuring consistency in coverage.

- As a seasonal crop producer, I want flexible insurance options that adapt to changing circumstances, such as weather patterns and market fluctuations, providing financial security during unpredictable times.

- As a livestock farmer, I want insurance coverage that includes veterinary expenses, ensuring the health and well-being of my animals is protected.

5.2 Solution Architecture



1. Data Management:

Centralized database for customer information, policies, and claims.

Integration with external data sources for risk assessment (weather data, crop information).

2. Policy Management System:

A robust system to create, update, and manage insurance policies.

Automation for policy underwriting and pricing based on risk factors.

3.Claims Processing:

Streamlined claims processing system with efficient workflows.

Integration with IoT devices for real-time data on crop conditions.

4.Communication and Notifications:

Communication platform for notifying farmers about policies, claims, and important information.

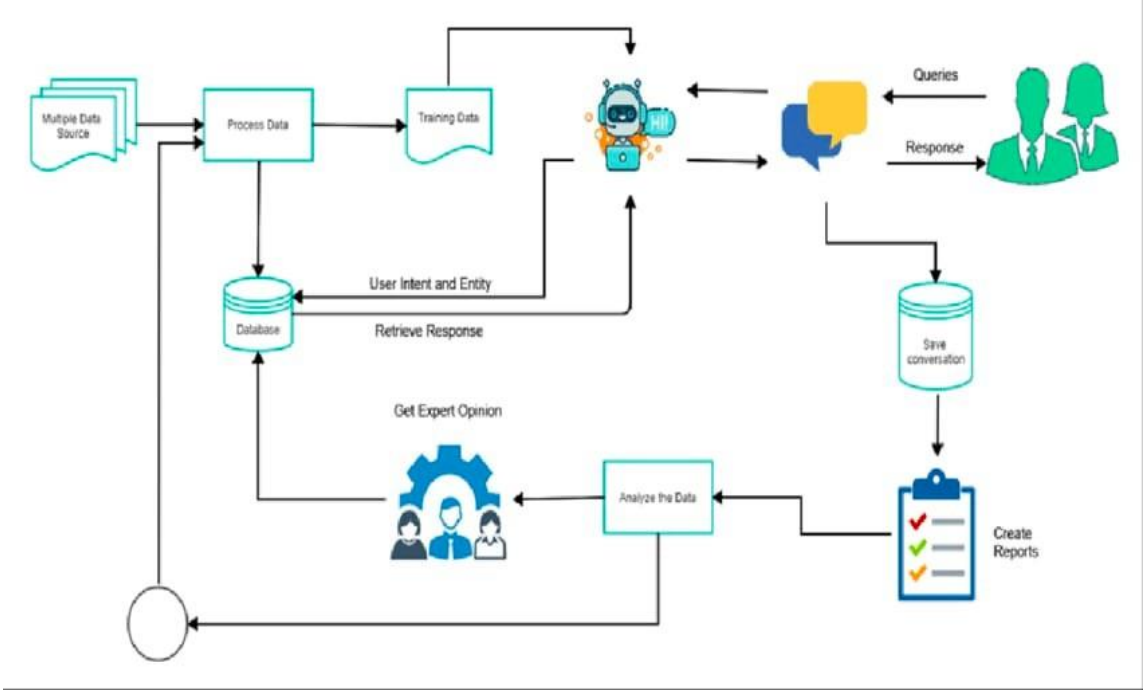
Alerts for upcoming weather events or changes in policy status.

5. Mobile App and Web Portal:

User-friendly interfaces for farmers to manage policies, report claims, and access information.

6.PROJECT PLANNING & SCHEDULING

6.1 Technical Architecture



Web Portal:

A user-friendly web portal allows farmers, insurance providers, and other stakeholders to interact with the system. It includes dashboards for policy management, claims processing, and data visualization.

Farmers' App:

A mobile app for farmers enables them to access insurance information, purchase policies, report losses through multimedia, and track claim statuses.

Smart Contract Layer:

Blockchain technology is leveraged to implement smart contracts for policy issuance, premium payments, and automated claims processing, ensuring transparency and reducing the risk of fraud.

6.2 sprint planning & estimation

• Farming is becoming steadily more commercialised, with greater levels of financial investment. Farmer/investors and their banks will frequently examine the feasibility of using a financial mechanism i.e. insurance, in order to address part of the risk to their financial investment.

• As a part of this trend to commercialisation greater use is now being made of contract farming arrangements, where insurance is one of many services provided, along with inputs, to growers.

• In summary, there is a trend to formalise risk management in farming, with insurance being one obvious mechanism which can be harnessed for this task.

• The World Trade Organization (WTO) regulations generally forbid governments from subsidizing agriculture directly; however, they permit the subsidization of agricultural insurance premiums.

6.3 Sprint delivery schedule

• One major reinsurer has calculated that the economic losses (adjusted for inflation) of weather-related events in the period 1985-1999 amounted to some US$707 billion.

• Over a longer period, 1950-1999, the average annual losses (again adjusted for inflation) have increased by more than ten times, while the global population has increased by a factor of 2.4.8 While crop and forest losses are only a part of this, the same reinsurer estimates that the costs associated with crop damaging weather events are doubling each decade.

7. CODING & SOLUTIONING

```
class FarmerInsuranceChain:
    def __init__(self):
        self.policies = {}

    def purchase_insurance(self, farmer_id, amount):
        if farmer_id not in self.policies:
            self.policies[farmer_id] = {"amount": amount, "claimed": False}
            print(f"Insurance purchased for farmer {farmer_id}. Amount: {amount}")
        else:
            print(f"Insurance already exists for farmer {farmer_id}. Cannot purchase again.")

    def claim_insurance(self, farmer_id, claim_amount):
        if farmer_id in self.policies:
            if not self.policies[farmer_id]["claimed"]:
                if claim_amount <= self.policies[farmer_id]["amount"]:
                    self.policies[farmer_id]["claimed"] = True
                    print(f"Insurance claimed for farmer {farmer_id}. Payout: {claim_amount}")
                else:
                    print("Claim amount exceeds the insured amount.")
            else:
                print(f"Insurance already claimed for farmer {farmer_id}.")
        else:
            print(f"No insurance found for farmer {farmer_id}.")

# Example Usage
insurance_chain = FarmerInsuranceChain()

insurance_chain.purchase_insurance("Farmer1", 5000)
insurance_chain.claim_insurance("Farmer1", 3000)
insurance_chain.claim_insurance("Farmer1", 2000)
insurance_chain.purchase_insurance("Farmer2", 8000)
insurance_chain.claim_insurance("Farmer2", 10000)
```

7.1 feature

✓ **Crop Insurance:**

Protection against crop losses due to natural disasters, pests, or other unforeseen events.
Coverage for yield and revenue losses.

✓ **Livestock Insurance:**

Coverage for loss of livestock due to accidents, diseases, or other covered perils.

✓ **Property Insurance:**

Protection for farm buildings, equipment, and other property against damages from events like fires, storms, or theft.

✓ **Liability Coverage:**

Protection in case of third-party injuries or property damage on the farm.

✓ **Weather-related Risk Mitigation:**

Insurance products that provide coverage for weather-related risks, such as drought or excessive rainfall.

✓ **Income Protection:**

Coverage to protect farmers' income in case of unforeseen circumstances that affect their ability to generate revenue.

✓ **Equipment Breakdown Insurance:**

Coverage for the repair or replacement of farm machinery and equipment in case of breakdowns.

✓ **Agribusiness Interruption Insurance:**

Coverage for lost income and extra expenses incurred due to interruptions in farming operations.

✓ **Multi-Peril Insurance:**

Comprehensive coverage that combines various types of coverage into a single policy to protect against multiple risks.

✓ **Technology Integration:**

Use of technology such as satellite imagery, weather data, and precision farming tools to assess and manage risks

7.2 Feature

- **Livestock Insurance:** Coverage for losses related to the death or health issues of farm animals.
- **Farm Equipment Insurance:** Protection for farm machinery and equipment against damage or loss.
- **Property Insurance:** Coverage for farm buildings, structures, and contents against risks like fire, theft, or vandalism.
- **Liability Insurance:** Protection against third-party claims for bodily injury or property damage that may occur on the farm.
- **Business Interruption Insurance:** Coverage for income loss if the farm operation is interrupted or temporarily shut down due to covered perils.
- **Weather Insurance:** Specialized coverage for weather-related risks that can impact agricultural productivity.
- **Specialized Coverage:** Some insurance policies may offer specific coverage for niche farming activities or products.
- **Risk Management Services:** Beyond insurance coverage, some insurers may provide risk management services to help farmers identify and mitigate potential risks.
- **Technology Integration:** Insurers may leverage technology such as satellite imagery, weather data, and other advanced tools for more accurate risk assessment and claims processing.
- **Government Programs:** In many countries, there are government-backed insurance programs or subsidies to support farmers in managing risks.

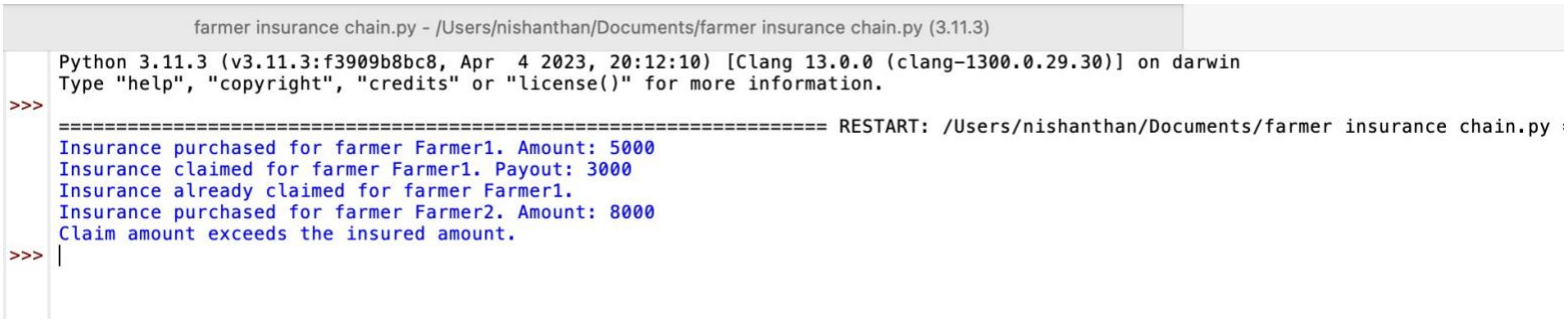
8. PERFORMANCE TESTING

8.1 Performance metrics

- **Transaction Throughput:**
  Definition: The number of transactions processed per unit of time.
  Importance: A high throughput indicates the system's ability to handle a large volume of transactions efficiently.
- **Transaction Latency:**
  Definition: The time it takes for a transaction to be initiated and completed.
  Importance: Lower latency is generally desirable, ensuring quick and responsive transactions for users.
- **Smart Contract Gas Usage:**
  Definition: The amount of gas consumed by smart contracts for executing transactions.
  Importance: Efficient use of gas is crucial for cost-effective transactions on blockchain networks.
- **Scalability:**
  Definition: The system's ability to handle an increasing number of users, transactions, or data without compromising performance.
  Importance: Scalability is crucial for accommodating growth and preventing congestion.
- **Fault Tolerance:**
  Definition: The system's ability to maintain functionality and data integrity in the presence of faults or failures.
  Importance: A reliable system should continue to operate even when components fail.
- **Consensus Mechanism Overhead:**
  Definition: The computational and network resources required for achieving consensus in a blockchain network.
  Importance: Consensus mechanisms, such as Proof of Work or Proof of Stake, should be efficient to minimize resource consumption.
- **Data Storage Efficiency:**
  Definition: The amount of storage space required for maintaining data on the blockchain.
  Importance: Efficient storage usage is essential for minimizing costs and ensuring a sustainable system.
- **Security Metrics:**
  Definition: Metrics related to the security of the system, including the number of successful attacks, the robustness of encryption, and adherence to best security practices.
  Importance: A secure system is crucial for protecting sensitive data and maintaining user trust.
- **User Experience Metrics:**
  Definition: Metrics related to the user experience, such as the time required for users to interact with the system, the intuitiveness of the user interface, and overall satisfaction.
  Importance: A positive user experience encourages adoption and engagement.
- **Cost of Transactions:**
  Definition: The total cost associated with processing a transaction, including gas fees and other related expenses.

9. RESULT

OUTPUT SCREENSHOT



10. ADVANTAGES AND DISADVANTAGES

Advantage of Farmers Insurance Chain:

- Wide Coverage: Farmers Insurance Chain often provides a broad range of coverage options, including home, auto, life, and business insurance, offering comprehensive protection for individuals and businesses.

Disadvantage of Farmers Insurance Chain:

- Cost: Farmers Insurance Chain may be perceived as more expensive compared to smaller or local insurance providers, as they might have higher overhead costs and administrative fees.
- Remember that specific experiences can vary, and it's essential to research and compare options based on individual needs and preferences.

11. CONCLUSION

While blockchain technology is not yet finalized, the sheer quantity of benefits gained from this medium in a very short period is amazing. Blockchain can completely transform the agricultural sector if properly deployed.As technology improvements continue, the dependability and efficiency of this system are likely to increase. The use of blockchain in the agriculture and food industry has helped the farmers and people involved with the process. Blockchain and agriculture now come hand in hand; the usage of blockchain in the agricultural sector has a sustainable business and works toward the reduction of waste and smooth future transactions sans fraud. Go for Blockchain Technology training and get

the best of the learning experience.

12. FURURE SCOPE

The future scope of a farmers insurance chain could involve leveraging technology for precision farming risk assessments, incorporating climate data for more accurate coverage, and expanding services to support sustainable agricultural practices. Additionally, partnerships with agtech companies and government initiatives could play a crucial role in enhancing the overall resilience of the agricultural sector

13. APPENDIX

G i t H u b &

Project Demo

Link

GitHub Link :

https://github.com/Sonali-ece/naanmuthalvan.git

Demo Video :

https://drive.google.com/file/d/1w3Wv2efmEM_obRCD6qL7UIdXALerzveA/view?usp=drive_link