Team Name - <u>SHINKANSEN</u> College - PANIPAT INSTITUTE OF ENGINEERING AND TECHNOLOGY Contact Details - 9067830001

Email id - sarthaksatyakaushik@gmail.com

Problem Statement - <u>Tracking spurious drugs & ensuring brand safety</u>

Idea/Approach Details

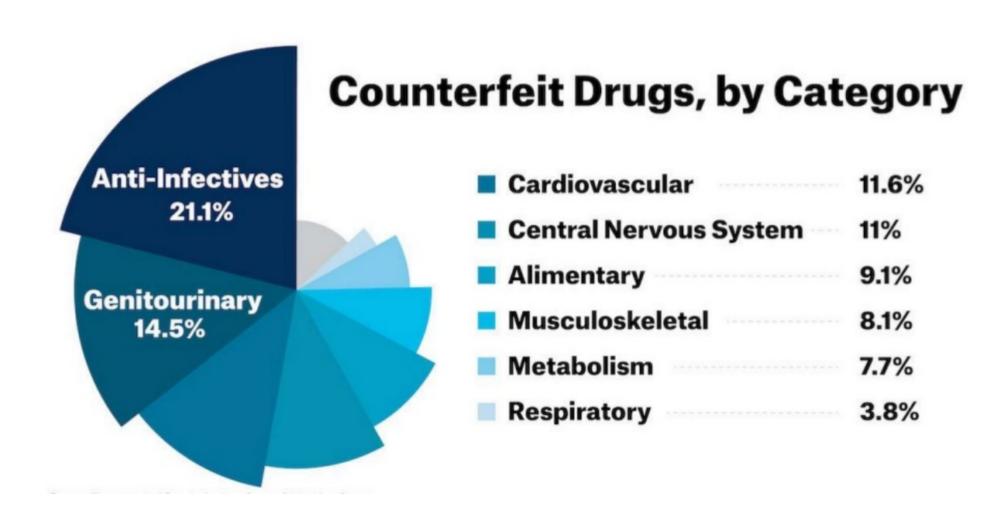
<u>Organization</u>: <u>Emcure Pharmaceutical Ltd</u>

<u>Problem Statement</u>: <u>Tracking spurious drugs & ensuring brand safety</u>

<u>Team Leader Name</u>: <u>Sarthak Kaushik</u> <u>Current AICTE Application No</u>: <u>1-3514050252</u>

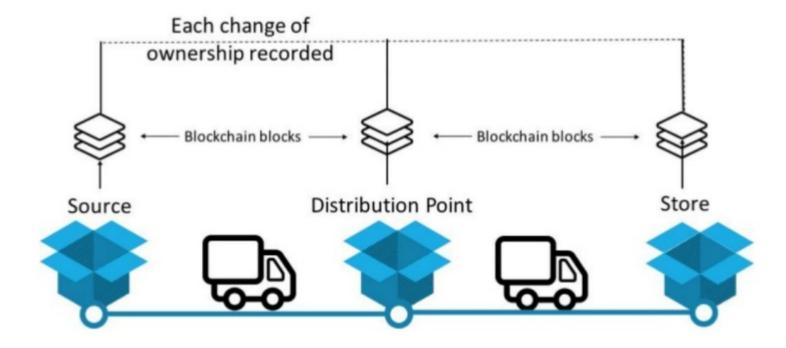
Problem Statement - The proliferation of counterfeit drugs is a serious concern for all pharmaceutical companies. We need to implement ways to integrate track and trace solutions in production and supply chain. We should be able to identify such spurious drugs which are deliberately or fraudulently mislabeled with respect to identity/source.

• Current Problem Scenario - Centralised Solutionfor data relationships & information flows
The graph represents real statistics -

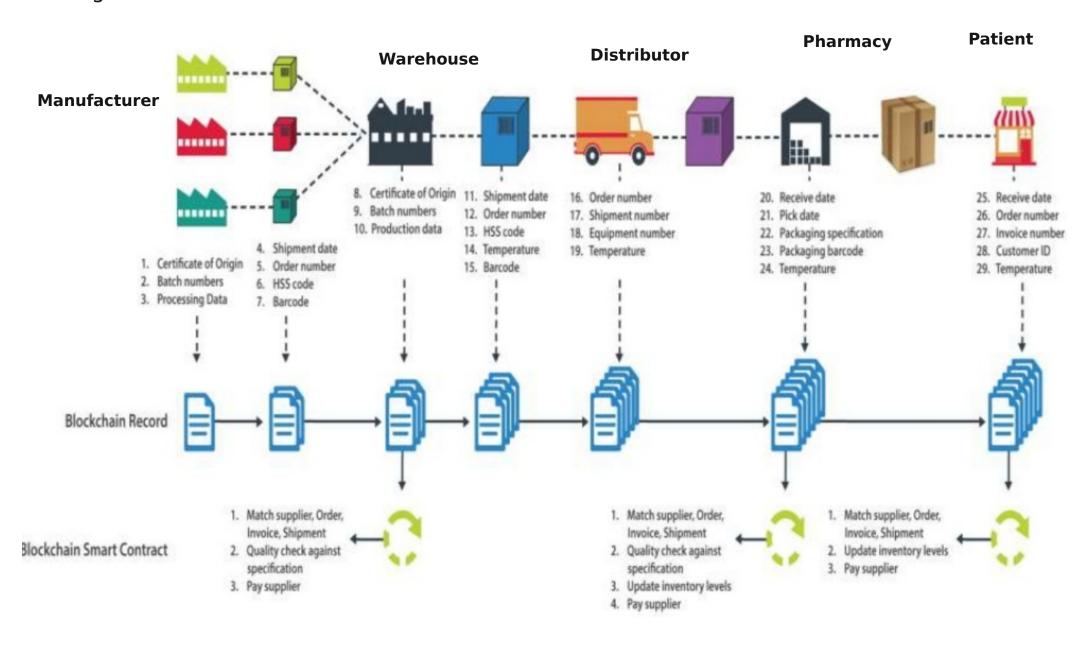


Ideation

• A Permissioned Blockchain-enabled tracking spurious drugs & ensuring brand safety

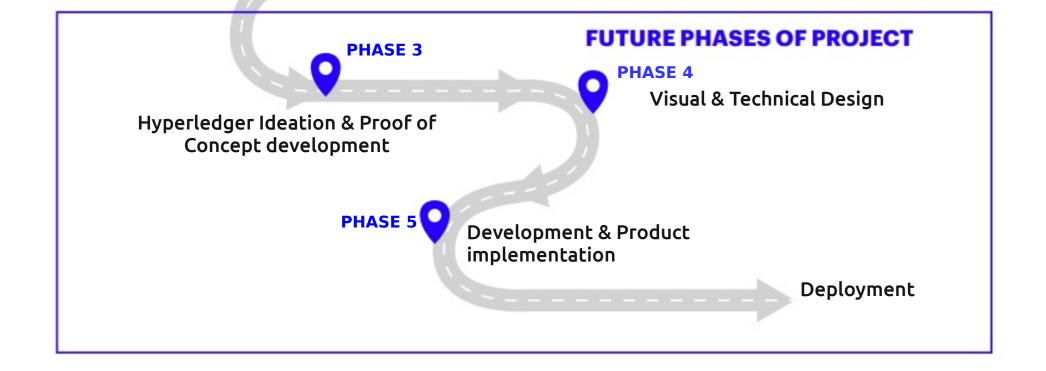


• High Level Architecture of Solution



Phases for onboarding Blockchain solution for pharmaceutical companies





Key Components used



Transaction Layer















Infrastructure Layer



Hyperledger Composer is an extensive, open development toolset and framework to make developing blockchain applications easier.

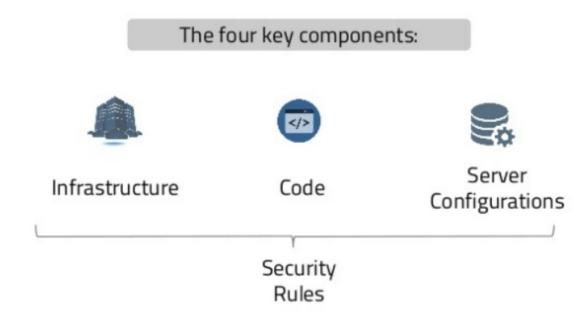
- Kafka® is used for building real-time data pipelines and streaming apps
- Cassandra database is the right choice when you need scalability and high availability without compromising performance
- Hyperledger is a multi-project open source collaborative effort hosted by The Linux Foundation, created to advance cross-industry blockchain technologies.
- IndiaStack is a set of APIs that allows governments, developers to utilise an unique digital Infrastructure to solve India's hard problems towards presence-less, paperless, and cashless service delivery.
- The framework takes an opinionated approach to configuration, freeing developers from the need to define boilerplate configuration
- Docker is a computer program that performs operating-system-level virtualization, also known as "containerization".

Technical Diagram

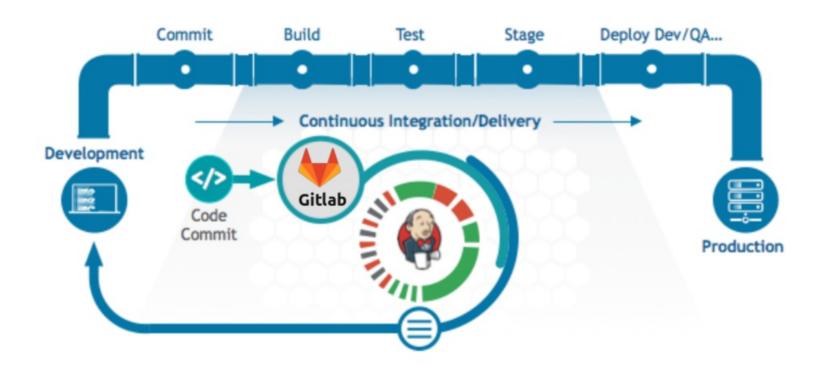
Stakeholder onboarding

Business Logic via India Stack IndiaStack **Spring** boot Broker 2 Broker 1 Broker 0 Kafka Connect Source Trusted parties Topic 1 partition 1 Registry Database Topic 1 partition 2 Mobile App Change Data Capture Consumers Kafka Cluster & kafka Kafka Connect Sink Producer docker kafka cluster on Docker **Distributor** Cassandra Db Time to time Kafka will sink a permissioned, replicated, shared ledger records in Cassandra Cluster **HYPERLEDGER Pharmacist** Manufacturer **HYPERLEDGER** Frameworks HYPERLEDGER HYPERLEDGER HYPERLEDGER **HYPERLEDGER** HYPERLEDGER **BURROW FABRIC** INDY **IROHA** Decentralized identity Permissioned & permissionless Permissionable smart Permissioned with Mobile application focus contract machine (EVM) channel support support; EVM transaction family HYPERLEDGER HYPERLEDGER HYPERLEDGER HYPERLEDGER **HYPERLEDGER COMPOSER** QUILT Blockchain framework As-a-service deployment Model and build View and explore data Ledger interoperability benchmark platform blockchain networks on the blockchain

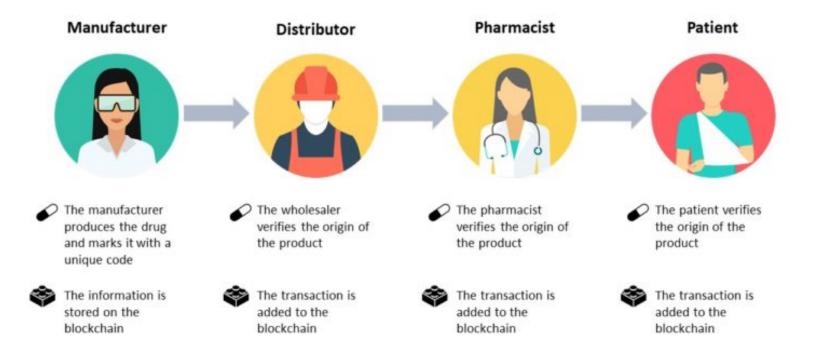
Technology Delivery Strategy:



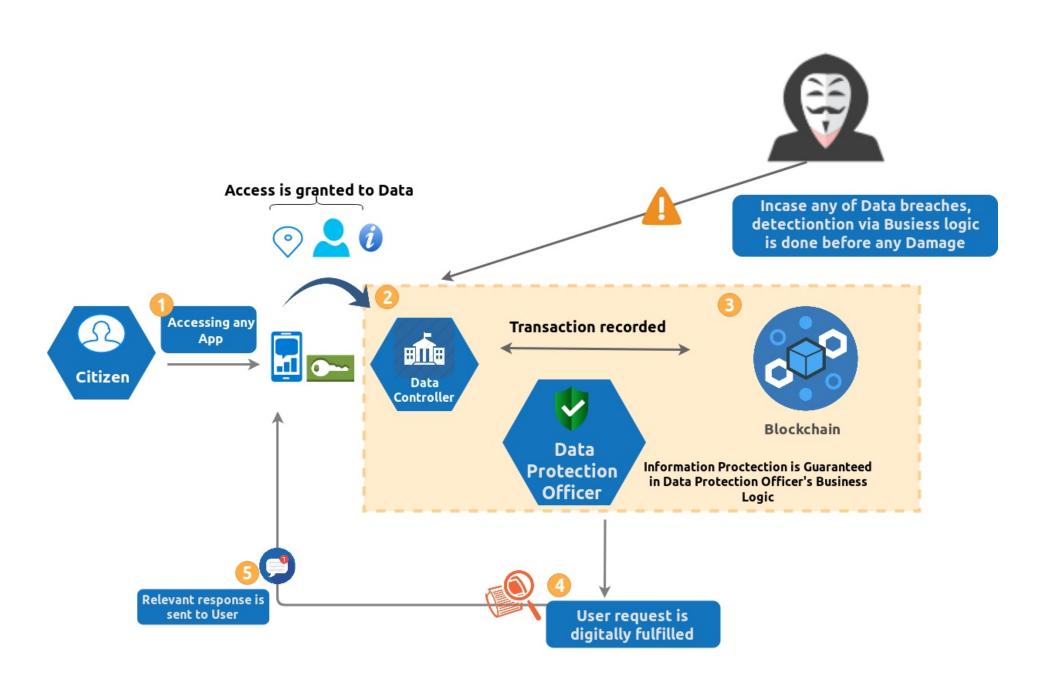
Technology Component Pipeline:



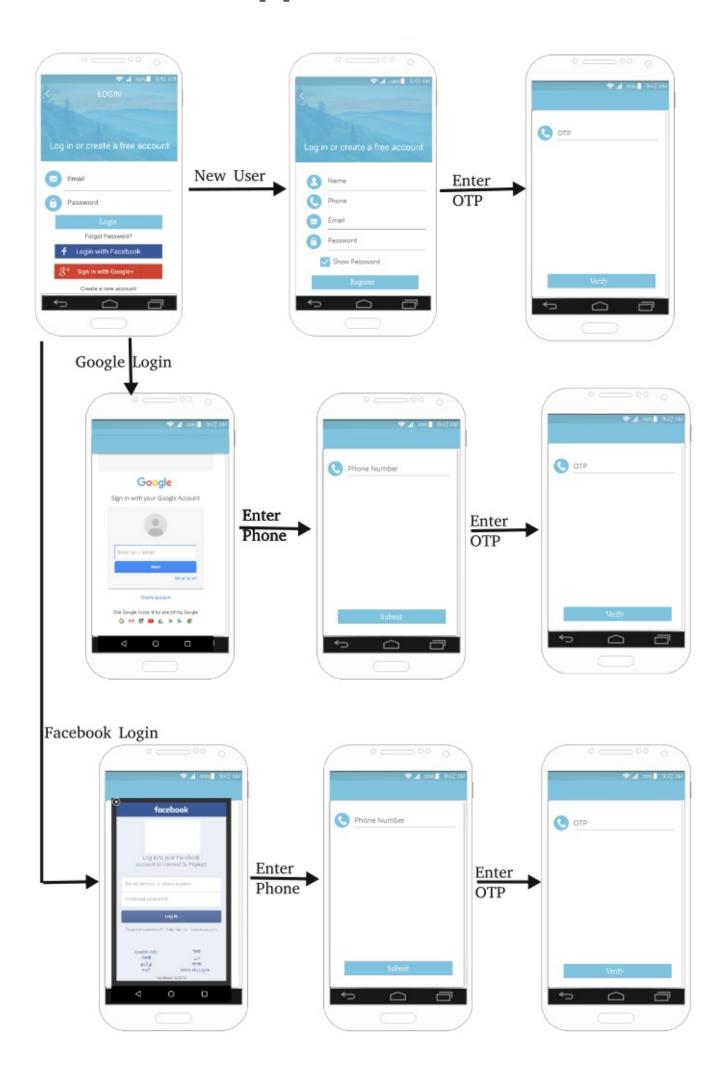
Stakeholders and Usecase



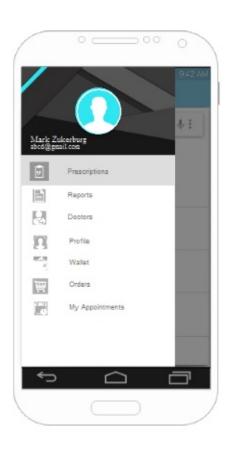
• **Usecase Scenario #1** - When user uses any App, one grants acccess to their sensitive data, the data Controller is responsible to access and verify medicinal data & id which is immutable, thus from Origin to patient the drug would be tracked via our Business logic and the private blockchain using Hyperledger would allow trusted parties to access and provide relevant ownership.



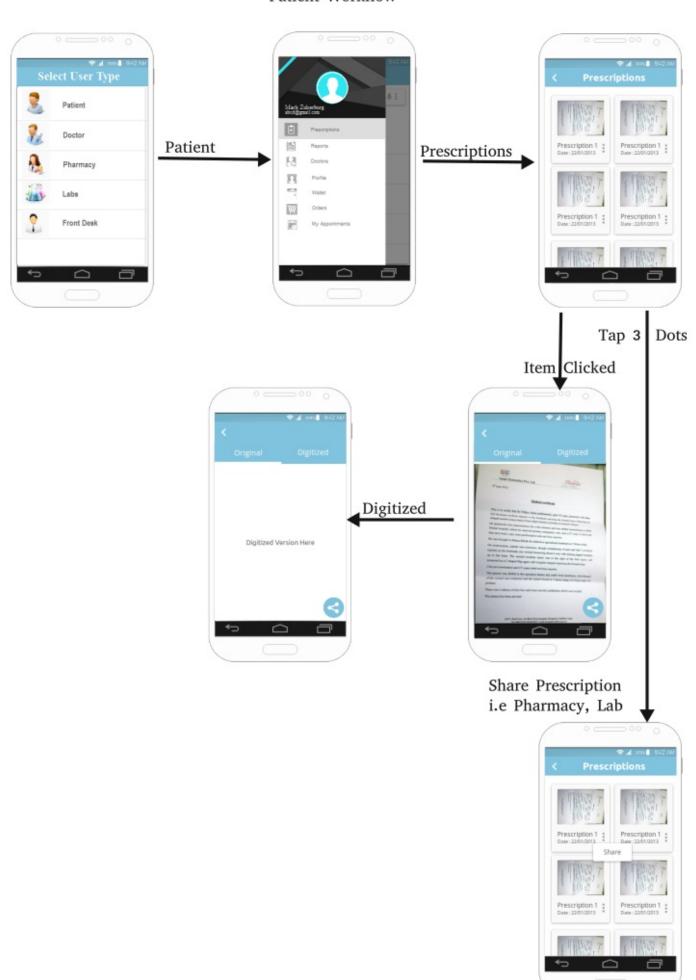
App Workflow



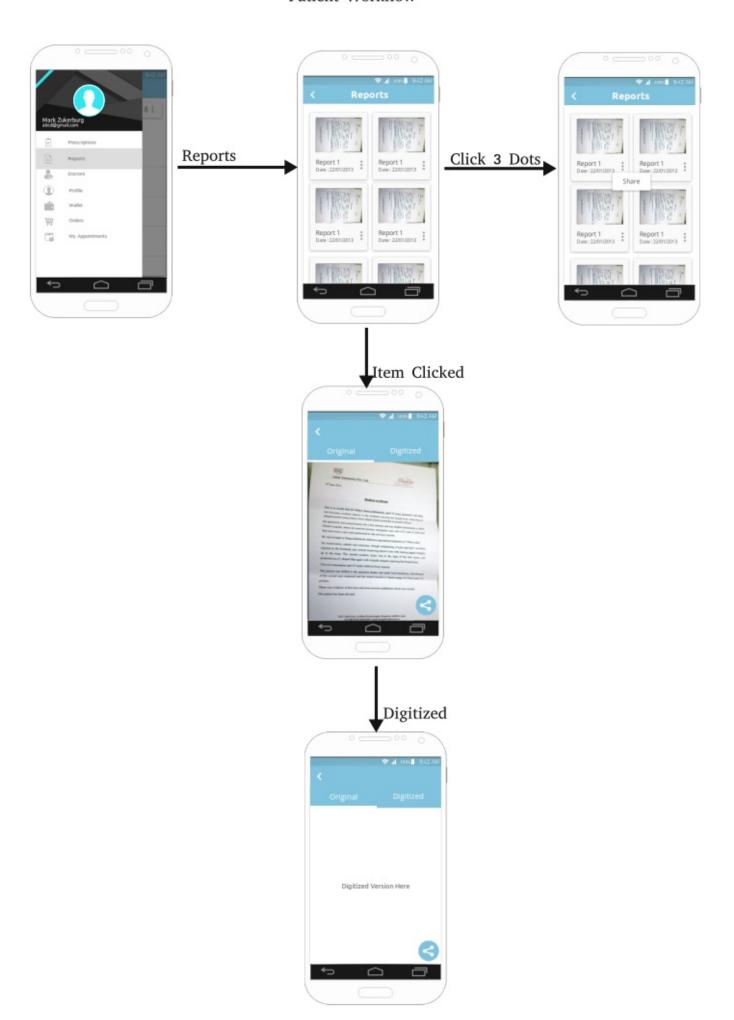
Patient Dashboard



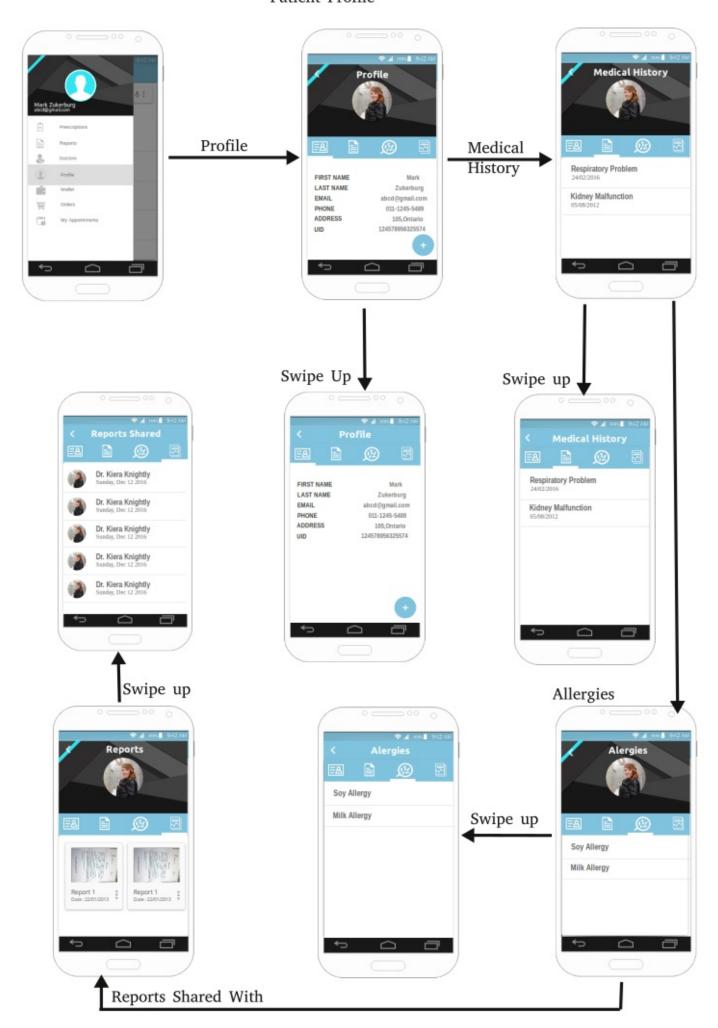
Patient Workflow



Patient Workflow



Patient Profile



Patient: Appointments

