

Applying blockchain concepts to the vehicle manufacture lifecycle use case

Identifying participants:

- **Paul:** The buyer and owner of a car
- **Mike:** An employee for the car manufacturer. The fictional name of the car manufacturer is

“Arium”.

- **Debbie:** An administrator for the regulator that is called the Vehicle & Drivers Authority

(VDA).

- **Tommen:** An insurer from an insurance company.

Provide examples of the type of data that each participant should be able to see and transactions they should be able to submit based on the needs of their roles :

- **Paul** orders a vehicle from Arium by using the vehicle-buying mobile app.
- **Mike's** manufacturer dashboard instantly shows the new order that is recorded in the blockchain network. He can check that the configuration that Paul selected is valid and he can trigger the manufacturing process.

• **Debbie** the regulator has instant insight into the fact that Paul ordered a new vehicle. Because they are all sharing data on the same blockchain network, all of these participants have instant insight into new orders.

- **Paul** can instantly see those updates in the mobile app. Debbie the regulator gets instant insight into the lifecycle of the vehicle before it has even left the factory floor.

- **TOMMEN** receives a notification informing that Paul requested an insurance policy for his new vehicle. It includes the details of the vehicle that Paul ordered and may use this information to decide whether he should insure this vehicle. Tommen can also see some information about Paul and finally he approves the request for the new insurance policy and a new insurance policy is created.

Describe the characteristics and type of blockchain network that is used in this use case :

The blockchain network that is used in this use case is a **private business blockchain network**

Provide examples of contractual agreements between participants.

- ☐ The manufacturer and the buyers accepts that the regulator ensure that the regulations are met for all vehicles in the network regardless of who buys or manufactures the vehicle.
- ☐ The parties in the business network must agree that the order that the buyer submitted is valid and follows the business rules that apply to this business network.

Provide examples of other participants that are not listed in Vehicle Manufacture lifecycle use case overview that might potentially be interested in joining this business network.

- **Agency for vehicle standards:** to improve road safety by testing cars, ensuring they are safe and legal to drive. And she can give Paul advice on keeping his vehicle safe to drive.

Identifying assets:

1/ List the assets in the use case business network.

- **Tangible assets:**

Car

- **Intangible assets:**

Car order

Insurance

2/ Provide examples of attributes and characteristics for each asset.

- **Car:** model, trims (options), color, interior, extended warranty and tinted windows.
- **Car order:** Order ID, vehicle being ordered, status of the order
- **Insurance policy :** the insurance policy ID

3/ Provide examples showing assets being updated through the use case and exchanged between participants.

The order updated when Paul select the car model, features and place the order. Mike track the new orders of vehicles and trigger the manufacturing process To the time when the car is delivered

4/ Explain how asset ownership and asset transfer are maintained in systems that do not use blockchain technology.

5/ Explain how asset ownership and asset transfer are maintained in blockchain solutions

Identifying applications:

1/ List the applications that the participants in the Vehicle Manufacture lifecycle network use to interact with the blockchain network.

Airum mobile App
Arium manufacturer Dashboard
regulatory Dashboard
insurance Dashboard

2/ Describe the blockchain component (which defines the business rules) that applications

Smart contracts are programs stored on a blockchain that run when predetermined conditions are met. They are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss. They can also automate a workflow, triggering the next action when conditions are met.

Identifying transactions:

1/ Provide examples of transactions in the Vehicle Manufacture lifecycle use case.

Ordering a vehicle: the buyer submits an order to buy a new car.

building the vehicle: the employee for the car manufacturer updates the order status as the order is processed

Transferring ownership of a vehicle: An administrator for the regulator changes the vehicle owner from the manufacturer to the buyer after the contractual agreements are met and the car is paid for and delivered.

Insuring the vehicle: The owner requests insurance policy from an insurer from an insurance company for his new vehicle.

2/ Describe the blockchain component where transactions are recorded.

The transactions are recorded in a single, shared and permissioned ledger.

3/ Describe the process by which the participants in the network approve a transaction

All the participants in the blockchain network agree on how transactions are verified through consensus.

Identifying events:

1/ List at least two examples of events in the Vehicle Manufacture lifecycle network.

Crash events
the vehicle overheating

2/ Provide examples of business processes that can be triggered by those events.

The manufacturer dashboard also receives the information about the incident (vehicle overheating), which can automatically start an investigative process to determine whether this is a common failure or an isolated incident.

The insurance dashboard receives the crash notification event can trigger insurance processes to handles the crash and the claims that the owner might raise. Also, the employee for the car manufacturer can calls the owner to make sure that he is OK.

Identifying external system integration:

1/ Provide an example of integration with external systems in the Vehicle Manufacture lifecycle network where data flows from the external system to the blockchain business network.

Arium installed IoT devices in a black box in the vehicle, and the information from the IoT devices is fed back into the network for everyone to see it.

2/ Provide an example of integration with external systems in the Vehicle Manufacture lifecycle network where data flows from the blockchain business network to the external system.

Some of the information that is recorded in the network can be used by Arium's enterprise resource planning (ERP) applications.

Identifying requirements and benefits :

1/ Provide examples of requirements that Paul the car buyer, Mike the vehicle manufacturer, Debbie the regulator, and Tommen the insurer might have:

Paul required that only participants who process his order have access to his personal information.

The regulator required to have instantly information about all vehicle orders and incidents

The manufacturer required that all business network transactions respect the smart contracts between him and all stakeholders

The insurer required that all incidents are recorded

2/ Explain how blockchain addresses the participants' requirements

Accountability: Members of the business network are known. All transactions are recorded in the ledger include the origin (who created it).

Privacy: only members involved in the transaction can see the right and appropriates information

Smart contract: Business rules and terms that are implied by the contract are embedded in the blockchain and run with transactions

3/ Provide examples of the benefits of using blockchain technology.

Enhanced security: For each approved transaction, all participants must agree on it through consensus. Then, each transaction will be encrypted and linked to the previous transaction, which creates an immutable chain that is impossible to modify or delete.

Greater transparency: All the data are shared across participants on the same blockchain network, which allows all participants to have a good relationship based on transparency and trust

Instant traceability: All participants can have an instantly insight of the asset statuses in the blockchain network and will be up-to-date about the transactions where they are involved.

Reduced cost: Reducing intermediaries in a blockchain network, companies can reduce everyday costs such as third-party fees, administrative costs, and other costs for exchanging assets.

Documentation: With blockchain, using a single digital ledger that is shared among participants reduces complications and increases efficiency.

Increased efficiency and speed: Blockchain provides tasks quickly thanks to the automation.