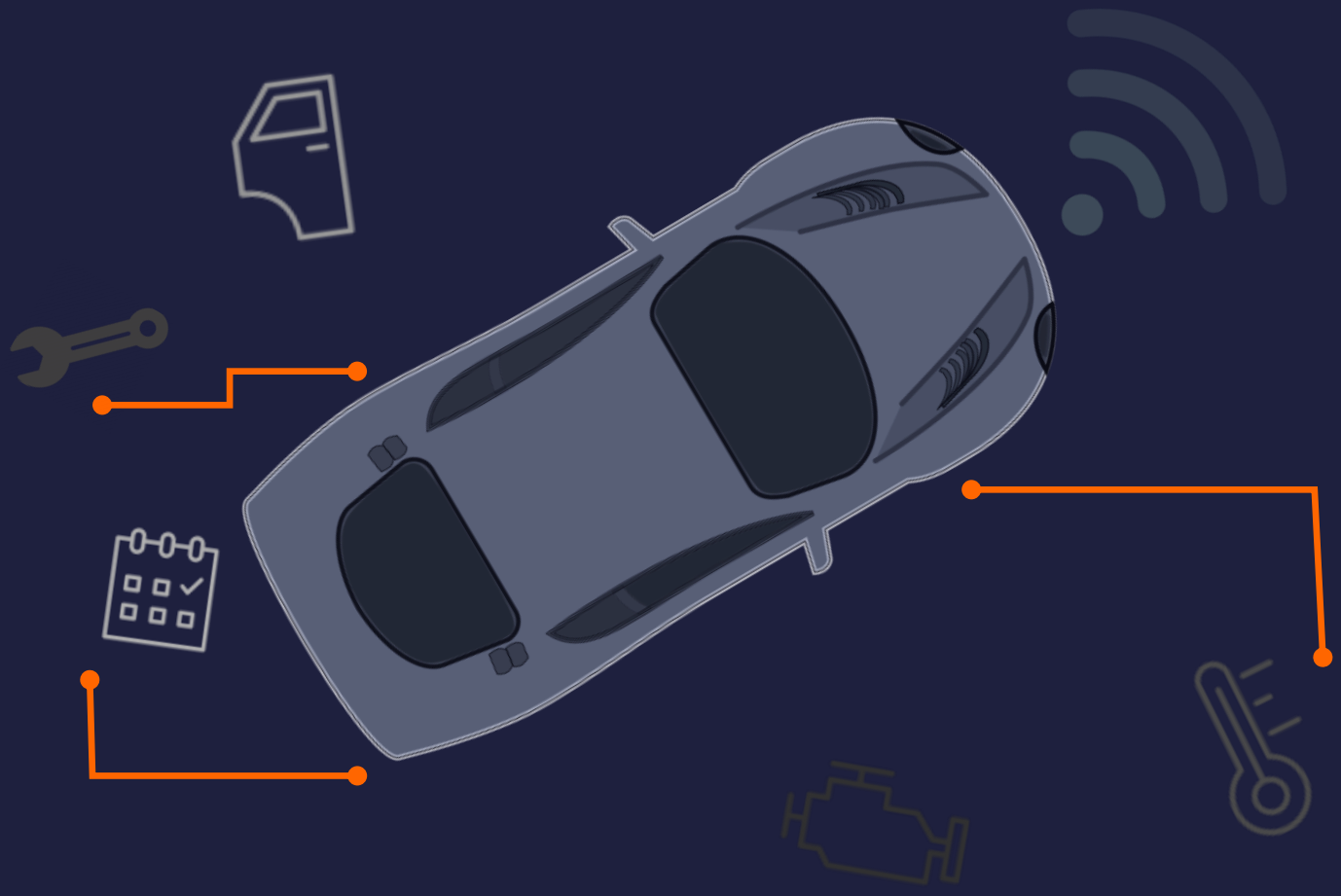
OPIN ENABLED MOBILITY USE CASES

Insurance and Automotive Interoperability



Data Alignment of OPIN and COVESA/W3C Standards

Open Insurance

COVESA

v1.0 Dec. 2021

OPIN ENABLED MOBILITY USE CASES

THE MOBILITY LAB

OPIN's mobility lab works on leading edge projects to explore the boundaries of connected mobility.

Corporate members and researchers worked together on cross-ecosystem standards, the creation of new customer journeys, the exploration of insurer and OEM connectivity, the development of proof of concepts and minimum viable products.

At OPIN, different innovation labs interact with each other on ongoing projects to produce coordinated and well studied output. The Mobility, Legal & Regulatory and Blockchain labs are OPIN's research hubs.

OPIN has partnered and collaborated with COVESA (formerly known as the GENIVI Alliance) on the alignment of the Open Insurance API and data standards with VSS. This will enhance and augment the adoption of OPIN standards and encourages shared business and system models in the insurance and mobility markets.

This is the first in a series of documents describing the work and implementation. OPIN and COVESA will also publish a technical PoC guidance and implementation paper.

AUTHORS

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Neil Walker, BA Hons.

SUPPLEMENTARY DOCUMENTS

Data Catalogue Use Cases

Motor Insurance Technical POC and Implementation

OPIN Data Standard

Vehicle Signal Specification (VSS)

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CONTENT

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INTRODUCTION

The Open Insurance Initiative (OPIN) and The Connected Vehicle Systems Alliance (COVESA) have worked together to produce interoperable data and API standards.

This document describes a range of insurance related analytical scenarios. To be able to do that, we have broadly defined a common understanding on appropriate rules, policies, and practices related to what is required for vehicle data streams to be shared.

In order to perform the data mapping exercise of vehicle signals and data streams with insurance data entities, a range of use cases were designed in order to be able to determine which signals (event data) will become part of this project.

To augment the value of the discussions, guest contributors were invited to participate in the weekly meetings that were held. Additionally, a public invitation was advertised and we were pleased to receive applications from Travelers, AIOI Nissay Dowa USA (Toyota Insurance Management Services), Microsoft, DBS Bank, Santalucía Seguros, Zurich Minas Brasil Seguros SA, Geotab and others.

As this is the first open-insurance and mobility project of this nature, core concepts and deliverables went through different iterations. All individuals involved shared their unique knowledge in a learn-by-doing and learn-by-sharing approach triggering valuable discoveries.

The foundation of this work is the OPIN data standard which was developed from the ground up in modular form allowing for virtually unlimited complexity in use case development. This standard is collaboratively designed by the community of OPIN members and is protected by MPL 2.0 license.

COVESA/W3C's Vehicle Signals Specification (VSS) v2.2.0 is a standardized vehicle data model that allows an industry actor to use a common naming space for communication abstracting underlying vehicle implementation details. The representation of vehicle data specifications is vendor independent and also uses MPL 2.0 license.

COVESA team included:

- Steve Crumb
- Gunnar Andersson
- Philippe Robin

OPIN's Mobility Working Group included:

- Neil Walker
- Martin Dennehy
- Phil Chalk
- Simon Hickling
- Kumar Maddani
- Fouad Husseini

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INTRODUCTION

With this partnership, we aim to demonstrate OPIN's ready usability with something tangible that **developers** can try for themselves, encouraging uptake with prospective data consumers and producers alike.

OPIN activities and internal Working Groups are oriented towards the insurance **developer**. It is a **culture** that is new to the insurance domain and one that we want to develop further. Engineering-led learning supported by legal and compliance experts will create a sustainable open ecosystem.

To demonstrate to the insurance and automotive communities of risk carriers, intermediaries, InsurTech startups, OEMs and developers the value of adopting the OPIN and VSS data models, Proof of Concepts (PoCs) and Minimum Viable Products (MVPs) will be co-created by several organizations to demonstrate interoperability. A separate document will articulate the implementation and architectural requirements for PoCs. The PoC document can be accessed at OPIN website and GitHub and will provide readers with implementation guidance, and references to the interfaces that allow a developer to access and apply the OPIN standard. COVESA will also provide access to GitHub and the materials to the COVESA website.

The content of this paper is subject to a review by OPIN's Legal & Regulatory Working Group. All findings or recommendations will be shared in an updated version of this document.

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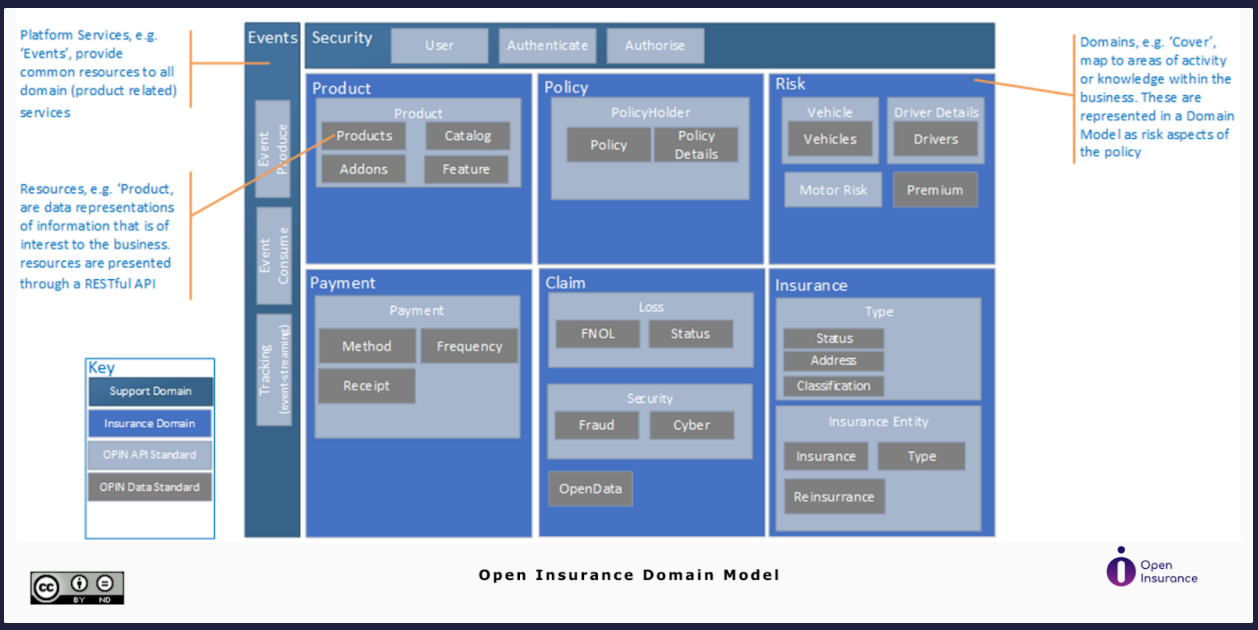
OPIN DATA SCHEMA

The domain model has six insurance domains and two supporting domains. The Insurance domain is bounded by its context of an API standard and a Data standard, these are:

- Product domain
- Policy domain
- Cover domain
- Payment domain
- Claim domain
- Insurance domain



The Security support domain is included to support the security context recommended to adopt the standard, and the Event support domain indicates standards that can be consumed as both a consumer and/or publisher of a Data Standard, as events occurring through the lifecycle of insurance.

There are ten core data entities in OPIN's Insurance Data standard. They are:

- Insurance Entity
- Personal
- Commercial
- Product
- Beneficiary
- Receipt

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OPIN DATA SCHEMA

- Receipt
- Claim
- Premium Bordereau
- Claims Bordereau
- Enums

These core properties are defined in a document titled "A Blueprint for an Open Insurance Standard". The reader is advised to use it as reference material to complement their understanding of OPIN's open standards.

The **Product** data entity branches out into the constituent parts of each insurance line of business. In the case of the motor insurance class, both personal and commercial, it branches out into:

- Motor Coverage
- Driver
- **Vehicle**

Almost all of the vehicle data streams analyzed by this project were added to the **Vehicle** entity of the motor insurance schema.

Please note the Product domain is an extensible model, with future innovations across Motor and non-Motor Insurance products capable of being exhibited and accessible for wider insurance lines of business.

API Event Data

Data from connected vehicles is classified into either Static, Semi-Dynamic or Fully Dynamic depending on the required frequency of data requests. These data requests range from as high as once every 2 seconds, e.g. checking that driver is belted, to once per month for retrieving the time remaining to the next car service as an example.

The supplementary document Data Catalogue - Use Case Data v1.10 lists all VSS v2.20 data properties that have been mapped to the relevant OPIN data properties. For example, vehicle max power in OPIN is requested by addressing:

```
motor.motorCoverage.vehicle.KW
```

while in VSS it is requested by addressing:

```
Vehicle.Powertrain.CombustionEngine.MaxPower
```

This document also makes some recommendations for:

1. Data request frequency rates
   Certain insurance use cases may require data at high intervals. Applications producing driver profiles may need to analyze patterns of braking, brake pedal force applied, instances of acceleration, deceleration rates, speed of turning the

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OPIN DATA SCHEMA

the steering wheel etc. Other use cases may work adequately at much lower frequencies. For example, a car concierge app may only need to request the date of an upcoming car service at a rate of once per month.

Accordingly, each semi-dynamic and fully-dynamic data element has a recommended minimum frequency rate specified. OEMs have the option of providing data at higher frequencies if required by insurance partners or app developers.

2. In-vehicle derived data elements
Data elements such as the g-force exerted on the driver while the vehicle goes round a turn requires a calculation using two data elements. The calculation requires the speed of the car and the radius of the turn. It is a simple formula but not all in-vehicle systems can readily provide this derived value.

OPIN and Covesa agreed that further work and coordination is needed to reach a level where raw as well as in-vehicle derived data may become accessible to insurers in the future.

Several new data categories have also been introduced for a more developer intuitive experience. The categories group together related data properties.

- Performance
Engine brake horsepower, torque, acceleration, top speed, engine size and traction control.

- Security Features
Immobilizer installed and theft detection system.

- Mileage
Current odometer reading, average daily milage, average yearly milage driven and highway yearly milage.

- Maintenance
Car service history, date next service is due, time remaining to next car service and list of dates vehicle has been recalled for servicing.

- Driving
Traction control engagement, longitudinal/latitude/verticle acceleration, braking frequency, brake pedal force applied, brake pedal speed applied, high performance configuration toggling, application of emergency braking, state of ignition, duration ignition has remained on, longitude/latitude/altitude/heading coordinates, vehicle moving indicator, use of horn, driving speed, wheel spin, deceleration rates, speed of turning the steering wheel, lane departure warning, ABS is active, obstacle detection is active, driver intervention, obstacle detection alert, automated acceleration using ADAS, g-force,

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OPIN DATA SCHEMA

yaw/pitch/roll angles, trailer hitched indicator, driver/passengers seatbelt is on and acceleration history.

- Fault detection
  Humidity/temperature in cabin, tire/s tread condition, air pressure in tire/s, condition of brake pads, condition of brake disc/s, clutch wear, dashboard warning lights, airbag deployed/ undeployed, ABS bakes error indication and engine warning.

- Damage
  Known vehicle damage, list of damaged parts, cost of damaged parts, date of upcoming car service and dashcam video recording.

- Cabin use
  Number of occupied seats and seat occupied by child seat.

- Access control
  Confirmation consent was given by the driver.

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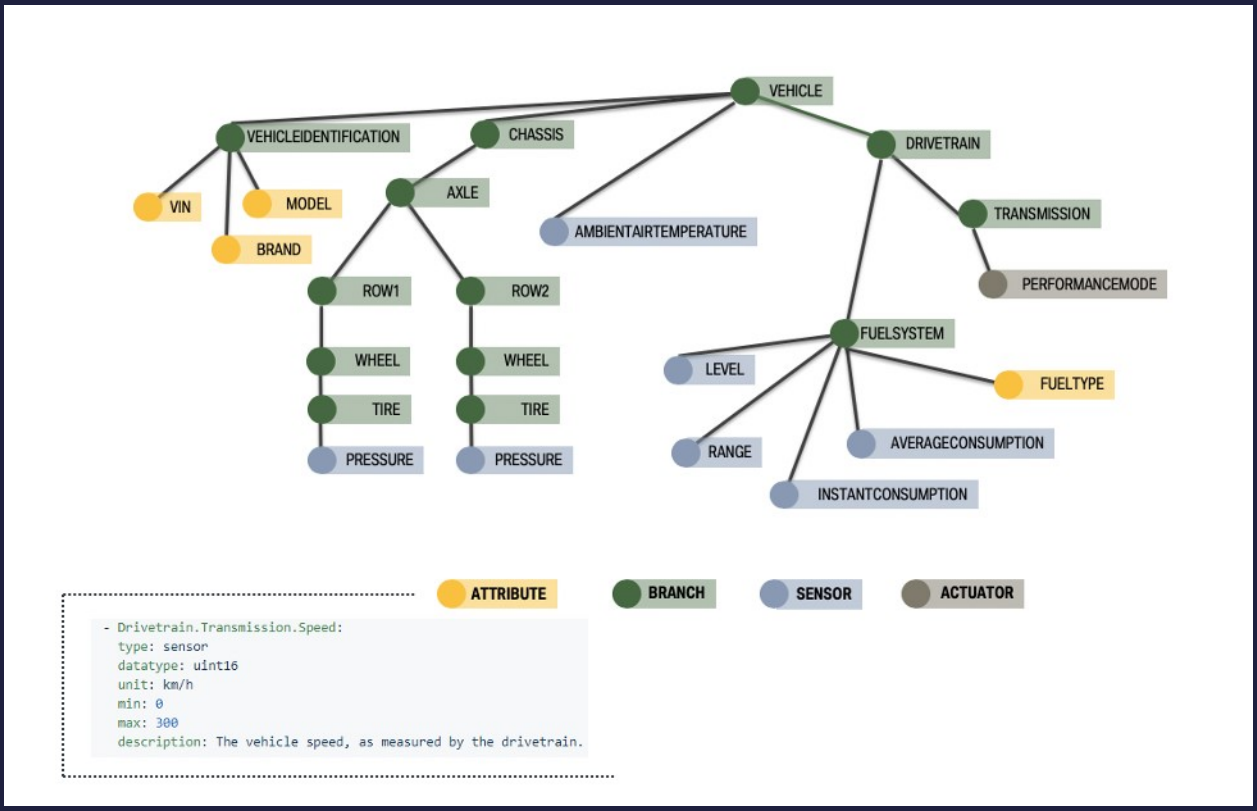
VSS DATA SCHEMA

The Vehicle Signal Specification (VSS) project was started at GENIVI in 2016 and is now the basis for several activities in W3C, COVESA and other organizations. In essence, it is a common vocabulary to describe vehicle signals, ensuring that the name and semantics of standard data points are the same across the software stack. Contributors to the specification include BMW, Volvo Cars, Jaguar Land Rover, Geotab, and Bosch, and others.

VSS defines a simple set of high level classes:

- Branch – a node in the data structure such as Engine, Body, Door, Mirror, Left, Right.
- Attribute - a static value associated with a branch, like the capacity of the fuel tank.
- Signal – a dynamically changing value associated with a branch, like Engine RPM, typically intended to be read by external systems.
- Actuator – a dynamic value associated with a branch, typically intended to be written by external systems to initiate an action or change (e.g. request a target cabin temperature)
- Branches may contain Signals, Attributes, and Branches.



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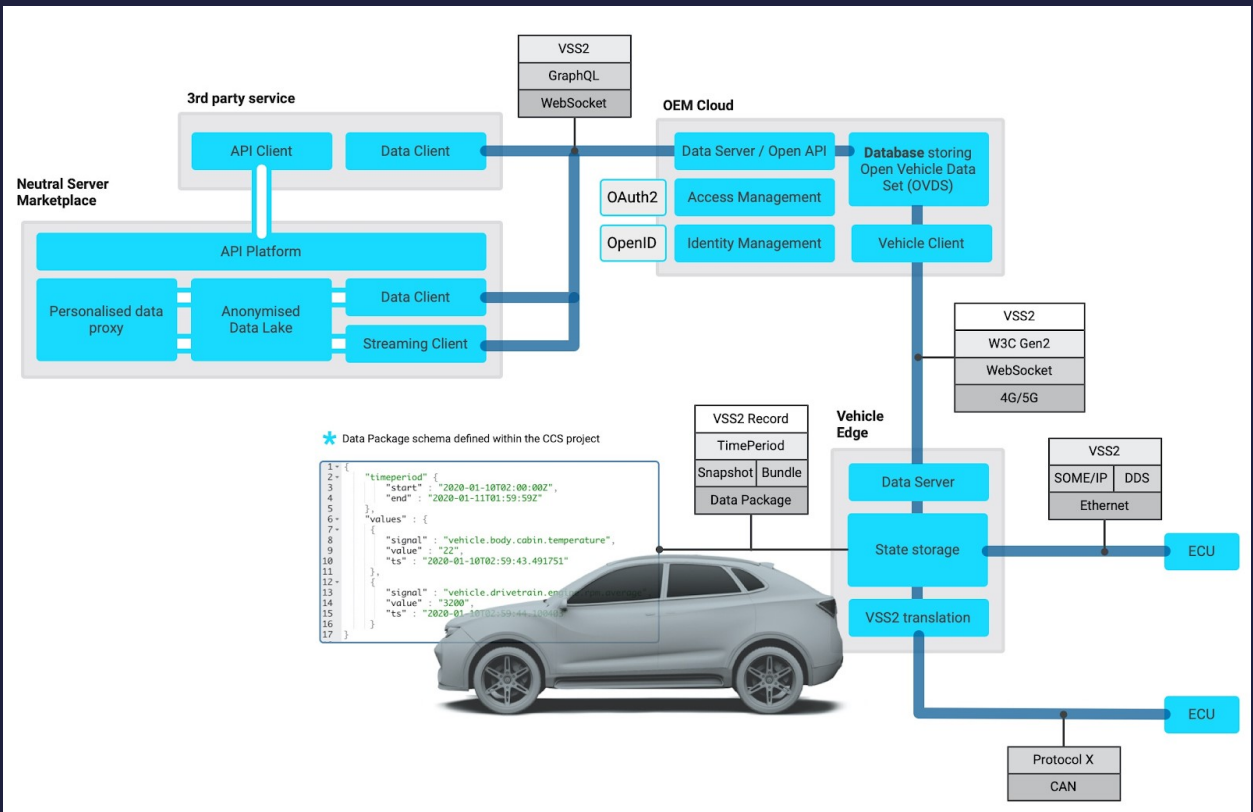
VSS DATA SCHEMA

Various projects associated with VSS define communication protocols, bindings to existing communication technologies, converters and code-generation tools, etc.:

- The **W3C** Vehicle Information Service Specification (VISS) defines a HTTP/REST and WebSocket based API to enable client applications to get, set, subscribe and unsubscribe to VSS-defined vehicle signals and data attributes.
- Code generation tools bind to in-vehicle communication buses, protocols, and to some specific platforms such as Android Automotive.
- VSS-supporting cloud-oriented frameworks are under development.

The purpose of the VISS and associated specifications are to promote a Server API that enables application development in a consistent manner across participating automotive manufacturers.

Example Vehicle-Data architecture for distributing information in VSS format, from COVESA's Cloud and Connected Services project (CCS):



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USE CASE DEVELOPMENT

Working Group (WG) members were generally in agreement on the definition of a use case to mean “a scenario in which a system receives an external request (such as user input) and responds to it”.

Use cases were a fundamental part of project activities. They were used to:

- Conceive interesting scenarios enabled by event data from vehicle
- Explore developing insurance trends or themes such as tailored insurance and predictive and preventative maintenance.
- Identify the range of VSS data needed to match a particular requirement for an insurance process or task
- Group common data requirement into static, semi-dynamic and fully dynamic data types
- Prioritize scenarios based on tangible attributes to develop Proof of Concepts and MVPs at a future date
- Demonstrate the versatility of open insurance and the value of sharing access to customer data

Use Case Development

Almost all of the scenarios that have been developed herein use predictive analytics. All use cases provide a mapping of all factors that combine to produce a predictable outcome.

This mapping requires a clearly defined set of target variables requiring an understanding of what the model is aiming to predict (the outcome), and the availability of a set of defined enrichment data.

Use Case Templates

To improve consistency in configuring process flow diagrams, a process flow template was designed and it incorporated OPIN’s motor insurance data schema. A process flow consists of a set of steps that make up a single use case or business process.

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USE CASE DEVELOPMENT

The template relies on a sample from an industry standard source and has been used to document use cases.

- Business Event: A trigger that stimulates activity. Many business events occur at the interface point between the business and one of the external entities with which it interacts. Business events must be observable.
- Actors: The actor that initiates this use case and all users who participate in this use case.
- Use Case Description: An overview of the overall scope and content of the use case.
- Use Case Association: A list of other use cases that are associated with this use case.
- Input summary: A brief summary that lists the data input by the actor.
- Output Summary: A summary that describes the intended output of the use case.

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THE SCENARIOS CATALOG

The template relies on a sample from an industry standard source and has been used to document use cases.

- Business Event: A trigger that stimulates activity. Many business events occur at the interface point between the business and one of the external entities with which it interacts. Business events must be observable.
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- Input summary: A brief summary that lists the data input by the actor.
- Output Summary: A summary that describes the intended output of the use case.

A large number of abstract use cases were collaboratively designed by the Mobility Working Group in order to capture functional requirements. However, only 16 use cases are included in this document, and they serve several objectives:

- Develop an understanding of the data and signals available from systems and sensors embedded in connected vehicles.
- Map the data entities of the two standards to capture overlap, introduce new data properties and achieve alignment.
- Scenarios can be viewed as a quick-start guide for use case deployment using OPIN's data standard and API specification.
- The catalog can be used to pick a candidate use case for a proof of concept and MVP.

Use cases were catalogued into:

1. Insurance Distribution
2. Vehicle Operation and Maintenance
3. Vehicle Incidents

Each of which captures a specific course of interactions that take place between one or more actors and in-vehicle systems. A use case may only be meaningful if used to describe functionality common with other use case/s. Similarly, a use case may extend a second use case.

Service designers, software analysts and product developers may study the use cases to identify the relationship between the functional requirements captured and for incremental and iterative development. They can also use the pre-made workflows and processes to speed up development.

The use cases included in this paper contain design templates for various potential applications. With the use of machine learning, data analytics could yield fantastic new functionality that enhance these templates.

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THE SCENARIOS CATALOG

The range of ideas that can be generated is limitless. Here are few examples:

Risk Prediction

- Predictive accident heatmaps per zip code
- Car type and fuel optimization per driver profile

Tailored Pricing

- In-vehicle (via infotainment system) insurance premium review
- Pricing based on one data variable e.g. mile driven

Claims Handling

- Journey and accident playbacks
- Initiate claims investigation and routing in real time

Touch Points

- Live driver coaching and performance feedback
- Video playback of trip with feedback per driver/trip

Loyalty & Rewards

- Head-to-head competitions
- Leaderboard by team (commercial fleet policy)

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INSURANCE DISTRIBUTION

Pre-Sale and Sale

This involves vehicle inspection, underwriting, policy processing, payment, collection and budgeting.

An innovative, digital point-of-sale aims to simplify the process of quoting and policy processing. Instant external data and prefilled information can simplify the buying process in an engaging and collaborative environment.

Scenarios that were developed included:

1/A - Scenario: Vehicle Purchase

1/B - Scenario: Vehicle Purchase with Embedded Finance

1/C- Scenario - Insurance Purchase (Direct)

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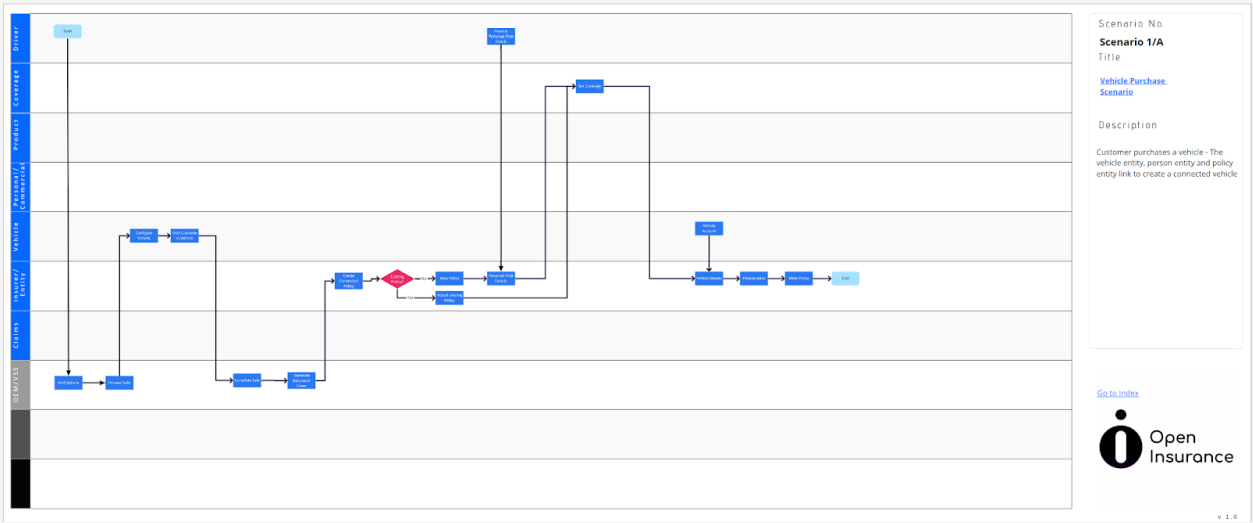
INSURANCE DISTRIBUTION

1/A Scenario: Vehicle Purchase



Business Event
The driver takes ownership of a vehicle (purchase or lease).

Actors
The OEM/car dealer company initiates this use case. Other actors include the OPIN Insurer, the vehicle and the driver.

Use Case Description
This foundation scenario represents a slightly different journey to the traditional insurance purchase process (outlined in scenario 1C) in so much as it is driven by the car supplier.

The OPIN insurer receives details of the vehicle and it's specification from the OEM and collects details of the owner either direct from the owner or in conjunction with the vehicle details from the OEM.

The OPIN Insurer underwrites the policy based on the driver details, vehicle details, risk details and on purchase, creates and binds the policy. This links the person (driver and named drivers) entity, the vehicle entity and the policy entity.

Use Case Association
1/B, 1/C and 1/G.

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INSURANCE DISTRIBUTION

1/A Scenario- Vehicle Purchase

Input summary

OPIN	VSS
.motorCoverage.vehicle.plateNumber	
.motorCoverage.vehicle.registrationDate	
.motorCoverage.vehicle.countryOfRegistration	Vehicle.VehicleIdentification.dateVehicleFirstRegistered
.motorCoverage.vehicle.chassisNumber	
.motorCoverage.vehicle.vin	Vehicle.VehicleIdentification.VIN
.motorCoverage.vehicle.engineNumber	
.motorCoverage.vehicle.agencyRepair	
.motorCoverage.vehicle.bodyType	Vehicle.VehicleIdentification.bodyType
.motorCoverage.vehicle.fuelType	Vehicle.OBD.FuelType
.motorCoverage.vehicle.aiClassification	
.motorCoverage.vehicle.vehicleUse	
.motorCoverage.vehicle.yearlyMilage	
.motorCoverage.vehicle.vehicleBrand	Vehicle.VehicleIdentification.Brand
.motorCoverage.vehicle.vehicleModel	Vehicle.VehicleIdentification.Model
.motorCoverage.vehicle.modelYear	Vehicle.VehicleIdentification.Year
.motorCoverage.vehicle.seats	Vehicle.VehicleIdentification.vehicleSeatingCapacity
.motorCoverage.vehicle.colour	
.motorCoverage.vehicle.trailerIncluded	Vehicle.Trailer.Connected
.motorCoverage.vehicle.sumInsured	
.motorCoverage.vehicle.accessories	
.motorCoverage.vehicle.accessoryValue	
.motorCoverage.vehicle.engineCapacity	Vehicle.Powertrain.CombustionEngine.Displacement
.motorCoverage.vehicle.co2Emissions	Vehicle.VehicleIdentification.meetsEmissionStandard
.motorCoverage.vehicle.automaticTransmission	Vehicle.Powertrain.Transmission.Type
.motorCoverage.vehicle.lefthandDrive	
.motorCoverage.vehicle.doors	Vehicle.Cabin.DoorCount
.motorCoverage.vehicle.securityDevice	
.motorCoverage.vehicle.modification	
.motorCoverage.vehicle.digitalKeyUsed	
.motorCoverage.vehicle.currentMileage	
.motorCoverage.vehicle.yearlyMilage	
.motorCoverage.vehicle.highwayYearlyMilage	
.motorCoverage.vehicle.dailyMilage	

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INSURANCE DISTRIBUTION

1/A Scenario- Vehicle Purchase

Input summary

.motorCoverage.vehicle.power
.motorCoverage.vehicle.torque
.motorCoverage.vehicle.evHP
.motorCoverage.vehicle.evTorque
.motorCoverage.vehicle.Acceleration
.motorCoverage.vehicle.maxSpeed
.motorCoverage.vehicle.hasImmobilizer
.motorCoverage.vehicle.hasTheftDetection
.motorCoverage.vehicle.serviceHistory
.motorCoverage.vehicle.recallHistory

Vehicle.Powertrain.CombustionEngine.MaxPower
Vehicle.Powertrain.CombustionEngine.MaxTorque
Vehicle.Powertrain.ElectricMotor.MaxPower
Vehicle.Powertrain.ElectricMotor.MaxTorque

Output Summary

Sale of a motor insurance policy as part of the vehicle purchase flow.

Example Process Flow

Note, this is a sunny day scenario where the driver accepts the price and purchases a policy. Alternative scenarios will be elaborated as required.

- Driver purchases a vehicle including the configuration of extras
- The OEM sells an insurance product to the driver
- The OEM confirms whether there is an existing policy
  - If a policy exists, the existing policy is updated to reflect the new vehicle
  - If the policy is new, the driver is asked to supply risk details pertaining to them (driver history, claims history etc…)
- For either new or existing policies, the vehicle data is derived from the OEM

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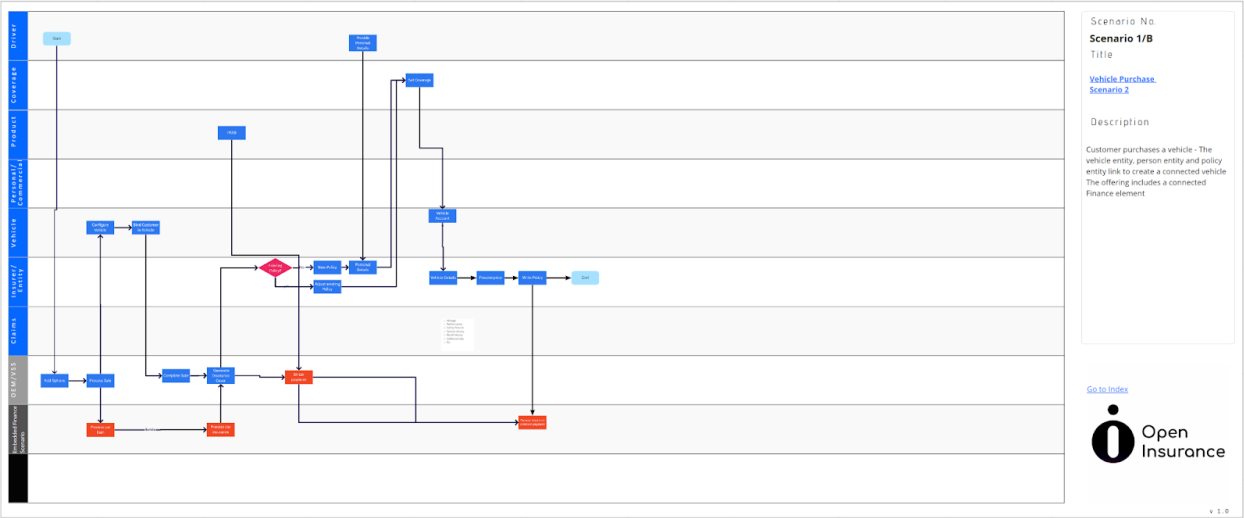
INSURANCE DISTRIBUTION

1/B - Scenario: Vehicle Purchase with Embedded Finance



Business Event

The driver takes ownership of a vehicle (purchase or leaser). Embedded open banking functionality is used for processing a car loan and the payment of insurance premium.

Actors

The OEM/car dealer company initiates this use case. Other actors include the OPIN Insurer, the Vehicle and the Driver.

Use Case Description

This foundation scenario represents a slightly different journey to the traditional insurance purchase process (outlined in scenario 1c) in so much as it is driven by the car supplier.

The OPIN insurer receives details of the vehicle and it's specification from the OEM and collects details of the owner either direct from the owner or in conjunction with the vehicle details from the OEM.

The OPIN Insurer underwrites the policy based on the driver details, vehicle details, risk details and on purchase, creates and binds the policy.

The key difference from scenario 1A is that the use case assumes that there is a facility to transact some of the financial elements of the process. Which supports concepts such as short term insurance and pay as you drive.

Use Case Association

1/A, 1/C and 1/G.

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INSURANCE DISTRIBUTION

1/B - Scenario: Vehicle Purchase with Embedded Finance

Input summary

OPIN	VSS
.motorCoverage.Vehicle.PlateNumber	
.motorCoverage.Vehicle.registrationDate	
.motorCoverage.Vehicle.countryOfRegistration	Vehicle.VehicleIdentification.dateVehicleFirstRegistered
.motorCoverage.vehicle.chassisNumber	
.motorCoverage.vehicle.vin	Vehicle.VehicleIdentification.VIN
.motorCoverage.vehicle.engineNumber	
.motorCoverage.vehicle.agencyRepair	
.motorCoverage.vehicle.bodyType	Vehicle.VehicleIdentification.bodyType
.motorCoverage.vehicle.fuelType	Vehicle.OBD.FuelType
.motorCoverage.vehicle.aiClassification	
.motorCoverage.vehicle.vehicleUse	
.motorCoverage.vehicle.yearlyMilage	
.motorCoverage.vehicle.vehicleBrand	Vehicle.VehicleIdentification.Brand
.motorCoverage.vehicle.vehicleModel	Vehicle.VehicleIdentification.Model
.motorCoverage.vehicle.modelYear	Vehicle.VehicleIdentification.Year
.motorCoverage.vehicle.seats	Vehicle.VehicleIdentification.vehicleSeatingCapacity
.motorCoverage.motorCoverageN.vehicle.colour	
.motorCoverage.vehicle.trailerIncluded	Vehicle.Trailer.Connected
.motorCoverage.vehicle.sumInsured	
.motorCoverage.vehicle.accessories	
.motorCoverage.vehicle.accessoryValue	
.motorCoverage.vehicle.engineCapacity	Vehicle.Powertrain.CombustionEngine.Displacement
.motorCoverage.vehicle.co2Emissions	Vehicle.VehicleIdentification.meetsEmissionStandard
.motorCoverage.vehicle.automaticTransmission	Vehicle.Powertrain.Transmission.Type
.motorCoverage.vehicle.lefthandDrive	
.motorCoverage.vehicle.doors	Vehicle.Cabin.DoorCount
.motorCoverage.vehicle.securityDevice	
.motorCoverage.vehicle.modification	
.motorCoverage.vehicle.digitalKeyUsed	
.motorCoverage.Vehicle.currentMileage	
.motorCoverage.Vehicle.yearlyMilage	
.motorCoverage.Vehicle.HP	Vehicle.Powertrain.CombustionEngine.MaxPower
.motorCoverage.Vehicle.torque	Vehicle.Powertrain.CombustionEngine.MaxTorque

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INSURANCE DISTRIBUTION

1/B - Scenario: Vehicle Purchase with Embedded Finance

Input summary

.motorCoverage.Vehicle.evHP	Vehicle.Powertrain.ElectricMotor.MaxPower
.motorCoverage.Vehicle.evTorque	Vehicle.Powertrain.ElectricMotor.MaxTorque
.motorCoverage.Vehicle.Acceleration	
.motorCoverage.Vehicle.maxSpeed	
.motorCoverage.Vehicle.Acceleration	
.motorCoverage.Vehicle.maxSpeed	
.motorCoverage.Vehicle.engineCapacity	Vehicle.Powertrain.CombustionEngine.Displacement
.motorCoverage.Vehicle.hasImmobilizer	
.motorCoverage.Vehicle.hasTheftDetection	
.motorCoverage.Vehicle.serviceHistory	
.motorCoverage.Vehicle.recallHistory	

Open Banking-Account Information Service Provider (AISP)
Open Banking-Payment Initiation Services (PIS)

Output Summary
Sale of a motor insurance policy as part of the vehicle purchase flow. Open finance services enable a greater seamless experience.

Example Process Flow
Note, this is a sunny day scenario where the driver accepts the price and purchases a policy. Alternative scenarios will be elaborated as required.

- Driver purchases a vehicle including the configuration of extras, this is on a lease or finance basis and the vehicle has the concept of payment for the purchase of extras.
- The OEM sells an insurance product to the driver and sets up the facility to complete in car payments
- The OEM confirms whether there is an existing policy
  - If a policy exists, the existing policy is updated to reflect the new vehicle
  - If the policy is new, the driver is asked to supply risk details pertain ing to them (driver history, claims history etc…)
- The OEM sets the coverage of the policy and updates the vehicle account with this information
- The OEM presents the price
- The driver accepts the price
- The OEM binds the driver to the vehicle and policy creates a connected policy.
- Settlement for the policy may be settled with a payment taken from the vehicle or via an OEM embedded finance facility.

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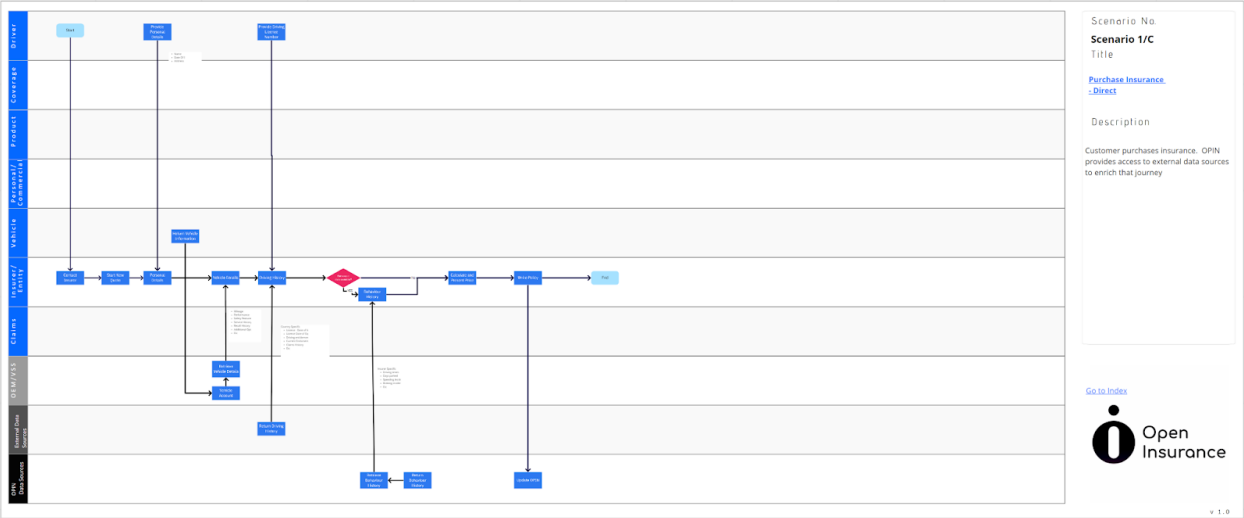
INSURANCE DISTRIBUTION

1/C- Scenario: Insurance Purchase (Direct)



Business Event
The driver purchases insurance directly from an OPIN enabled insurer who can utilise data from external sources to assist in the insurance rating and purchase journey.

Actors
The driver initiates this use case. Other actors include an OPIN Insurer, the vehicle, and the OEM.

Use Case Description
This foundation scenario mirrors the standard insurance purchase process. In this instance, the insurer receives details of the vehicle and it's specification from the vehicle itself and collects details of the owner either direct from the owner or in conjunction with external data sources to collect claims history etc.

Driving history can be obtained from third party/ies including other OPIN insurers.

The Insurer assesses the policy based on the driver details, vehicle details, risk details and on purchase, creates and binds the policy.

Use Case Association
1/A, 1/B and 1/G.

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INSURANCE DISTRIBUTION

1/C- Scenario: Insurance Purchase (Direct)

Input summary

OPIN	VSS
.motorCoverage.Vehicle.PlateNumber	
.motorCoverage.Vehicle.registrationDate	
.motorCoverage.Vehicle.countryOfRegistration	Vehicle.VehicleIdentification.dateVehicleFirstRegistered
.motorCoverage.vehicle.chassisNumber	
.motorCoverage.vehicle.vin	Vehicle.VehicleIdentification.VIN
.motorCoverage.vehicle.engineNumber	
.motorCoverage.vehicle.agencyRepair	
.motorCoverage.vehicle.bodyType	Vehicle.VehicleIdentification.bodyType
.motorCoverage.vehicle.fuelType	Vehicle.OBD.FuelType
.motorCoverage.vehicle.aiClassification	
.motorCoverage.vehicle.vehicleUse	
.motorCoverage.vehicle.yearlyMilage	
.motorCoverage.vehicle.vehicleBrand	Vehicle.VehicleIdentification.Brand
.motorCoverage.vehicle.vehicleModel	Vehicle.VehicleIdentification.Model
.motorCoverage.vehicle.modelYear	Vehicle.VehicleIdentification.Year
.motorCoverage.vehicle.seats	Vehicle.VehicleIdentification.vehicleSeatingCapacity
.motorCoverage.vehicle.colour	
.motorCoverage.vehicle.trailerIncluded	Vehicle.Trailer.Connected
.motorCoverage.vehicle.sumInsured	
.motorCoverage.vehicle.accessories	
.motorCoverage.vehicle.accessoryValue	
.motorCoverage.vehicle.engineCapacity	Vehicle.Powertrain.CombustionEngine.Displacement
.motorCoverage.vehicle.co2Emissions	Vehicle.VehicleIdentification.meetsEmissionStandard
.motorCoverage.vehicle.automaticTransmission	Vehicle.Powertrain.Transmission.Type
.motorCoverage.vehicle.lefthandDrive	
.motorCoverage.vehicle.doors	Vehicle.Cabin.DoorCount
.motorCoverage.vehicle.securityDevice	
.motorCoverage.vehicle.modification	
.motorCoverage.vehicle.digitalKeyUsed	
.motorCoverage.Vehicle.currentMileage	
.motorCoverage.Vehicle.yearlyMilage	
.motorCoverage.Vehicle.HP	Vehicle.Powertrain.CombustionEngine.MaxPower
.motorCoverage.Vehicle.torque	Vehicle.Powertrain.CombustionEngine.MaxTorque

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INSURANCE DISTRIBUTION

1/C- Scenario: Insurance Purchase (Direct)
Input summary

.motorCoverage.Vehicle.evHP	Vehicle.Powertrain.ElectricMotor.MaxPower
.motorCoverage.Vehicle.evTorque	Vehicle.Powertrain.ElectricMotor.MaxTorque
.motorCoverage.Vehicle.Acceleration	
.motorCoverage.Vehicle.maxSpeed	
.motorCoverage.Vehicle.Acceleration	
.motorCoverage.Vehicle.maxSpeed	
.motorCoverage.Vehicle.engineCapacity	Vehicle.Powertrain.CombustionEngine.Displacement
.motorCoverage.Vehicle.hasImmobilizer	
.motorCoverage.Vehicle.hasTheftDetection	
.motorCoverage.Vehicle.serviceHistory	
.motorCoverage.Vehicle.recallHistory	
.motorCoverage.Vehicle.brakingFreq	
.motorCoverage.Vehicle.brakingPedalForce	
.motorCoverage.Vehicle.brakingPedalSpeed	
.motorCoverage.Vehicle.performanceMode	

Data from Carfax, AA Car data reports or Motor Insurer's Bureau (MIB).
Book price of Vehicle.
Driving license and claims history information.

Output Summary
Sale of a motor insurance policy as part of the vehicle purchase flow.

Example Process Flow
Note, this is a sunny day scenario where the driver accepts the price and purchases a policy. Alternative scenarios will be elaborated as required.

- Driver contacts an OPIN insurer to purchase an insurance policy
- The insurer initiates a new quote and collects personal details from the driver
- The insurer then collects the vehicle details from the connected vehicle directly
- The insurer then collects the driving license number from the driver and re trieves driving history from an appropriate external data source where available (alternately, the insurer can collect this information directly from the driver if driv ing history data sources are unavailable).
- The Insurer checks whether the driver has an OPIN driving history record
  - If the record exists, the insurer will retrieve the driving behaviour
  - If the record does not exist, the insurer will proceed to the next step
- The insurer calculates a price for the policy and presents it to the customer
- The driver accepts the price and purchases the policy
- The insurer binds driver to the policy and vehicle creating a connected policy.

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VEHICLE OPERATION AND MAINTENANCE

Driver management
This includes activation, purchase of an on-demand service or subscription, change, suspension, re-activation, renewal, request on event, loyalty and rewards, reimbursement and termination.

Prediction and Prevention
Providing alerting and forecasting information to driver and policyholder.

Assistance
Requests for assistance, monitoring of interventions and SLA compliance.

Remedy
Performance catalogues, SLAs, list prices and reference of service providers.

Monitoring
Driving patterns, driving behaviour, IoT communication protocols, types of signal and types of events.

Scenarios that were developed included:

1/D- Scenario; Operate Vehicle - Servicing

1/E- Scenario; Operate Vehicle - Return/ Sold

1/F- Scenario; Vehicle Insured Status

1/G- Scenario; Driving Style and Intensity

1/H- Scenario: Safety Feature Usage

1/I- Scenario: Safety Feature Deployment

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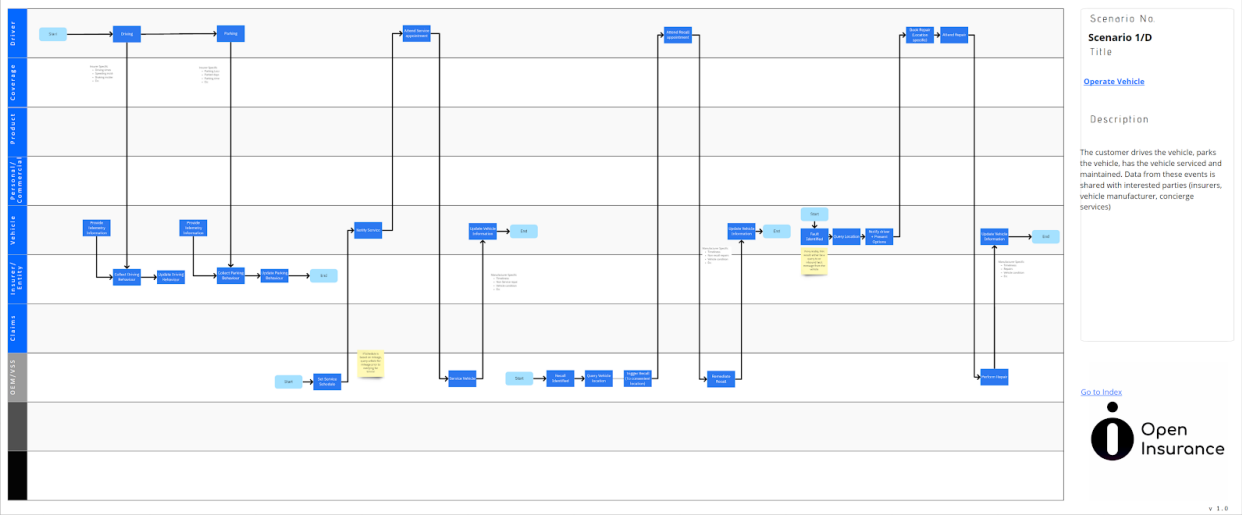
VEHICLE OPERATION AND MAINTENANCE

1/D- Scenario: Operate Vehicle - Servicing



Business Event

The driver operates their vehicle, driving it, parking it, taking it for a service, responding to recalls and taking it for a repair. The OPIN insurer records this information to build a view on the driver and how they drive, maintain and operate their vehicle.

Actors

The driver initiates this use case. Other actors include the OPIN Insurer, the vehicle, and OEM.

Use Case Description

This foundation scenario captures details regarding the regular operation of the vehicle, including the following:

- Driving style (acceleration, speed, braking etc.)
- Parking (Location, duration, times, etc.)
- Scheduled Maintenance (service appointments attended, missed etc.)
- Recall management (recalls, response time, missed etc.)

The purpose of collecting this data is as follows, it builds a picture of the driver and their driving style which can inform other processes that utilise driver behaviour such as reward scenarios but

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VEHICLE OPERATION AND MAINTENANCE

1/D- Scenario: Operate Vehicle - Servicing

also provides insight into non driving style risk information such as - does the driver maintain their car in line with OEM recommendations and do they park where they say they do (a standard question on UK insurance for risk assessment). Finally having a method of collecting parking location will support further use cases around prompting triggers to advise the driver of parking in a risky area.

Use Case Association
1/E, 1/G, 1/H and 1/P.

Input summary

OPIN	VSS
.motorCoverage.vehicle.vehicleUse	
.motorCoverage.Vehicle.yearlyMilage	
.motorCoverage.vehicle.vehicleBrand	
.motorCoverage.vehicle.vehicleModel	
.motorCoverage.vehicle.modelYear	
.motorCoverage.vehicle.plateNumber	
.motorCoverage.vehicle.vin	
.motorCoverage.vehicle.agencyRepair	
.motorCoverage.vehicle.distanceUnit	
.motorCoverage.vehicle.pleasureDistance	
.motorCoverage.vehicle.businessDistance	
OPIN.Vehicle.tireConditionRow1Left	
.motorCoverage.Vehicle.tireConditionRow1Right	
.motorCoverage.Vehicle.tireConditionRow2Left	
.motorCoverage.Vehicle.tireConditionRow2Right	
.motorCoverage.Vehicle.tirePressureRow1Left	Vehicle.Chassis.Axle.Row1.Wheel.Left.Tire.Pressure
.motorCoverage.Vehicle.tirePressureRow1Right	Vehicle.Chassis.Axle.Row1.Wheel.Right.Tire.Pressure
.motorCoverage.Vehicle.tirePressureRow2Left	Vehicle.Chassis.Axle.Row2.Wheel.Left.Tire.Pressure
.motorCoverage.Vehicle.tirePressureRow2Right	Vehicle.Chassis.Axle.Row2.Wheel.Right.Tire.Pressure
.motorCoverage.Vehicle.brakePadWearRow1Left	Vehicle.Chassis.Axle.Row1.Wheel.Left.Brake.PadWear

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VEHICLE OPERATION AND MAINTENANCE

1/D- Scenario: Operate Vehicle - Servicing

.motorCoverage.Vehicle.brakePadWearRow1Right	Vehicle.Chassis.Axle.Row1.Wheel.Right.Brake.PadWear
.motorCoverage.Vehicle.brakePadWearRow2Left	Vehicle.Chassis.Axle.Row2.Wheel.Left.Brake.PadWear
.motorCoverage.Vehicle.brakePadWearRow2Right	Vehicle.Chassis.Axle.Row2.Wheel.Right.Brake.PadWear
.motorCoverage.Vehicle.brakesWearRow1Right	Vehicle.Chassis.Axle.Row1.Wheel.Left.Brake.BrakesWorn
.motorCoverage.Vehicle.brakesWearRow1Left	Vehicle.Chassis.Axle.Row1.Wheel.Right.Brake.BrakesWorn
.motorCoverage.Vehicle.brakeWearRow2Left	Vehicle.Chassis.Axle.Row2.Wheel.Left.Brake.BrakesWorn
.motorCoverage.Vehicle.brakeWearRow2Right	Vehicle.Chassis.Axle.Row2.Wheel.Right.Brake.BrakesWorn
.motorCoverage.Vehicle.clutchCondition	Vehicle.Powertrain.Transmission.ClutchWear
.motorCoverage.Vehicle.dashboardWarning	
.motorCoverage.Vehicle.hasBrakesError	Vehicle.ADAS.ABS.Error
.motorCoverage.Vehicle.hasEngineWarning	
.motorCoverage.Vehicle.yearlyMilageDynamic	
.motorCoverage.Vehicle.tirePressureRow1Left	Vehicle.Chassis.Axle.Row1.Wheel.Left.Tire.Pressure
.motorCoverage.Vehicle.tirePressureRow1Right	Vehicle.Chassis.Axle.Row1.Wheel.Right.Tire.Pressure
.motorCoverage.Vehicle.tirePressureRow2Left	Vehicle.Chassis.Axle.Row2.Wheel.Left.Tire.Pressure
.motorCoverage.Vehicle.tirePressureRow2Right	Vehicle.Chassis.Axle.Row2.Wheel.Right.Tire.Pressure
.motorCoverage.Vehicle.longitude	Vehicle.CurrentLocation.Longitude
.motorCoverage.Vehicle.latitude	Vehicle.CurrentLocation.Latitude
.motorCoverage.Vehicle.altitude	Vehicle.CurrentLocation.Altitude
.motorCoverage.Vehicle.heading	Vehicle.CurrentLocation.Heading
.motorCoverage.Vehicle.serviceHistory	
.motorCoverage.Vehicle.serviceDue	Vehicle.Service.ServiceDue
.motorCoverage.Vehicle.timeToService	Vehicle.Service.TimeToService

Output Summary

Generate insights on the upkeep of a vehicle to a roadworthy condition and its safe keeping.

Example Process Flow

Note, this is four independent smaller processes describing the main operational activities relating to a vehicle

- The driver operates the vehicle
- The insurer collects driving behaviour from the telemetry available from the vehicle
- The insurer updates the driver's driving record
- The driver parks the vehicle

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VEHICLE OPERATION AND MAINTENANCE

1/D- Scenario: Operate Vehicle - Servicing

- The insurer collects parking information (times, location etc..) from the vehicle
- The insurer updates the driver's driving record.
- The OEM sets the service schedule for the vehicle.
- The vehicle notifies the driver that a service is due, given locality information, the vehicle could also recommend the most convenient location for service
- The driver takes the vehicle for a service
- The OEM updates the service record for the vehicle
- The OEM issues a recall for the vehicle
- The OEM queries the vehicle location and triggers the recall to a convenient lo cation based on the vehicle's location
- The driver attends the recall location (or books and attends at their preferred lo cation)
- The OEM resolves the recall issue
- The OEM updates the vehicle record
- The vehicle notes an issue that requires attention
- It queries location and OEM dealer network to make suggestions of where to take the vehicle for resolution
- The driver books and attends a repair appointment
- The OEM repairs the vehicle
- The OEM updates the vehicle record

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VEHICLE OPERATION AND MAINTENANCE

1/E- Scenario - Operate Vehicle - Return/Sold

Business Event

The driver returns or sells their vehicle. The OPIN model requires that the driver and vehicle are delinked.

Actors

The driver initiates this use case. Other actors include the OPIN Insurer, the vehicle OEM and smartphone OEM.

Use Case Description

This foundation scenario focuses on the secure delinking of a driver and vehicle when the vehicle is returned or sold. The scenario is extended with delinking of Digital Key access.

Use Case Association

This use case is critical to prove that OPIN is supporting the safety and security of driver and vehicle data and wider interoperability with other open standards alliances in this case the Car Connectivity Consortium (CCC).

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VEHICLE OPERATION AND MAINTENANCE

1/E- Scenario: Operate Vehicle - Servicing

Input summary

OPIN	VSS
.motorCoverage.vehicle.plateNumber	
.motorCoverage.vehicle.chassisNumber	
.motorCoverage.vehicle.vin	Vehicle.VehicleIdentification.VIN
.motorCoverage.vehicle.digitalKeyUsed	

Output Summary

Insurer receives information on the sale of the vehicle or confirmation of return of the vehicle (if leased) to the lessor as this information is updated within the vehicle.

Example Process Flow

- The driver returns or sells the vehicle
- The insurer cancels the policy
- The OEM removes digital keys, removes driver data from the vehicle and up dates vehicle ownership record
- The driver parks the vehicle
- The insurer collects parking information (times, location etc..) from the vehicle
- The insurer updates the driver's driving record.
- The OEM sets the service schedule for the vehicle.
- The vehicle notifies the driver that a service is due, given locality information, the vehicle could also recommend the most convenient location for service
- The driver takes the vehicle for a service
- The OEM updates the service record for the vehicle
- The OEM issues a recall for the vehicle
- The OEM queries the vehicle location and triggers the recall to a convenient lo cation based on the vehicle's location
- The driver attends the recall location (or books and attends at their preferred lo cation)
- The OEM resolves the recall issue
- The OEM updates the vehicle record

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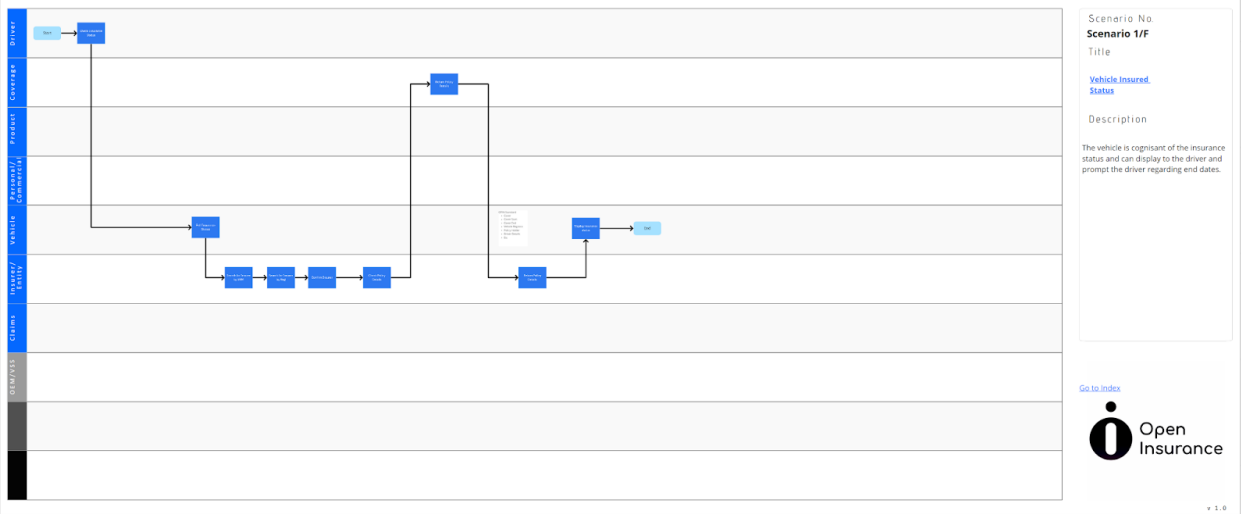
VEHICLE OPERATION AND MAINTENANCE

1/F- Scenario: Vehicle Insured Status



Business Event

This scenario allows an OPIN enabled vehicle to be cognizant of insurance status and advises the driver on insurance expiry dates.

Actors

The driver initiates this use case. Other actors include the OPIN Insurer, the vehicle, a government agency (where applicable) and OEM.

Use Case Description

The driver initiates checking the insurance status of the vehicle using the infotainment system. The data is sourced from an OPIN connected insurer by searching for the vehicle/policy using a number of data points such as Vehicle Identity Number, Vehicle Registration Number or Chassis Number. This case assumes an OPIN enabled SDK is used for this operation.

Use Case Association

1/A, 1/B and 1/C.

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VEHICLE OPERATION AND MAINTENANCE

1/F- Scenario: Vehicle Insured Status

Input summary

OPIN	VSS
.motorCoverage.vehicle.plateNumber	
.motorCoverage.vehicle.registrationDate	
.motorCoverage.vehicle.countryOfRegistration	
.motorCoverage.vehicle.chassisNumber	
.motorCoverage.vehicle.vin	

Output Summary

Insurance provability and vehicle becoming contextually aware of its insurance status.

Example Process Flow

- The driver operates the vehicle
- The vehicle polls for its insurance status (This could be a regular check or as a result of the driver initiating a request for this information from the infotainment system.
- OPIN identifies the insurer via the VRN and passes the query to the insurer
- The insurer identifies the policy via the vehicle registration
- The insurer checks the policy
- The insurer returns the key details (Date of renewal, Cover start, exceptions, etc…)
- The vehicle displays the requested data.

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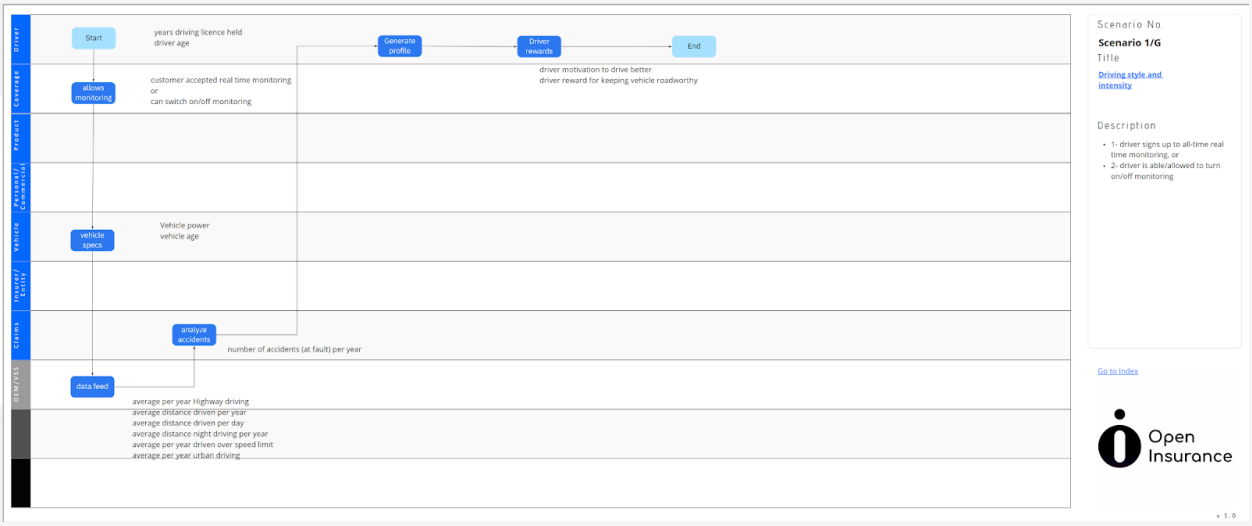
VEHICLE OPERATION AND MAINTENANCE

1/G- Scenario: Driving Style and Intensity



Business Event

Building on use case 1/D the driver operates their vehicle, driving it, and the data from the vehicle sensors is recorded by OPIN Insurer to build a driver profile.

Actors

The driver initiates this use case. Other actors include the OPIN Insurer and the Vehicle.

Use Case Description

This scenario allows OPIN Insurer to build a profile of the insured's driving style and patterns with the driver's consent for real time monitoring. This use case relies solely on collecting the number of miles driven. In combination with historical claims experience accurate risk pricing can be achieved.

Use Case Association

1/A, 1/B, 1/C, 1/M, 1/N and 1/O.

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VEHICLE OPERATION AND MAINTENANCE

1/G- Scenario: Driving Style and Intensity

Input summary

OPIN	VSS
.motorCoverage.vehicle.vin	Vehicle.VehicleIdentification.VIN
.motorCoverage.vehicle.aiClassification	
.motorCoverage.vehicle.vehicleUse	
.motorCoverage.vehicle.vehicleGarage	
.motorCoverage.vehicle.vehicleBrand	Vehicle.VehicleIdentification.Brand
.motorCoverage.vehicle.vehicleModel	Vehicle.VehicleIdentification.Model
.motorCoverage.vehicle.modelYear	Vehicle.VehicleIdentification.Year
.motorCoverage.vehicle.row1Pos1Isbelted	Vehicle.Cabin.Seat.Row1.Pos1.IsBelted
.motorCoverage.vehicle.row1Pos2Isbelted	Vehicle.Cabin.Seat.Row1.Pos2.IsBelted
.motorCoverage.vehicle.row2Pos1Isbelted	Vehicle.Cabin.Seat.Row2.Pos1.IsBelted
.motorCoverage.vehicle.row2Pos2Isbelted	Vehicle.Cabin.Seat.Row2.Pos2.IsBelted
.motorCoverage.Vehicle.occupiedSeats	
.motorCoverage.vehicle.accelHistory	
.motorCoverage.Vehicle.currentMileageDynamic	Vehicle.TravelledDistance
.motorCoverage.Vehicle.yearlyMilageDynamic	
.motorCoverage.Vehicle.highwayYearlyMilageDynamic	
.motorCoverage.Vehicle.dailyMilage	
.motorCoverage.Vehicle.consentGranted	
.motorCoverage.Vehicle.ignitionOn	Vehicle.IgnitionOn
.motorCoverage.Vehicle.ignitionOff	Vehicle.IgnitionOffTime
.motorCoverage.Vehicle.ignitionOnTime	Vehicle.IgnitionOnTime
.motorCoverage.Vehicle.ignitionOffTime	Vehicle.IgnitionOffTime
.motorCoverage.Vehicle.longitude	Vehicle.CurrentLocation.Longitude
.motorCoverage.Vehicle.latitude	Vehicle.CurrentLocation.Latitude
.motorCoverage.Vehicle.altitude	Vehicle.CurrentLocation.Altitude
.motorCoverage.Vehicle.heading	Vehicle.CurrentLocation.Heading
.motorCoverage.Vehicle.isMoving	Vehicle.IsMoving

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VEHICLE OPERATION AND MAINTENANCE

1/G- Scenario: Driving Style and Intensity

.motorCoverage.Vehicle.hornIsActive	Vehicle.Body.Horn.IsActive
.motorCoverage.Vehicle.drivingSpeed	Vehicle.Speed
.motorCoverage.Vehicle.decelrationRate	
.motorCoverage.Vehicle.steeringSpeedTurn	
.motorCoverage.Vehicle.obstacleDetectionIsActive	Vehicle.ADAS.ObstacleDetection.IsActive
.motorCoverage.Vehicle.speedSet	Vehicle.ADAS.CruiseControl.SpeedSet
.motorCoverage.Vehicle.yaw	Vehicle.AngularVelocity.Yaw
.motorCoverage.Vehicle.pitch	Vehicle.AngularVelocity.Pitch
.motorCoverage.Vehicle.roll	Vehicle.AngularVelocity.Roll
.motorCoverage.Vehicle.gForce	

Output Summary
Generate driver Profile through the amount of miles driven.

Example Process Flow
Precondition of this flow is that the driver has accepted real time monitoring and where it is toggleable the driver has monitoring enabled.

- Driver operates vehicle
- The driver enables real time monitoring
- The vehicle provides data to the OEM about the driver's driving style (Speed, braking, distance, driving time, highway driving time, urban driving time etc…)
- The insurer returns any accidents or incidents relating to the driver/vehicle
- The combination of vehicle specification, driving behaviour and accident history is written to the driver's driving behaviour profile.
- Where appropriate (in regards to appropriate insurance product) driver behave iour rewards can be generated for good driving over a fixed period.

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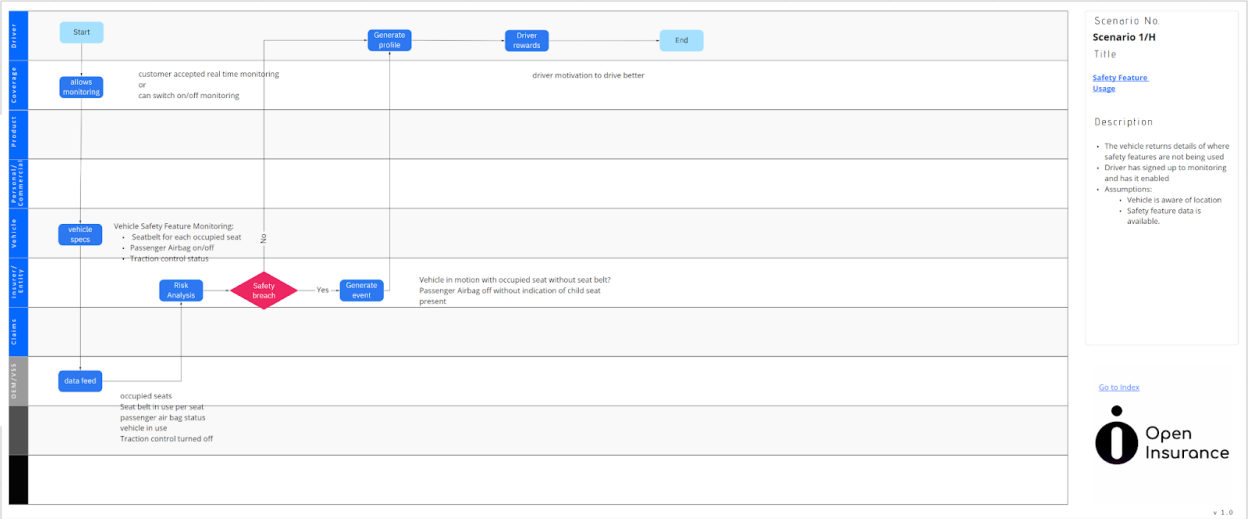
VEHICLE OPERATION AND MAINTENANCE

1/H- Scenario: Safety Feature Usage



Business Event
The driver operates the vehicle and utilises or disables the safety features available in the vehicle.

Actors
The driver initiates this use case. Other actors include the OPIN Insurer, the Vehicle, and OEM.

Use Case Description
Modern vehicles have a variety of sensors and driver aids many of which can be turned off by the driver. Recording these choices adds an additional dimension to a driver profile. This use case supports scenarios involving driver attitude, safety consciousness and driver rewards.

Use Case Association
1/A, 1/B, 1/C and 1/G.

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VEHICLE OPERATION AND MAINTENANCE

1/H- Scenario: Safety Feature Usage

Input summary

OPIN	VSS
.motorCoverage.vehicle.plateNumber	
.motorCoverage.vehicle.registrationDate	
.motorCoverage.vehicle.countryOfRegistration	Vehicle.VehicleIdentification.dateVehicleFirstRegistered
.motorCoverage.vehicle.chassisNumber	
.motorCoverage.vehicle.vin	Vehicle.VehicleIdentification.VIN
.motorCoverage.vehicle.engineNumber	
.motorCoverage.vehicle.bodyType	Vehicle.VehicleIdentification.bodyType
.motorCoverage.vehicle.vehicleUse	
.motorCoverage.vehicle.vehicleBrand	Vehicle.VehicleIdentification.Brand
.motorCoverage.vehicle.vehicleModel	Vehicle.VehicleIdentification.Model
.motorCoverage.vehicle.modelYear	Vehicle.VehicleIdentification.Year
.motorCoverage.vehicle.seats	Vehicle.VehicleIdentification.vehicleSeatingCapacity
.motorCoverage.vehicle.sumInsured	
.motorCoverage.vehicle.accessories	
.motorCoverage.vehicle.accessoryValue	
.motorCoverage.Vehicle.ignitionOn	
.motorCoverage.Vehicle.ignitionOff	
.motorCoverage.Vehicle.ignitionOnTime	
.motorCoverage.Vehicle.ignitionOffTime	
.motorCoverage.Vehicle.consentGranted	
.motorCoverage.vehicle.row1Pos1Isbelted	Vehicle.Cabin.Seat.Row1.Pos1.IsBelted
.motorCoverage.vehicle.row1Pos2Isbelted	Vehicle.Cabin.Seat.Row1.Pos2.IsBelted
.motorCoverage.vehicle.row2Pos1Isbelted	Vehicle.Cabin.Seat.Row2.Pos1.IsBelted
.motorCoverage.vehicle.row2Pos2Isbelted	Vehicle.Cabin.Seat.Row2.Pos2.IsBelted
.motorCoverage.Vehicle.childSeatOccupiesSeat	
.motorCoverage.vehicle.hasTractionEnabled	

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VEHICLE OPERATION AND MAINTENANCE

1/H- Scenario: Safety Feature Usage

.motorCoverage.vehicle.occupiedSeats	
.motorCoverage.vehicle.isMoving	Vehicle.IsMoving

Output Summary
Updated driver profile to support underwriting decisions and rewards schemes.

Example Process Flow
Precondition of this flow is that the driver has accepted real time monitoring and where it is toggleable the driver has monitoring enabled.

- Driver operates vehicle
- The driver enables real time monitoring
- The vehicle is cognizant of and is monitoring the usage of safety features and feeds this data to the OEM
- The OEM records safety feature utilisation such as seat belts in use, traction control status etc…
- The OEM feeds the information to the insurer who determines if safety breaches are occurring
  - If there is no breach, the driver profile is updated with this information
  - If there is a breach, for example driving without a seatbelt in use per occupied seat, an event is generated and written to the driver profile, the event can be consumed by other use cases.
- Where appropriate (in regards to appropriate insurance product) driver behaviour rewards can be generated for utilising safety features appropriately over a fixed period

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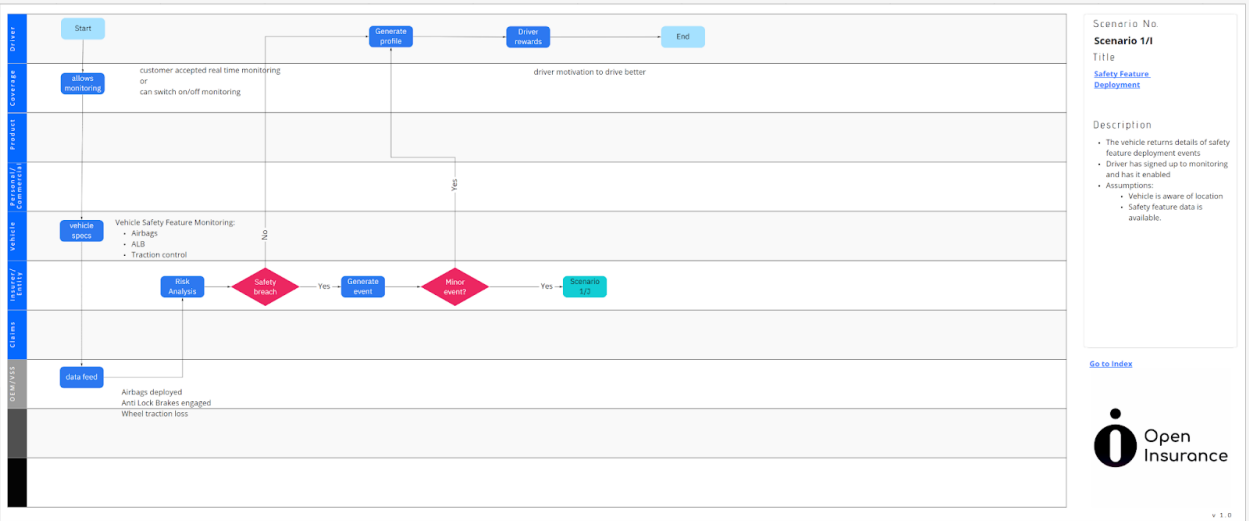
VEHICLE OPERATION AND MAINTENANCE

1/I- Scenario: Safety Feature Deployment



Business Event

The driver operates the vehicle and an event occurs which necessitates the deployment of one or more of the enabled safety features. This might be in response to an incident or a driving style choice.

Actors

The driver initiates this use case. Other actors include the OPIN Insurer, the vehicle, and OEM.

Use Case Description

Modern vehicles have a variety of sensors and driver aids many of which can be turned off by the driver. Where one of these features is deployed, it can provide insight into an incident. In the case of a minor incident, it can update the driver profile to help build a richer picture of driving style, where the incident leads to a claim, this data can help support the claim and provide useful insight.

Use Case Association

1/A, 1/B, 1/C, 1/G and 1/H.

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VEHICLE OPERATION AND MAINTENANCE

1/I- Scenario: Safety Feature Deployment

Input summary

OPIN	VSS
.motorCoverage.vehicle.plateNumber	
.motorCoverage.vehicle.registrationDate	
.motorCoverage.vehicle.countryOfRegistration	Vehicle.VehicleIdentification.dateVehicleFirstRegistered
.motorCoverage.vehicle.chassisNumber	
.motorCoverage.vehicle.vin	Vehicle.VehicleIdentification.VIN
.motorCoverage.vehicle.engineNumber	
.motorCoverage.vehicle.bodyType	Vehicle.VehicleIdentification.bodyType
.motorCoverage.vehicle.vehicleUse	
.motorCoverage.vehicle.vehicleBrand	Vehicle.VehicleIdentification.Brand
.motorCoverage.vehicle.vehicleModel	Vehicle.VehicleIdentification.Model
.motorCoverage.vehicle.modelYear	Vehicle.VehicleIdentification.Year
.motorCoverage.vehicle.seats	Vehicle.VehicleIdentification.vehicleSeatingCapacity
.motorCoverage.vehicle.sumInsured	
.motorCoverage.vehicle.accessories	
.motorCoverage.vehicle.accessoryValue	
.motorCoverage.Vehicle.ignitionOn	
.motorCoverage.Vehicle.ignitionOff	
.motorCoverage.Vehicle.ignitionOnTime	
.motorCoverage.Vehicle.ignitionOffTime	
.motorCoverage.Vehicle.consentGranted	
.motorCoverage.vehicle.row1Pos1Isbelted	Vehicle.Cabin.Seat.Row1.Pos1.IsBelted
.motorCoverage.vehicle.row1Pos2Isbelted	Vehicle.Cabin.Seat.Row1.Pos2.IsBelted
.motorCoverage.vehicle.row2Pos1Isbelted	Vehicle.Cabin.Seat.Row2.Pos1.IsBelted
.motorCoverage.vehicle.row2Pos2Isbelted	Vehicle.Cabin.Seat.Row2.Pos2.IsBelted
.motorCoverage.Vehicle.childSeatOccupiesSeat	

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VEHICLE OPERATION AND MAINTENANCE

1/I- Scenario: Safety Feature Deployment

.motorCoverage.vehicle.hasTractionEnabled	
.motorCoverage.vehicle.occupiedSeats	
.motorCoverage.vehicle.isMoving	Vehicle.IsMoving
.motorCoverage.vehicle.wheelSpin	
.motorCoverage.vehicle.hasAirbagDeployed	Vehicle.Cabin.Seat.Row1.Pos1.Airbag.IsDeployed

Output Summary
Updated driver profile to support underwriting decisions and rewards schemes.

Example Process Flow
Precondition of this flow is that the driver has accepted real time monitoring and where it is toggleable the driver has monitoring enabled.

- Driver operates vehicle
- The driver enables real time monitoring
- The vehicle is cognizant of and is monitoring the usage of safety features and feeds this data to the OEM
- The vehicle indicates to the OEM that a safety feature has been utilised - Loss of traction, Anti Lock Brake engaged, Airbag deployed etc...
- The OEM records that a safety feature has been utilised
- The OEM feeds the information to the insurer who determines if safety breaches are occurring
  - If there is no breach, the driver profile is updated with this information
  - If there is a breach, the insurer determines if it is a significant breach
    + If the breach is significant then the process moves onto a vehicle led notification of an incident (scenario 1/J)
    + If the breach is minor, an event is generated and written to the driver profile, the event can be consumed by other use cases.
- Where appropriate (in regards to appropriate insurance product) driver behaviour rewards can be generated for utilising safety features appropriately over a fixed period

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VEHICLE INCIDENTS

Insured drivers can get involved in various types of incidents. An incident could lead to a loss and/or a claim, for example a head on impact. But insurers can take a more proactive role in alerting and assisting the driver if data from connected cars is shared and analyzed in real time.

Data generated by incidents can be shared with insurers, authorities, concierge services and others to facilitate claims processing.

Scenarios that were explored included:
1/J- Scenario - Vehicle Incident - Impact - Vehicle led notification

1/K- Scenario: Early detection, warning and assistance during a flood

1/L- Scenario: Vehicle Incident - Stolen- Vehicle led notification

1/M- Scenario: Assessing and costing damage in real time

1/N- Scenario: Crash of autonomous car into a moving vehicle

1/O- Scenario: Damage to third party property

1/P- Scenario: Prescriptive analytics

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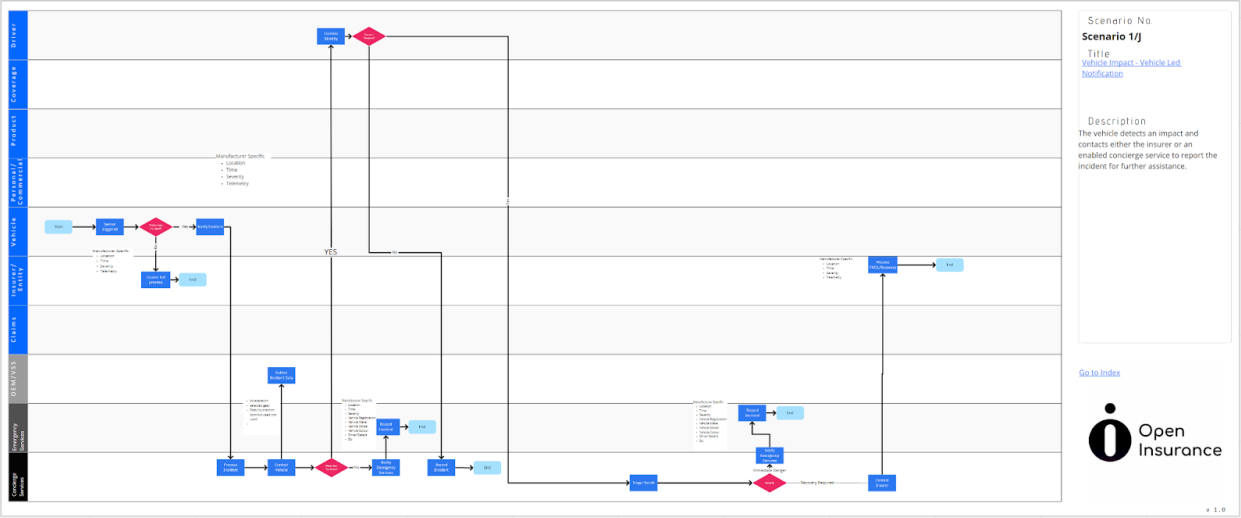
VEHICLE INCIDENTS

1/J- Scenario: Vehicle Incident - Impact - Vehicle led notification



Business Event

The vehicle detects an impact event which triggers in-vehicle systems to reach out for assistance either from an insurer or a concierge service.

Actors

The vehicle initiates this use case. Other actors include the OPIN Insurer, the driver, the concierge service (where applicable) and the emergency services.

Use Case Description

This scenario utilises the capabilities of a vehicle and the services sold with vehicles to initiate action when a collision incident occurs. The driver can be contacted and if required or unresponsive, emergency services can be directed to aid the driver. The insurance company can also initiate the First Notification of Loss (FNOL) process to improve the insured's journey and aid retention/cost reduction.

Use Case Association

1/I, 1/M, 1/N and 1/O

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VEHICLE INCIDENTS

1/J- Scenario: Vehicle Incident - Impact - Vehicle led notification

Input summary

OPIN	VSS
.motorCoverage.vehicle.plateNumber	
.motorCoverage.vehicle.registrationDate	
.motorCoverage.vehicle.countryOfRegistration	Vehicle.VehicleIdentification.dateVehicleFirstRegistered
.motorCoverage.vehicle.chassisNumber	
.motorCoverage.vehicle.vin	Vehicle.VehicleIdentification.VIN
.motorCoverage.vehicle.agencyRepair	
.motorCoverage.vehicle.bodyType	Vehicle.VehicleIdentification.bodyType
.motorCoverage.vehicle.aiClassification	
.motorCoverage.vehicle.vehicleUse	
.motorCoverage.vehicle.vehicleBrand	Vehicle.VehicleIdentification.Brand
.motorCoverage.vehicle.vehicleModel	Vehicle.VehicleIdentification.Model
.motorCoverage.vehicle.modelYear	Vehicle.VehicleIdentification.Year
.motorCoverage.Vehicle.modelYear	
.motorCoverage.Vehicle.hasAirbagDeployed	Vehicle.Cabin.Seat.Row1.Pos1.Airbag.IsDeployed
.motorCoverage.Vehicle.hasBrakesError	Vehicle.ADAS.ABS.Error
.motorCoverage.Vehicle.hasEngineWarning	
.motorCoverage.Vehicle.hasAirbagDeployed	Vehicle.Cabin.Seat.Row1.Pos1.Airbag.IsDeployed
.motorCoverage.Vehicle.hasBrakesError	Vehicle.ADAS.ABS.Error
.motorCoverage.Vehicle.hasEngineWarning	
.motorCoverage.vehicle.longitude	Vehicle.CurrentLocation.Longitude
.motorCoverage.vehicle.latitude	Vehicle.CurrentLocation.Latitude
.motorCoverage.vehicle.altitude	Vehicle.CurrentLocation.Altitude
.motorCoverage.vehicle.heading	Vehicle.CurrentLocation.Heading
.motorCoverage.vehicle.tractionControlEngaged	Vehicle.ADAS.TCS.IsActive

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VEHICLE INCIDENTS

1/J- Scenario: Vehicle Incident - Impact - Vehicle led notification

.motorCoverage.vehicle.hasTractionEnabled

.motorCoverage.vehicle.emergencyBraking

.motorCoverage.claim.location

.motorCoverage.claim.lossCause

.motorCoverage.claim.fnol

.motorCoverage.claim.lossDate

Output Summary

Maintain almost real time contact with the insured driver, offer assistance and provide concierge services when needed.

Example Process Flow

Precondition of this flow is that the driver has accepted real time monitoring and where it is toggleable the driver has monitoring enabled.

- A vehicle sensor is triggered
- Is the vehicle concierge equipped?
  - If no then details of the incident will be transmitted to the insurer for follow up (location, time, severity, telemetry)
  - If yes, then continue to notify incident to the concierge service
- The concierge service processes the incident, informs the OEM and attempts to contact the vehicle
- The concierge service also passes the incident details onto the OEM
  - If no response is received the concierge service contacts the appropriate emergency services
  - The Emergency service records the incident and takes action as appropriate.
  - If a response is received the concierge service conform the driver's identity and ask if support is required
    - + If no support is required, the concierge service record the incident
    - + If support is required, the concierge service triage the needs of the driver
      - If there is immediate danger, the concierge service notify the emergency services
      - Otherwise the concierge service contact the insurer
      - The insurer initiates the FNOL/recovery process.

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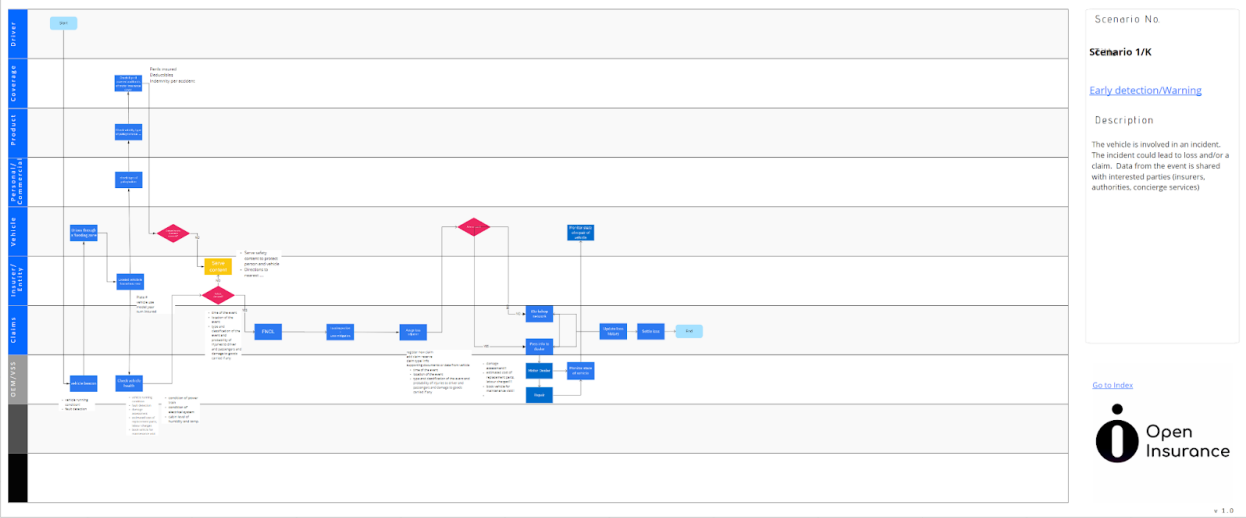
VEHICLE INCIDENTS

1/K- Scenario: Early detection, warning and assistance during a flood



Business Event
The insured vehicle approaches a hazardous zone which may cause injury to the driver and damage to the vehicle.

Actors
The insurance company initiates this use case. Other actors include the driver, OEM, loss adjuster and car workshop or dealership.

Use Case Description
The insurer, based on geolocation data, takes the initiative to alert the driver of impending flood hazard by sending information and suggestions of the best course of action to take to avert loss.

If no damage has occurred, the insurer navigates the driver to a safer location while serving appropriate real time content and information.

If damage has occurred, the insurer can initiate digitally if possible FNOL, loss adjustment and booking the vehicle in for repairs at dealer workshop or non-dealer workshop depending on policy terms and conditions.

The use case suggests a direct communication channel between the insurer and repairers to allow for communication of estimated cost of replacement parts, labour charges and for monitoring repair fulfilment.

Use Case Association
1/G, 1/H, 1/I and 1/J.

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VEHICLE INCIDENTS

1/K- Scenario: Early detection, warning and assistance during a flood

Input summary

OPIN	VSS
.motorCoverage.claim.lossDate	
.motorCoverage.claim.timeOfLoss	
.motorCoverage.claim.location	
.motorCoverage.claim.claimType	
.motorCoverage.claim.lossCause	
.motorCoverage.claim.description	
.motorCoverage.Vehicle.longitude	Vehicle.CurrentLocation.Longitude
.motorCoverage.Vehicle.latitude	Vehicle.CurrentLocation.Latitude
.motorCoverage.Vehicle.altitude	Vehicle.CurrentLocation.Altitude
.motorCoverage.Vehicle.heading	Vehicle.CurrentLocation.Heading
.motorCoverage.Vehicle.isMoving	Vehicle.IsMoving
.motorCoverage.Vehicle.cabinTemperature	
.motorCoverage.Vehicle.cabinHumidity	
.motorCoverage.Vehicle.dashboardWarning	(add?)
.motorCoverage.Vehicle.hasAirbagDeployed	Vehicle.Cabin.Seat.Row1.Pos1.Airbag.IsDeployed
.motorCoverage.Vehicle.hasBrakesError	Vehicle.ADAS.ABS.Error
.motorCoverage.Vehicle.hasEngineWarning	(add?)
.motorCoverage.Vehicle.damagedParts	
.motorCoverage.Vehicle.damagedPartsCost	
.motorCoverage.vehicle.agencyRepair	
.motorCoverage.vehicle.yaw	Vehicle.AngularVelocity.Yaw
.motorCoverage.vehicle.pitch	Vehicle.AngularVelocity.Pitch
.motorCoverage.vehicle.roll	Vehicle.AngularVelocity.Roll
.motorCoverage.claim.fnol	
.motorCoverage.claim.lossDate	
.motorCoverage.claim.reserve	
.motorCoverage.claim.lossCause	
.motorCoverage.claim.description	

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VEHICLE INCIDENTS

1/K- Scenario: Early detection, warning and assistance during a flood

.motorCoverage.vehicle.modelYear
.motorCoverage.vehicle.sumInsured

Vehicle.VehicleIdentification.Year

Output Summary
Generate additional contact points with the insured driver, instant FNOL notification to insurer, and process claims faster. Data aggregation can be used to estimate risk accumulation exposure in certain geographic areas, public parking lots or electric battery charging stations.

Example Process Flow

- Driver begins a journey
- State and operation of vehicle are transmitted to insurer
- Vehicle transmits telematics data to insurer
- OPIN insurer recognizes vehicle is approaching a flood zone
- Insurer carries out checks of type of policy coverage (e.g. comprehensive), perils covered, validity etc.
  - If peril is not covered by policy, alerts and assistance content is sent to driver
- If flood peril is covered by policy
  - Check vehicle health by analyzing sensor data for faults
  - If vehicle is damaged
    + Initiate FNOL process
    + Initiate loss inspection and mitigation processes
    + If agency repair is covered
      - Pass on details of vehicle and damage details
      - Book vehicle for repair
      - Monitor state of repair
        + If agency repair is not covered
      - Direct policyholder to repair workshop
- Update loss history
- Settle cost of repairs to workshop

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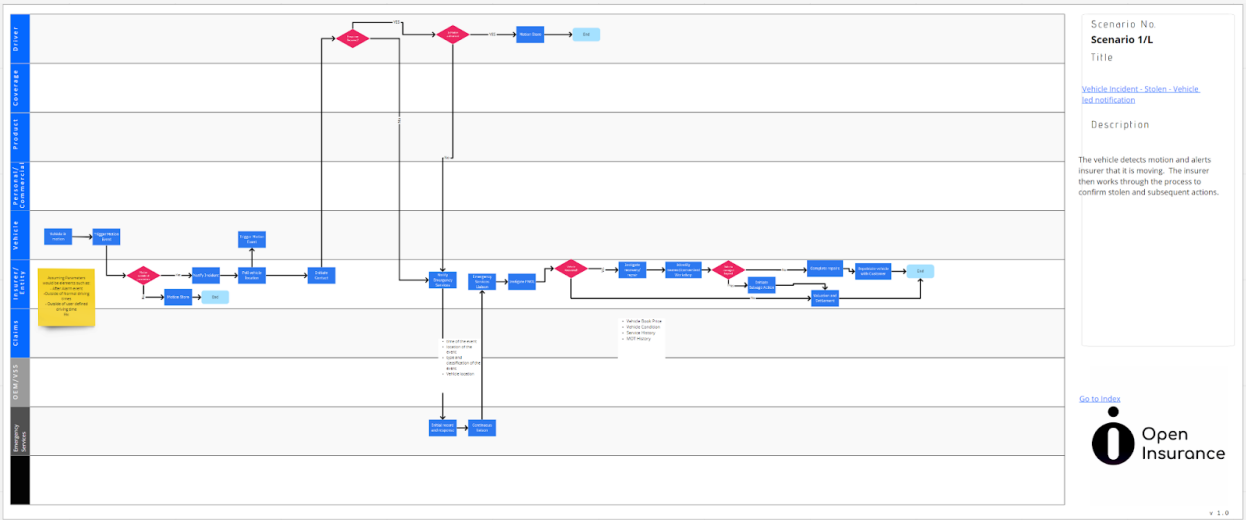
VEHICLE INCIDENTS

1/L- Scenario: Vehicle Incident - Stolen- Vehicle led notification



Business Event

The vehicle detects motion and alerts the insurer that it is moving. The insurer then works through the process to confirm stolen and subsequent actions

Actors

The vehicle initiates this use case. Other actors include the OPIN Insurer, the driver and the Emergency Services

Use Case Description

This scenario utilises the capabilities of a vehicle and the services sold with vehicles to initiate action when a vehicle is taken without permission. The driver can be contacted and if they confirm the vehicle has been taken without consent or if they are unavailable for confirmation then emergency services can be contacted and tracking data from the vehicle (GPS etc) can be made available. The insurance company can also initiate the First Notification of Loss process to improve the insured's journey and aid retention/cost reduction.

Use Case Association

1/G, 1/H, 1/I and 1/J.

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VEHICLE INCIDENTS

1/L- Scenario: Vehicle Incident - Stolen- Vehicle led notification

Input summary

OPIN	VSS
.motorCoverage.Vehicle.hasImmobilizer	
.motorCoverage.Vehicle.hasTheftDetection	
.motorCoverage.vehicle.digitalKeyUsed	
.motorCoverage.Vehicle.ignitionOn	Vehicle.IgnitionOn
.motorCoverage.Vehicle.ignitionOff	Vehicle.IgnitionOffTime
.motorCoverage.Vehicle.ignitionOnTime	Vehicle.IgnitionOnTime
.motorCoverage.Vehicle.ignitionOffTime	Vehicle.IgnitionOffTime
.motorCoverage.Vehicle.longitude	Vehicle.CurrentLocation.Longitude
.motorCoverage.Vehicle.latitude	Vehicle.CurrentLocation.Latitude
.motorCoverage.Vehicle.altitude	Vehicle.CurrentLocation.Altitude
.motorCoverage.Vehicle.heading	Vehicle.CurrentLocation.Heading
.motorCoverage.Vehicle.isMoving	Vehicle.IsMoving
.motorCoverage.claim.fnol	
.motorCoverage.claim.lossDate	
.motorCoverage.claim.claimType	
.motorCoverage.claim.location	
.motorCoverage.claim.lossCause	
.motorCoverage.claim.description	
.motorCoverage.vehicle.serviceHistory	
.motorCoverage.vehicle.sumInsured	

Output Summary

Prevent loss of vehicle, maintain contact with insured driver and accelerate claim processing and settlement.

Example Process Flow

- Vehicle in Motion and triggers a motion event to the insurer
- Is the motion outside of proscribed parameters?
  - If no then the motion is written to the driving behaviour log/store
  - If yes then the insurer records an incident
  - The insurer polls the vehicle location and contacts the insured
  - The insurer acts based on the response received

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VEHICLE INCIDENTS

1/L- Scenario: Vehicle Incident - Stolen- Vehicle led notification

+ If no response received
    - The insurer contacts the emergency services
    - The insurer continues to liaise with the emergency services
    - The insurer instigate FNOL
    - The FNOL journey is impacted by the recovery of the vehi cle?
        + If the vehicle is recovered, the insurer will instigate recovery and repair to the nearest appropriate work shop
        + The workshop will support the insurance company on as to the state of the vehicle in terms of economic via bility of repair
            - If the vehicle is beyond repair, the insurer will in stage a salvage/total loss process
            - If the vehicle is repairable, the insurer will insti gate a repair and repatriation process
        + If the vehicle is not recovered the insurer will instigate a valuation and settlement process
    - If a response is received, the insurer ascertains as to whether the motion event is authorised
        + If the motion is unauthorised the insurer will fol low the process above that starts with “The in surer contacts the emergency services”
        + If the motion event is authorised, the insurer records the motion event under driver behaviour and takes no further action.

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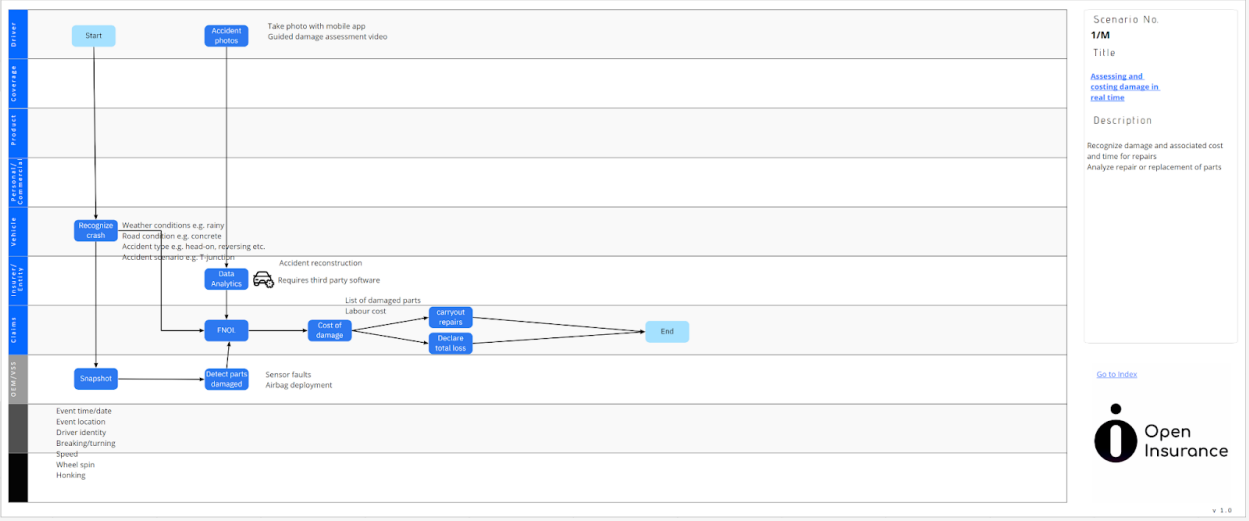
VEHICLE INCIDENTS

1/M- Scenario: Assessing and costing damage in real time



Business Event

Cut through FNOL initiation by vehicle allowing for automated accident recognition by the insurer as soon as the driver is involved in an accident.

Actors

The vehicle initiates this use case thus is the actor. Other actors include the OPIN insurer and OEM.

Use Case Description

Data from various systems, gyroscopes and accelerometers could provide information leading to the recognition of an impact event. This data can be enriched with data from external sources to reconstruct an accident. Weather conditions, such as rain or snow, road conditions, such as concrete surface, and on dash video footage are potential third party software and hardware that generate enrichment data. In combination, the insurer may be able to recognize a head-on accident at a T junction using machine trained algorithms.

An added verification layer may involve the driver in a guided video damage assessment or still shots using the insurers mobile app.

Use Case Association

1/N and 1/O.

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VEHICLE INCIDENTS

1/M- Scenario: Assessing and costing damage in real time

Input summary

OPIN	VSS
.motorCoverage.claim.claimNumber	
.motorCoverage.claim.fnol	
.motorCoverage.claim.lossDate	
.motorCoverage.claim.claimType	
.motorCoverage.claim.location	
.motorCoverage.claim.lossCause	
.motorCoverage.claim.description	
.motorCoverage.claim.liabilityShare	
.motorCoverage.claim.reserve	
.motorCoverage.claim.excessAmount	
.motorCoverage.vehicle.ignitionOn	Vehicle.IgnitionOn
.motorCoverage.vehicle.ignitionOff	Vehicle.IgnitionOffTime
.motorCoverage.vehicle.ignitionOnTime	Vehicle.IgnitionOnTime
.motorCoverage.vehicle.ignitionOffTime	Vehicle.IgnitionOffTime
.motorCoverage.vehicle.longitude	Vehicle.CurrentLocation.Longitude
.motorCoverage.vehicle.latitude	Vehicle.CurrentLocation.Latitude
.motorCoverage.vehicle.altitude	Vehicle.CurrentLocation.Altitude
.motorCoverage.vehicle.heading	Vehicle.CurrentLocation.Heading
.motorCoverage.vehicle.hasAirbagDeployed	Vehicle.Cabin.Seat.Row1.Pos1.Airbag.IsDeployed
.motorCoverage.vehicle.hasBrakesError	Vehicle.ADAS.ABS.Error
.motorCoverage.vehicle.hasEngineWarning	
.motorCoverage.vehicle.brakingPedalForce	
.motorCoverage.vehicle.brakingPedalSpeed	
.motorCoverage.vehicle.steeringSpeedTurn	
.motorCoverage.vehicle.wheelSpin	
.motorCoverage.vehicle.hornIsActive	Vehicle.Body.Horn.IsActive
.motorCoverage.vehicle.damagedParts	
.motorCoverage.vehicle.damagedPartsCost	
.motorCoverage.vehicle.wheelSpin	
.motorCoverage.vehicle.decelrationRate	

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VEHICLE INCIDENTS

1/M- Scenario: Assessing and costing damage in real time

.motorCoverage.vehicle.steeringSpeedTurn	
.motorCoverage.vehicle.laneDepartureWarnning	Vehicle.ADAS.LaneDepartureDetection.Warning
.motorCoverage.vehicle.adasAbsIsActive	Vehicle.ADAS.ABS.IsActive
.motorCoverage.vehicle.obstacleDetectionIsActive	Vehicle.ADAS.ObstacleDetection.IsActive
.motorCoverage.vehicle.driverIntervention	
.motorCoverage.vehicle.obstacleDetectionWarning	Vehicle.ADAS.LaneDepartureDetection.Warning
.motorCoverage.vehicle.speedSet	Vehicle.ADAS.CruiseControl.SpeedSet
.motorCoverage.vehicle.dashboardWarning	

Output Summary
Recognize damage occurrence, analyze repair or replacement of parts and associated cost and time for repairs.

Example Process Flow

- Driver is involved in an accident
- Vehicle systems recognize a crash
- Vehicle captures several seconds worth of data leading to and after the accident (a snapshot)
- Insurer initiates FNOL using snapshot data
- Insurer guides driver in capturing images/video recording of damage
- If data analytics capability is available to insurer
    + Reconstruct accident
    + Estimate list of damaged parts and cost of repair
- Resolve claim
    + Initiate repair process
    + Declare total loss
- Settle claim

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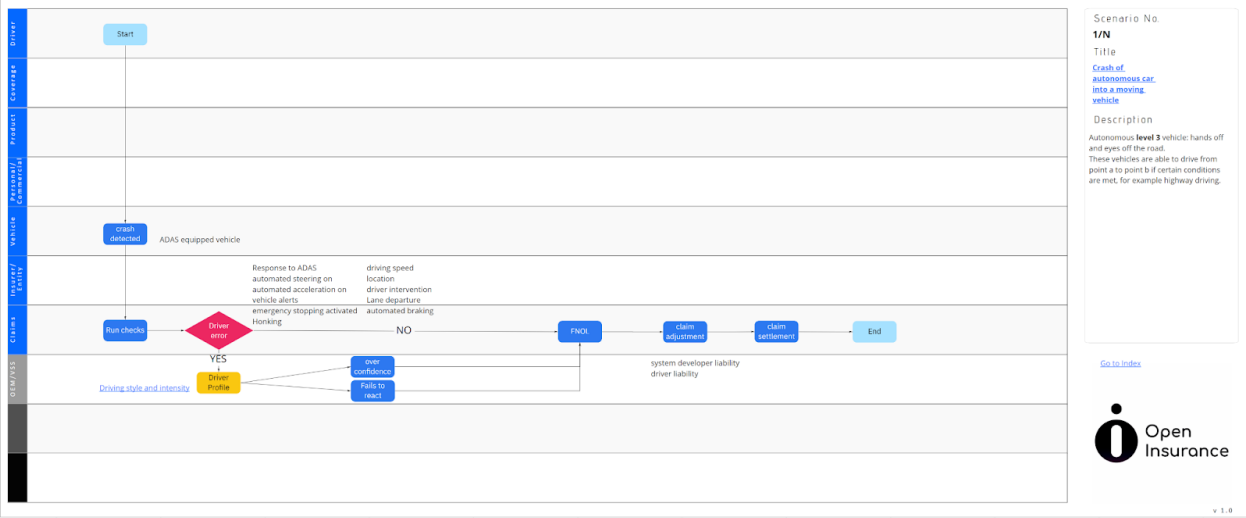
VEHICLE INCIDENTS

1/N- Scenario: Crash of autonomous car into a moving vehicle



Business Event

Autonomous level 3 vehicles offer hands off and eyes off the road capabilities. These vehicles are able to drive from point a to point b if certain conditions are met, for example driven on highways.

Actors

The insurer initiates this use case thus is the actor. Other actors include the driver and OEM.

Use Case Description

Liability determination is becoming ever more important as more vehicles adopt level 3 autonomous driving. Driver interaction with ADAS and system override to avert accidents should be monitored and evaluated by insurers.

In some instances the driver may be over-confident of the behaviour of ADAS and not keep a watchful eye on a developing hazardous situation. In other instances, driver distraction may mean the driver does not respond to ADAS warning in good time. This information may help the insurer form a driver profile which can have an influence on the premium rate calculated.

Additionally, such data can determine whether some vehicles/vehicle models are prone to ADAS errors. This information can be used by insurers to determine the risk that different vehicles pose.

Use Case Association

1/M and 1/O.

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VEHICLE INCIDENTS

1/N- Scenario: Crash of autonomous car into a moving vehicle

Input summary

OPIN	VSS
.motorCoverage.claim.fnol	
.motorCoverage.claim.lossDate	
.motorCoverage.claim.claimType	
.motorCoverage.claim.location	
.motorCoverage.claim.lossCause	
.motorCoverage.claim.description	
.motorCoverage.claim.liabilityShare	
.motorCoverage.vehicle.aiClassification	
.motorCoverage.Vehicle.drivingSpeed	Vehicle.Speed
.motorCoverage.Vehicle.longitude	Vehicle.CurrentLocation.Longitude
.motorCoverage.Vehicle.latitude	Vehicle.CurrentLocation.Latitude
.motorCoverage.Vehicle.altitude	Vehicle.CurrentLocation.Altitude
.motorCoverage.Vehicle.heading	Vehicle.CurrentLocation.Heading
.motorCoverage.Vehicle.driverIntervention	
.motorCoverage.Vehicle.laneDepartureWarnning	Vehicle.ADAS.LaneDepartureDetection.Warning
.motorCoverage.Vehicle.adasAbsIsActive	Vehicle.ADAS.ABS.IsActive
.motorCoverage.Vehicle.obstacleDetectionIsActive	Vehicle.ADAS.ObstacleDetection.IsActive
.motorCoverage.Vehicle.speedSet	Vehicle.ADAS.CruiseControl.SpeedSet
.motorCoverage.Vehicle.obstacleDetectionWarning	Vehicle.ADAS.LaneDepartureDetection.Warning
.motorCoverage.Vehicle.emergencyBraking	
.motorCoverage.Vehicle.hornIsActive	Vehicle.Body.Horn.IsActive

Output Summary

FNOL information, driver response to ADAS alerts and information can generate an accurate vehicle profile.

System-developer liability versus driver liability is an important topic that is addressed by this use case.

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VEHICLE INCIDENTS

1/N- Scenario: Crash of autonomous car into a moving vehicle

Example Process Flow

- Driver initiates a journey in an ADAS equipped vehicle
- Driver is involved in an accident
- Insurer initiates FNOL
- Insurer runs analytics using sensor data and other parameters prior to accident
    + If cause of accident was driver error
        Update driver profile
    + adjusts claim
    + settles claim

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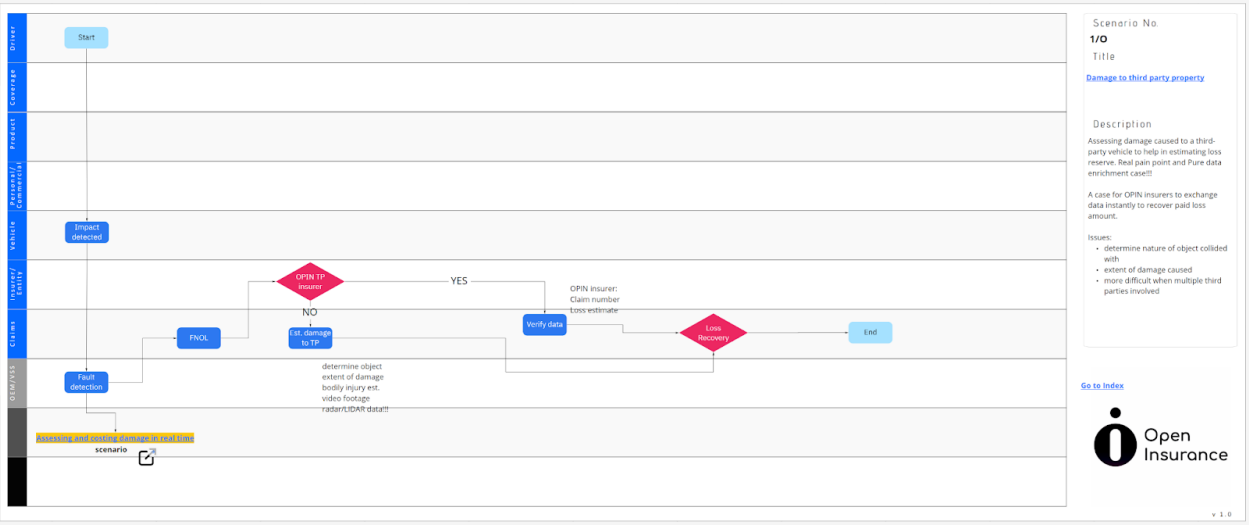
VEHICLE INCIDENTS

1/O- Scenario: Damage to third party property



Business Event

Issues such as determining the nature of objects collided with, or the extent of damage caused to multiple third parties can be further complicated when multiple insurers are involved.

Actors

The insurer is the actor in this use case. Other actors include the driver, OPIN insurer/s and the Vehicle.

Use Case Description

Accident data-sharing in complex claims, for example where several claimants are involved in a multi-car pile up, can reduce the time to resolution and improve results.

A case for OPIN insurers to exchange data instantly to recover paid loses. Insurers will be able to efficiently assess injuries or damage caused to third-party properties helping in setting accurate loss estimates/ reserve, initiate subrogation and take appropriate action.

Use Case Association

1/M and 1/N.

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VEHICLE INCIDENTS

1/O- Scenario: Damage to third party property

Input summary

OPIN	VSS
.motorCoverage.claim.claimNumber	
.motorCoverage.claim.fnol	
.motorCoverage.claim.lossDate	
.motorCoverage.claim.claimType	
.motorCoverage.claim.location	
.motorCoverage.claim.lossCause	
.motorCoverage.claim.description	
.motorCoverage.claim.liabilityShare	
.motorCoverage.claim.reserve	
.motorCoverage.claim.claimStatus	
.motorCoverage.claim.lastUpdate	
.motorCoverage.claim.excessAmount	
.motorCoverage.claim.documents	
.motorCoverage.Vehicle.decelrationRate	
.motorCoverage.Vehicle.longitude	Vehicle.CurrentLocation.Longitude
.motorCoverage.Vehicle.latitude	Vehicle.CurrentLocation.Latitude
.motorCoverage.Vehicle.altitude	Vehicle.CurrentLocation.Altitude
.motorCoverage.Vehicle.heading	Vehicle.CurrentLocation.Heading
.motorCoverage.Vehicle.damagedParts	
.motorCoverage.Vehicle.damagedPartsCost	
.motorCoverage.Vehicle.obstacleDetectionIsActive	Vehicle.ADAS.ObstacleDetection.IsActive
.motorCoverage.Vehicle.videoSnapshot	

Output Summary

Accurate loss reserve related data, determining recovery amounts, fraud prevention, swift verification and negotiation with third party insurers for claim recoveries and improved efficiency in claims processing.

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1/O- Scenario: Damage to third party property

Example Process Flow

- Driver causes an accident
- Vehicle detects impact damage
- Insurer uses scenario I/M to assess and cost damage in real time
- Insurer initiative FNOL
    + If third party is insured by an OPIN insurer
        - Verify accident information
        - Receive claim recovery information and quantum
    + If third party is not insured by an OPIN insurer
        - Estimate loss to third party
- Insurer settles loss

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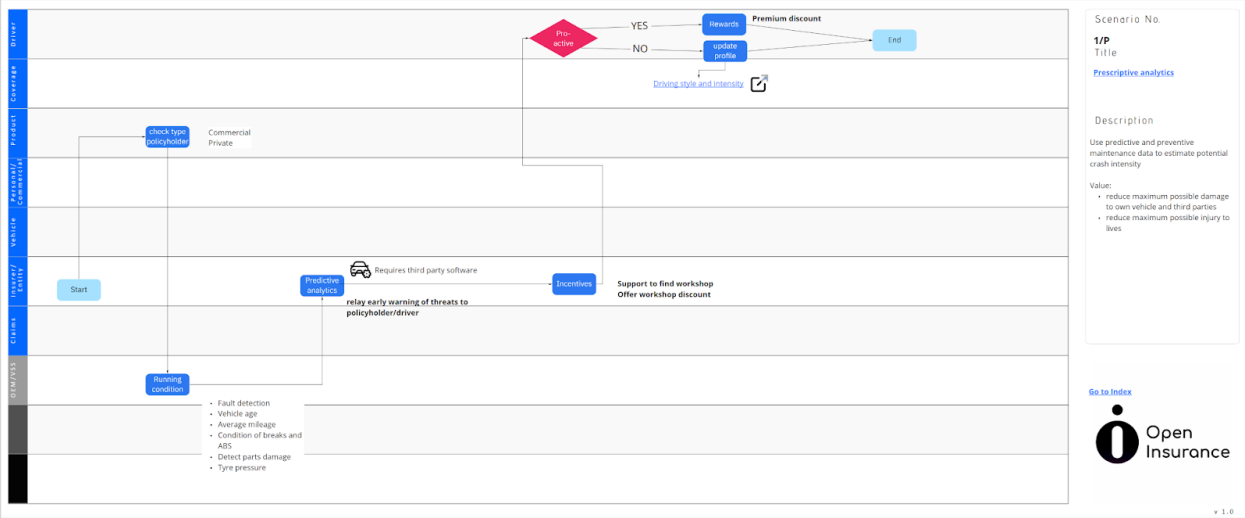
1/P- Scenario: Prescriptive analytics



Business Event

Use incentives to prompt the Insured to take a more proactive approach to pre-scriptive maintenance.

Actors

The insurer is the actor in this use case. Other actors include the owner or driver of the car, and OEM.

Use Case Description

Ingestion and analytics of vehicle data to generate predictive maintenance needs for an insured vehicle.

By designing a preventive maintenance program:

- maintain a genuine touch point with the Insured or driver.
- reduce maximum possible damage to own vehicle and third parties
- reduce maximum possible injury to lives

A layered approach to incentives featuring cash rebates and discounts for repairs, improvement of policyholder profile, and subsequent premium reduction, could motivate the driver to take a more proactive approach.

Use Case Association

1/A, 1/B, 1/C and 1/G.

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1/P- Scenario: Prescriptive analytics

Input summary

OPIN	VSS
.motorCoverage.vehicle.vehicleUse	
.motorCoverage.vehicle.yearlyMilage	
.motorCoverage.vehicle.vehicleBrand	
.motorCoverage.vehicle.vehicleModel	
.motorCoverage.vehicle.modelYear	
.motorCoverage.vehicle.plateNumber	
.motorCoverage.vehicle.vin	
.motorCoverage.vehicle.agencyRepair	
.motorCoverage.vehicle.distanceUnit	
.motorCoverage.vehicle.pleasureDistance	
.motorCoverage.vehicle.businessDistance	
.motorCoverage.vehicle.tireConditionRow1Left	
.motorCoverage.vehicle.tireConditionRow1Right	
.motorCoverage.vehicle.tireConditionRow2Left	
.motorCoverage.vehicle.tireConditionRow2Right	
.motorCoverage.vehicle.tirePressureRow1Left	Vehicle.Chassis.Axle.Row1.Wheel.Left.Tire.Pressure
.motorCoverage.vehicle.tirePressureRow1Right	Vehicle.Chassis.Axle.Row1.Wheel.Right.Tire.Pressure
.motorCoverage.vehicle.tirePressureRow2Left	Vehicle.Chassis.Axle.Row2.Wheel.Left.Tire.Pressure
.motorCoverage.vehicle.tirePressureRow2Right	Vehicle.Chassis.Axle.Row2.Wheel.Right.Tire.Pressure
.motorCoverage.vehicle.brakePadWearRow1Left	Vehicle.Chassis.Axle.Row1.Wheel.Left.Brake.PadWear
.motorCoverage.vehicle.brakePadWearRow1Right	Vehicle.Chassis.Axle.Row1.Wheel.Right.Brake.PadWear
.motorCoverage.vehicle.brakePadWearRow2Left	Vehicle.Chassis.Axle.Row2.Wheel.Left.Brake.PadWear
.motorCoverage.vehicle.brakePadWearRow2Right	Vehicle.Chassis.Axle.Row2.Wheel.Right.Brake.PadWear
.motorCoverage.vehicle.brakesWearRow1Right	Vehicle.Chassis.Axle.Row1.Wheel.Left.Brake.BrakesWorn
.motorCoverage.vehicle.brakesWearRow1Left	Vehicle.Chassis.Axle.Row1.Wheel.Right.Brake.BrakesWorn
.motorCoverage.vehicle.brakeWearRow2Left	Vehicle.Chassis.Axle.Row2.Wheel.Left.Brake.BrakesWorn
.motorCoverage.vehicle.brakeWearRow2Right	Vehicle.Chassis.Axle.Row2.Wheel.Right.Brake.BrakesWorn
.motorCoverage.vehicle.clutchCondition	Vehicle.Powertrain.Transmission.ClutchWear
.motorCoverage.vehicle.dashboardWarning	
.motorCoverage.vehicle.hasBrakesError	Vehicle.ADAS.ABS.Error
.motorCoverage.vehicle.hasEngineWarning	

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VEHICLE INCIDENTS

1/P- Scenario: Prescriptive analytics

Output Summary
Keep the vehicle in roadworthy condition. Reduce maximum possible damage to own vehicle and third parties and reduce maximum possible injury to lives. This scenario is also equally applicable to fleet management software vendors and fleet operators.

Example Process Flow

- Insurer determines likely utilization of vehicle depending on private or comer cial use
- Insurer runs analytics on vehicle running condition
- Insurer generates predictive analytics
- If anomalies are detected, insurer
    + Alerts policyholder or driver
    + Offer incentives to carry out repairs
        - Support to find appropriate workshop
        - Offer workshop discount
    + Policyholder/driver receives this information
        - If proactive action taken
            + Insurer offers premium discount at renewal
            + Insurer improves driver profile score - use case 1/G
        - If no proactive action taken
            + Insurer updates driver profile score - use case 1/G

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ADOPTION AND CHANGE CONTROL

The implications of open insurance go far beyond just insurance. Opening access to the insurance ecosystem through intelligent sharing of data, providing the tools for developers to experiment, creating communities of experts among dozens of other factors will provide a great boost for other industries to participate in open ended innovation.

It would be great to see organizations from diverse domains expand on the use cases presented here and identify and address constraints that may prevent the adoption of new technologies or processes. It will be equally interesting to see information flowing between different platforms not only within the insurance domain but also across platforms in other domains.

To aid in this endeavor, a second document titled "**Motor Insurance Technical POC and Implementation**" is under preparation by the mobility group and COVESA and is scheduled for publication in December 2021. Links to the document will be added to the OPIN website as well as GitHub.

As a community we also recognize the importance of communication. To this end, the OPIN Mobility Group will be operating a series of open invitations and sessions to discuss and review the work behind these two publications. An invitation is extended to OEMs and insurance organizations to explore and conduct proofs of concept.

Open standards are organic in nature and do undergo continuous development. The OPIN and COVESA communities have committed to maintaining alignment of both standards. Efforts will be made to improve the range of insurance-related derived information that is computed in-vehicle, potentially reducing the need for and the volume of data to be transferred to the cloud and also allow in-vehicle insurance systems to be possible. Moreover, a second more complex project is scheduled for the beginning of 2022 focusing on claims related data snapshots.

The working group is open to conversations and contact can be established by using the contact form at the OPIN website. A GitHub account also provides an opportunity for anyone to directly engage and submit change and improvement requests.

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DISCLAIMER

We are sharing information on this work and the roadmap to outline the Open Insurance Think Tank (OPIN) plans for the open API standard. All information provided in this document and supplements are provided for INFORMATIONAL PURPOSES ONLY, is general in nature, and is not intended to and should not be relied upon or construed as a binding commitment. OPIN makes no guarantees of any kind regarding the information herein.

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About **OPIN**

As a think tank we're working on solving many of the challenges that insurance companies and their partners come across. Through a range of projects, the community is discovering different driver journeys and use cases. We start by looking at what application functionality we would want to design and then explore different data categories that could be made available by the vehicle and its communication network to develop new systems and ML techniques. With our automotive partners we are exploring the boundaries of composable insurance.

Through its partnership with automotive partners, The Open Insurance Think Tank is developing and validating data standards and service catalogs that can accommodate the needs of the two industry domains within a privacy preserving framework.

https://openinsurance.io/

About **COVESA**

The Connected Vehicle Systems Alliance (COVESA), formerly known as the GENIVI Alliance, is a global, member-driven alliance focused on the development of open standards and technologies that accelerate innovation for connected vehicle systems, resulting in a more diverse, sustainable and integrated mobility ecosystem. COVESA is the only alliance focused solely on developing open standards and technologies for connected vehicles, which now form a growing percentage of vehicles on the road. Leveraging vehicle data and vehicle-to-cloud connectivity has become a primary goal of automakers and their suppliers.

https://www.covesa.global

Open Insurance

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