UServ Product Derby Case Study

Company Profile

UServ Financial Services provides a full service portfolio of financial products, including:

- o Insurance
    - o Property and Casualty
    - o Vehicle
        - ▪ Auto
        - ▪ Motorcycle
        - ▪ Boat
    - o Life
    - o Health
    - o Business
- o Banking
    - o Demand Deposit
    - o Savings
    - o Money Market
    - o Retirement
    - o Loans
        - ▪ Mortgage
        - ▪ Credit Cards
        - ▪ Lines of Credit

UServ's objective is to satisfy the complete financial services of its clients including their families, their businesses and their business colleagues. With this focus on complete relationship services, clients are rewarded for their loyalty as they deepen their relationship with UServ by increasing their financial portfolio.

UServ plays a balancing act between rewarding their best clients and managing the risk inherent in providing on-going service to clients whose portfolios are profitable, but violate the eligibility rules of individual products.

Business Rules

UServ's business rules are an essential component for managing this risk. The business rules address eligibility, pricing and cancellation policies at both the individual product and portfolio level.

Client Segmentation Business Rules

This case study focuses on UServ's vehicle insurance products, but differentiates the basic business rules from those that apply to preferred and elite clients.

A Preferred Client has a portfolio that includes at least three products. For example, a Preferred Client may have a portfolio that includes vehicle and life insurance policies and an Individual Retirement Account (IRA). A client is not a Preferred Client if their portfolio includes only three life insurance policies or four IRAs.

An Elite Client falls within UServ's top 1% clients based on revenue. UServ currently has 2.5 million clients, so there are 25,000 Elite Clients.

Eligibility Business Rules

The base business rules are dependent on the type of vehicle being insured and the characteristics of the people covered by the policy.

Automobile Eligibility

Potential Theft Category

If the car is a convertible, then the car's potential theft rating is high.
If the car's price is greater than $45,000, then the car's potential theft rating is high.
If the car model is on the list of "High Theft Probability Auto", then the car's potential theft rating is high.

If all of the following are true, then the car's potential theft rating is moderate.
   o   car's price is between $20,000 and $45,000,
   o   car model is not on the list of "High Theft Probability Auto"

If all of the following are true, then the car's potential theft rating is low:
   o   car's price is less that $20,000
   o   car model is not on the list of "High Theft Probability Auto"

The "High Theft Probability Auto" list is maintained by Risk Management and provided as input to the eligibility rating process.

Potential Occupant Injury Category

If the car has no airbags, then the car's potential occupant injury rating is extremely high.
If the car only has driver's air bag, then the car's potential occupant injury rating is high.
If the car has driver's and front passenger air bags, then the car's potential occupant injury rating is moderate.
If the car has driver's front passenger and side panel air bags, then the car's potential occupant injury is low.
If the car is a convertible and has no roll bar, then the potential occupant injury is extremely high.

Auto Eligibility

If the Potential Occupant Injury Rating is extremely high, then the auto eligibility is "not

eligible".
If the Potential Occupant Injury Rating is high, then the auto eligibility is "provisional".
If the Potential Theft Rating is high, then the auto eligibility is "provisional".

If none of the following is true, then the auto eligibility is "eligible"
    o   Auto eligibility is "not eligible"
    o   Auto eligibility is "provisional"

Driver Eligibility

(applied to each driver covered by the application or policy)

Driver Age Category

If the driver is male and is under the age of 25, then young driver.
If the driver is female and is under the age of 20, then young driver.
If young driver and driver has training certification, then eligible driver.
If the driver is over the age of 70, then senior driver.
If senior driver and driver has training certification, then eligible driver.

If the following are not true, then eligible driver
    o   Young driver
    o   Senior driver

If driver has taken driver's training from school then driver has training certification.
If driver has taken driver's training from a licensed driver training company, then driver has training certification.
If driver had taken a senior citizen driver's refresher course, then driver has training certification.

Driving Record Category

If the driver has been convicted of a DUI, then the driver qualifies as a High Risk Driver
If the number of accidents the applicant has been involved in is greater than 2, then the driver qualifies as a High Risk Driver.
If the driver has had more that 3 moving violations in the last two years, then the driver qualifies as a High Risk Driver.

Eligibility Scoring

A client's eligibility for auto insurance is determined by a scoring system based on the risk ratings for various categories. The lower the score, the better the eligibility rating.

For each Auto:	Rating	Score
Auto Eligibility	Not Eligible	+100

	Provisional	+50
	Eligible	+0
For each Driver	Young Driver that is not an Eligible Driver	+30
	Senior Driver that is not an Eligible Driver	+20
	Eligible Driver	+0
	High Risk Driver	+100
Client Segment	Preferred	-50
	Elite	-100

If eligibility score is less that 100, then client is eligible for insurance
If eligibility score is between 100 and 250 inclusive, then the client's application/policy renewal must be reviewed by underwriting manager who will determine whether the client is eligible for auto insurance.
If eligibility score is greater than 250, the client is not eligible for auto insurance.
If a long term client, the client is always eligible for auto insurance, as is every person and car directly covered by a long term client's auto policy.
A long term client has maintained a UServ portfolio for 15 years.

Pricing Business Rules

If the client is eligible for auto insurance, then the annual premium must be determined.

Auto Premiums

For each car on the policy:

If compact car, then base premium is $250.
If sedan, then base premium is $400.
If luxury car, then base premium is $500.
If car is new, then increase premium by $400.
If the model year is the same as the current year, then new car.
If the model year is the same as next year, then the car is new.
If car is less than 5 years old, then increase premium by $300.
If car is between 5 and 10 years old, then increase premium by $250.
If uninsured motorist coverage is included, then increase premium by $300
If medical coverage is included, then increase premium by $600.
If Potential Occupant Injury is Extremely High, then increase premium by $1,000.
If Potential Occupant Injury is High, then increase premium by $500.
If Potential Theft is High, then increase premium by $500.

Auto Discounts

If the car only has Driver airbags then lower the premium by 12 %.
If the car has Driver and Passenger airbags then lower the premium by 15 %.
If the car has Driver, Passenger and Side airbags then lower the premium by 18 %.
If the car's potential theft rating is high and the car is equipped with an alarm system, then lower the premium by 10%.

Percentages are accumulated. Add up all the percentages that apply to the car and apply as a total discount.

Driver Premiums

For each driver on the policy:

If young driver and married and located in CA, NY or VA, then increase premium by $700.
If young driver and single and located in CA, NY or VA, then increase premium by $720.
If young driver and married and not located in CA, NY or VA, then increase premium by $300.
If young driver and single and not located in CA, NY or VA, then increase premium by $300.
If senior driver and located in CA, NY or VA, then increase premium by $500.
If senior driver and not located in CA, NY or VA, then increase premium by $200.
Driver is a Typical Driver is all of the following are true: o   Not a Young Driver o   Not a Senior Driver
If a Typical Driver, then increase premium by $0.
If a High Risk Driver, then increase premium by $1,000.
Raise the premium by $ 150 per accident

Market Segment Discounts

These discounts are applied after all the individual car and driver premiums with discounts have been calculated. Total those premiums and then apply the market segment discounts.

If a preferred client, lower the premium by $250.
If an elite client, then lower the premium by $500.

Base Premium

After all discounts have been applied, the annual premium must be greater than or equal to the sum of the base premium for all the cars on the policy.

Scenarios

Grandfathered Rule Sets

The purpose of this scenario, besides exercising the auto insurance eligibility and pricing business rules, is to establish business rules for determining preferred clients, apply them and then change the business rules to be more stringent. The original set of rules continues to apply to clients who qualified as premium clients under those rules. The new ruleset applies to new clients.

Preferred Client Business Rule V1

A Preferred Client has a portfolio that includes at least three products families. For example, a Preferred Client may have a portfolio that includes vehicle and life insurance policies and an Individual Retirement Account (IRA). A client is not a Preferred Client if their portfolio includes only three vehicle insurance policies or four IRAs.

Sara Klaus is a new customer establishing a portfolio of financial services:

- o Checking Account
- o IRA
- o Property Insurance for her house
- o Auto Insurance

She qualifies for a Preferred Client because she is establishing accounts and policies in more that three product families.

Auto profiles:

Car 1	2005 Honda Odyssey Full Airbags Alarm System Price $39,000 Type: Luxury Not on "High Theft Probability List"
Car 2	2002 Toyota Camry Driver and Passenger Airbags Price: $12,000 Type: Compact Not on "High Theft Probability List"

Driver profiles:

Sara	Female
	38 years old
	Single
	Lives in Arizona
	No Accidents
	1 Moving Violation
	No DUIs
Spenser	Sara's Son
	Male
	17 years old
	Single
	Lives in Arizona
	No Accidents
	No Moving Violations
	No DUIs
	Has a Driver's Training Certificate from school
	Has a Good Student Certificate

Options for each car: Uninsured Motorist, Medical Coverage

Premium Amount:
Preferred Client: Yes

Preferred Client Business Rule V2

Four months after Sara becomes a client, management wants to reward longevity as well as depth of a client's portfolio. They have decided to change the Preferred Client eligibility rules to include a measure of longevity.

> A Preferred Client has a portfolio that includes an average of three products families over the prior rolling 12 month period. The configuration of the portfolio families can change over the period, so long as the average is three product families. New clients must maintain this average for a year before they are eligible.

To ensure that the existing preferred clients are not upset over the change in these eligibility rules, they will continue to maintain their preferred client status until their portfolio configuration falls below the 3 family limit.

In this scenario, a new client with the exact same profile as Sara does not qualify for the preferred customer. Sara is re-rated at her six month anniversary and continues to qualify as a preferred client.

Auto profiles:

Car 1	2005 Honda Odyssey
	Full Airbags

	Alarm System Price $39,000 Type: Luxury Not on "High Theft Probability List"
Car 2	2002 Toyota Camry Driver and Passenger Airbags Price: $12,000 Type: Compact Not on "High Theft Probability List"

Driver Profiles:

Mark Houston	Male 38 years old Single Lives in Arizona No Accidents 1 Moving Violation No DUIs
Angie	Mark's Daughter Female 17 years old Single Lives in Arizona No Accidents No Moving Violations No DUIs Has a Driver's Training Certificate from school Has a Good Student Certificate

Options: Uninsured Motorist, Medical Coverage

Premium Amount:
Preferred Client: No

Re-rate Sara, everything is the same except the cars are a year older

Premium Amount:
Preferred Client: Yes

Eligibility Within and Outside an Elite Client Relationship

This scenario exercise the business rules related to cars and drivers that are not eligible on their own, but are when they are part of the portfolio owned by an Elite Client. When that person tries to establish their own portfolio, they are scored based on their own merit independent of their merit.

Ray Meno is a well known TV personality who has one of the largest car collections (137) that are covered by UServ's auto insurance policy. Each member of his family (himself, his wife and 4 children) is covered by a million dollar life insurance policy. His UServ investment advisor manages his portfolio of real estate and financial investments.

Ray is UServ's highest revenue generating Elite client for the last 18 years.

Shane Meno is Ray's 21 year old son who has a problematic driving record. He drives one of his father's classic cars.

Shane	Male
	21 years old
	Single
	Lives in California
	2 Accidents
	3 Moving Violations
	No DUIs
	Has a Driver's Training Certificate from school

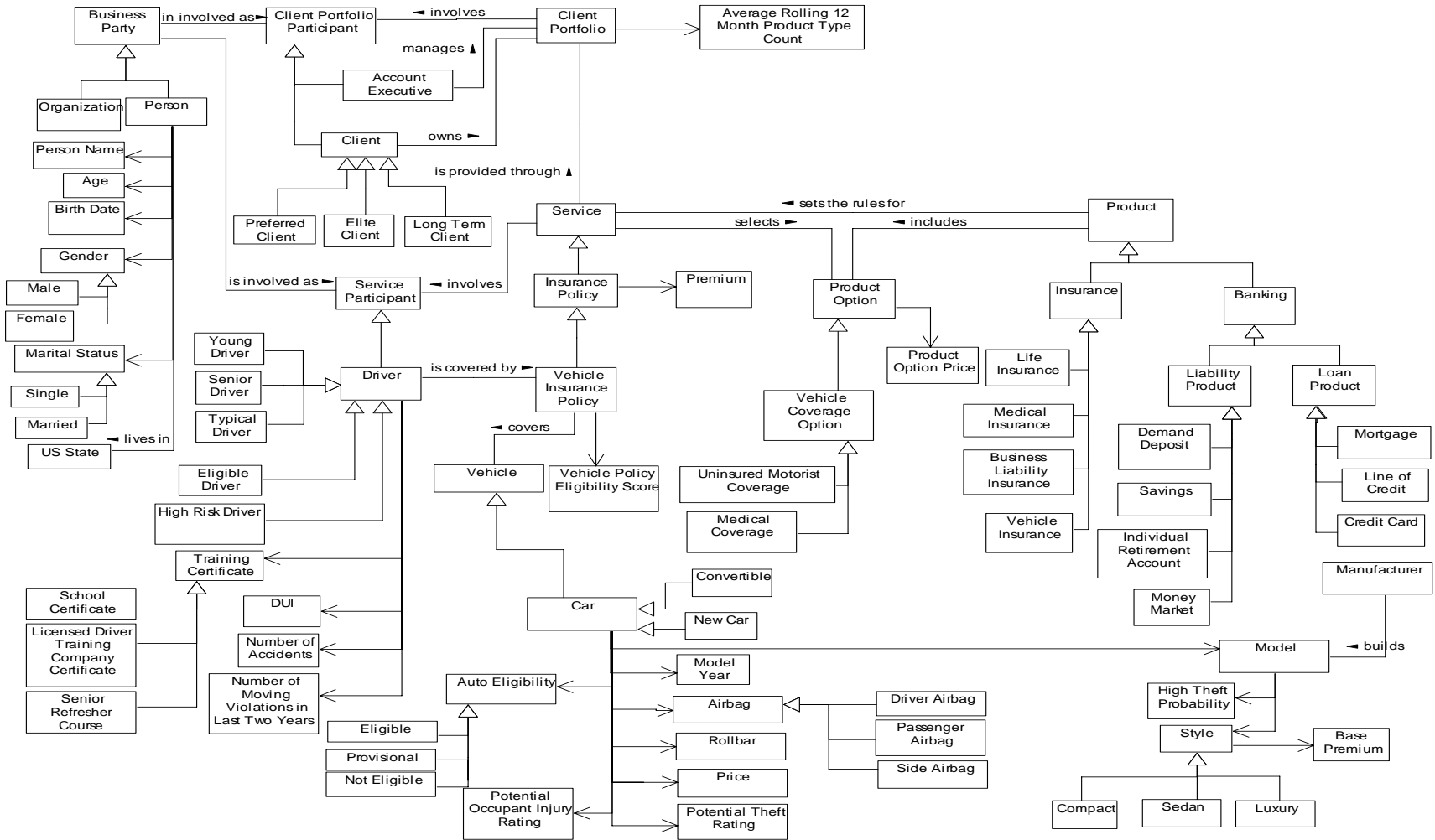| Shane's Car	1965 VW Bug
	No Airbags
	Price: $1,500
	Type: Compact
	On "High Theft Probability List"
	Convertible
	No Rollbar

Eligibility Score:
Premium for Shane:
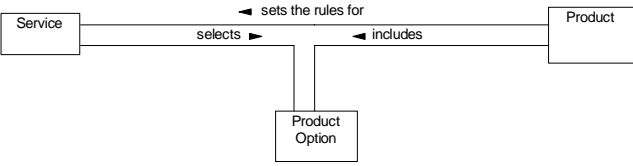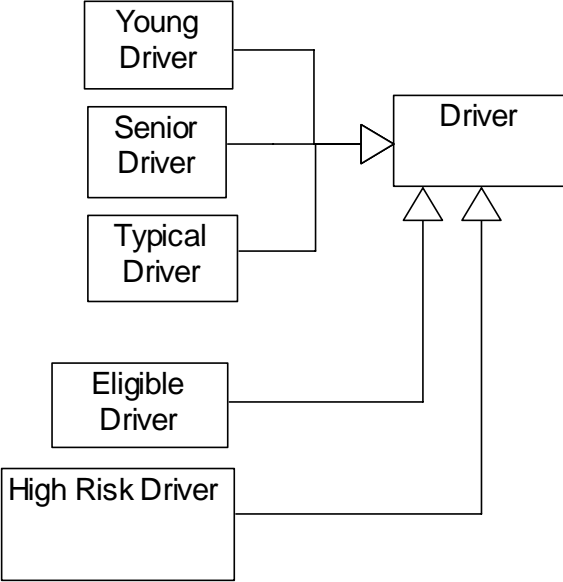Premium for Shane's Car:
Applicable Discounts:

Shane marries and applies for an auto insurance policy for himself and his wife. He is no longer directly involved in his father's portfolio.
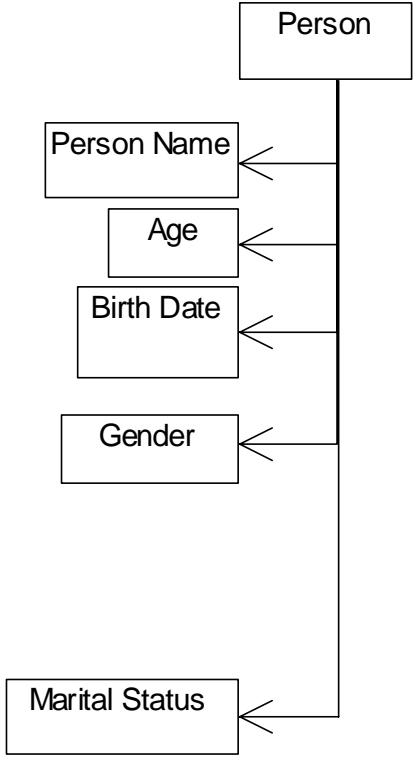
Re-rate Shane's application and determine whether he is eligible for auto insurance with UServ. He has installed a rollbar in his VW.

Business Concepts (Fact) Model

Business Concepts Model Key

Graphic	Translation
Service — sets the rules for — selects ► — ◄ includes — Product — Product Option	Read fact in the direction of the small arrow. o Product sets the rules for Service. o Product includes Product Options. o Service selects Product Option.
Young Driver, Senior Driver, Typical Driver → Driver ← Eligible Driver, High Risk Driver	Identify states that the primary business concept (in this case the Driver) can be in. Read fact in the direction of the triangle arrow: o Young Driver is a type of Driver o Senior Driver is a type of Driver o Typical Driver is a type of Driver The above facts are mutually exclusive. o Eligible Driver is a type of Driver o High Risk Driver is a type of Driver These states can co-exist. Reading the fact from the primary business concept: o Some Drivers are Young Drivers o Some Drivers are High Risk Drivers Etc.

Graphic	Translation
Person Person Name Age Birth Date Gender Marital Status	"Has" Facts The business concept of the arrow head side of the fact is a piece of knowledge (knowledge property) of the other business concept. Read in the direction of the arrow head: o Person has Person Name o Person has Age o Person has Birth Date o Person has Gender o Person Had Marital Status

Facts are unconstrained. For example, the default statement for Service selects Product Option is A Service may select some Product Options. Business rules must be stated to constrain the fact, such as:

o   Every Service must select at least one Product Option. "At least" translates to one or more.
o   Every Service must be governed by exactly one Product. "Exactly one" translates to one and only one.

The business rules that constrain the facts are not provided in this case study.

The fact model is not intended to dictate the application's object class model or database design. It represents the knowledge that must be available to support the business rules. The developer is free to choose how to represent this knowledge in the solution.

The solution does not need to determine whether the Client is an Elite Client. Assume that this information is provided to the application.

The solution does not need to calculate the rolling 12 month average product count. Assume that this information is provided to the application.

Business Process Models

Manage UServ
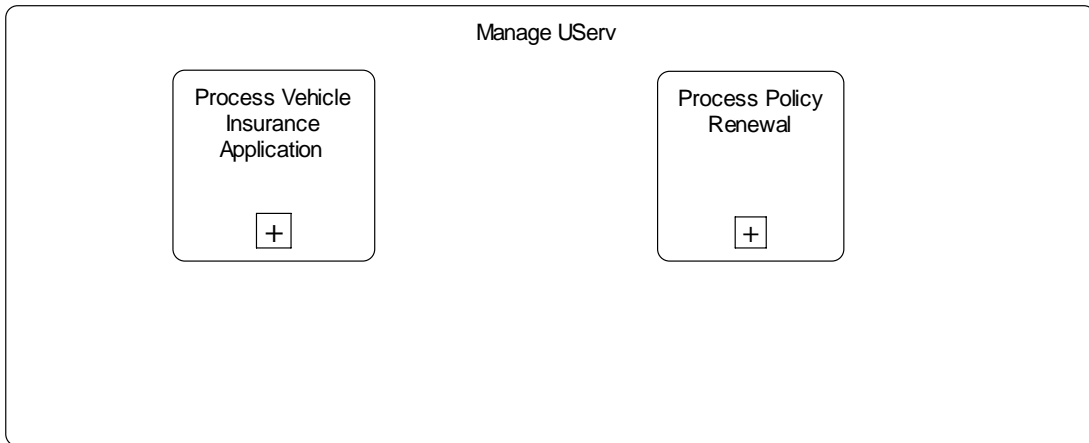
Process Vehicle
Insurance
Application

+
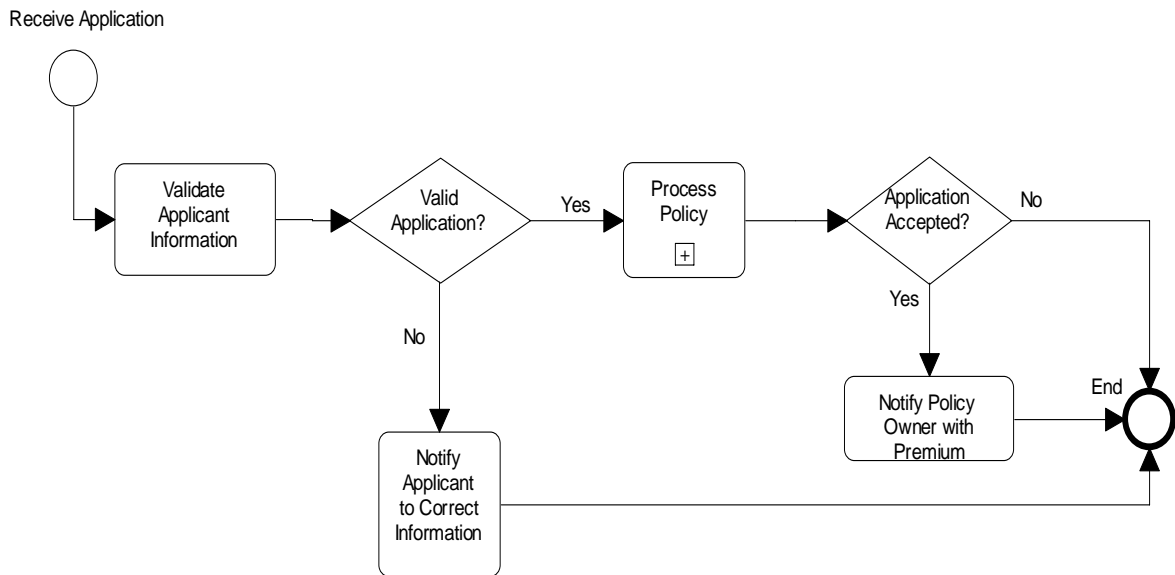
Process Policy
Renewal

+

Process Vehicle Insurance Application

Receive Application

Validate
Applicant
Information

Valid
Application?

Yes

Process
Policy

+

Application
Accepted?

No

Yes

No

Notify
Applicant
to Correct
Information

Notify Policy
Owner with
Premium

End

Process Policy Renewal

```
Time to Renew Policy
        ⏰

        │
        ▼
   ┌─────────┐           ◆
   │ Process │        Policy          No
   │ Policy  │─────▶  Renewed?  ─────────────┐
   │   [+]   │           ◆                    │
   └─────────┘           │                    │
                        Yes                   │
                         │                    │
                         ▼                    ▼
                  ┌──────────────┐          ◯
                  │ Notify Policy │─────▶   End
                  │ Owner with    │
                  │ Premium       │
                  └──────────────┘
```

Process Policy

```
                                    ┌─────────┐
                                    │ Premium │
                                    └─────────┘
                                         ▲
                                         ┊
  Eligibility Score less than 100   ┌──────────┐
  ─────────────────────────────────│ Determine │───────────────┐
                                    │ Premium   │               │
                                    └──────────┘               │
                                         ▲                      │
                                      Eligible                  │
    ◆                                    │                      │
  Score      Eligibility Score    ┌──────────┐      ◆           │
  Policy     between 100 and       │ Route to │  Underwriting   │
   [+]  ─────inclusive ───────────│Underwriting│─▶ Decision?   │
    ◆                              └──────────┘      ◆      Return
    │                                                │        ◯
    │                                            Ineligible    ▲
    │                                                │         │
    │   Eligibility Score greater than 250  ┌──────────┐       │
    └───────────────────────────────────── │ Notify of │───────┘
                                            │Ineligibility│
                                            └──────────┘
```

Score Policy