

Smart EV Bus

thefinal Group

Project Phase #2

By

Suphavadee	Cheng	6488120
Jidapa	Moolkaew	6488176
Ponnapassorn	Iamborisut	6488179
Thadeeya	Duangkaew	6488181
Pimmada	Chompurat	6488204
Ravikarn	Jarungjitvittawas	6488210

**A Report Submitted in Partial Fulfillment of
the Requirements for**

ITCS361 Management Information System

Faculty of Information and Communication Technology

Mahidol University

2023

Table of Contents

Business Description	1
Value Chain	9
Process Design Concept.....	18
Mongkol Company Process	21
Bus Manufacturing.....	24
Application Development.....	40
Customer	46
ODOO	52
Core Modules	52
Plugins	55
ODOO Implementation diagram	57
Odoo Implementation in Bus Assembly.....	57

Business Description

At Mongkol Company, we are at the forefront of revolutionizing public transportation across Thailand. With the growing popularity of public transportation, especially buses, we are keenly aware of the changing needs of our residents. Our unwavering commitment is to provide innovative solutions that not only enhance the travel experience but also address contemporary challenges. Our mission is crystal clear: to improve the convenience, safety, and sustainability of public bus transportation in every province, making travel a seamless and enjoyable experience for all.

The overview

The popularity of public transportation in Thailand has increased significantly, with a growing number of people preferring buses as their preferred means of transportation. Buses are preferred by residents because of their flexibility, cost-effectiveness, scalability, and accessibility. Despite these benefits, several difficulties remain. The COVID-19 pandemic has resulted in increased safety measures such as social separation and constant mask use, which has affected how people utilize public transportation. In response to these issues, our firm has devised a unique solution - a cashless bus transaction system that is seamlessly linked with palm scanning and QR codes. Our method provides easy getting on and off from buses, with a focus on speed and precision. In addition, our vision goes beyond this invention. We actively seek collaborations to support environmentally friendly initiatives and contribute to the reduction of greenhouse gas emissions in all Thai provinces.

Products and Services

We deliver a complete solution targeted at enhancing people's trips in Thailand. Our key products are contemporary electric buses and a user-friendly app that work together to create a flawless and effective transit journey for both locals and visitors. As a sample,

- **Electric Buses for a Greener Commute:**
 - Our fleet of modern electric buses represents a significant step toward eco-friendly transportation.

- These buses run on electricity instead of fuel, contributing to reduced air pollution and a healthier city.
- We prioritize your comfort and safety by equipping our buses with the latest technologies.
- **Innovative Application for Easy Travel:**
 - Our user-friendly application is at the heart of our service, designed to make your experience as simple and pleasurable as possible:
- **Key Features of Our App:**
 - **Cashless Payment System:** Passengers using the application may easily manage their bus fare purchases without the need for cash. Our integrated without touches scanning technology supports customers to make a payment by scanning their registration palmprint, delivering a safe, swift, and convenient boarding and leaving experience. If riders have not already registered their palmprint, the application also accepts QR code transactions. Easily scan the QR code with your mobile device to complete fare payments.
 - **Real-Time Bus Tracking:** the application we provide facilitates passengers to follow buses in real-time, allowing them to organize their travels more effectively by figuring out when the following bus will arrive at their destination.
 - **Enhanced Convenience:** Convenience is our priority. For instance, our app enables clients to instantly top up the bus account and monitor their purchase history. They could additionally set up announcements for their destination, so they never lose it.
 - **Strategic Route Planning:** We strategically select routes that serve areas with a high concentration of educational institutions, employment opportunities, and higher income levels while covering all regions of Thailand. Our aim is to encourage greater public transportation usage.

Our aim is to provide a comfortable, environmentally sustainable, and efficient option to travel around Thailand. Whether being local people or travelers visiting the city, our electric buses with unique software will make your travels not only satisfying but also sustainable.

The status of business

We are a major player in the public transport industry, dedicated to pioneering innovative solutions that have transformed the commuting experience in Thailand. Our success is driven by cutting-edge technology, such as Ev-bus, and our eco-friendly application, which prioritize sustainability and convenience. Our firm commitment to these values has solidified our position as a leading force in the city's transportation evolution. Millions of people have downloaded our app, confirming our position as the highest quality transportation solutions company in the country.

Looking ahead, our aim includes more than just taking Thailand's public transit to new heights. We hope to provide our professional knowledge and methods to various communities facing similar obstacles, with a vision of minimizing global transportation concerns. Our vision is of a transit system in cities that is perfectly linked together, sustainable, and accessible to all.

The features of products and services

Feature in Application

- **Payment:** We have integrated a payment system within the app, allowing users to conveniently top up their prepaid expenses for bus fares. This payment method is linked to your account, which is registered through our palm scanning technology. Even if passengers have insufficient wallet funds, they can still use our service after at least one previous use, but this option is available just once. In such cases, passengers receive notifications to top up their accounts. We also provide a transaction history feature for passengers' reference. The payment page within the app follows a logic similar to that of banking and food delivery apps, addressing the issue of passengers who do not carry cash. We use Omise (open payment) to support various payment types, including API for banks.
- **Finding the Nearest Bus with Optimal Routes and Arrival Times:** Finding the Nearest Bus with Optimal Routes and Arrival Times: Finding the right bus for a specific destination can be difficult in nowadays, especially for foreigners. This problem affects both tourists and locals. To address this issue, our app allows passengers to enter where they are headed, and it will promptly determine the best bus routes. This not only assists passengers in selecting a suitable bus but also provides

estimated arrival times, making it a crucial resource for commuters, including employees. For accurate location services, we've integrated Google Maps API.

- **Chat for feedback:** Feedback is crucial for our startup technology. It enables us to address passenger concerns and continually enhance our features. We are committed to ensuring that every passenger can easily utilize our service, particularly since some features may be new to many individuals.
- **Destination Notifications [Subscription-Based]:**
 - This feature provides passengers with a helpful notification about their destination.
 - It ensures that even if passengers are sleeping or unfamiliar with the area, they'll be alerted when they reach their marked destination in the application.
 - This helps passengers disembark at the correct stop, avoiding errors.
- **Fare Display [Subscription-Based]:**
 - Customers can utilize this feature to check and prepare for the fare.
 - It eliminates concerns about not having enough money to pay for the fare, especially for those who have set their source and destination within the application.
- **Available Seats Count [Subscription-Based]:**
 - This feature might seem simple but it's an important one.
 - Passengers can decide whether to board a bus based on the number of available seats. For those who prefer less crowded buses, our app provides an alternative option: checking the arrival time of the nearest bus.

Additional information

In accordance with the PDPA (Personal Data Protection Act), certain sensitive personal data, such as biometrics, is collected, including the passenger's palm print for payment purposes. However, we also provide an alternative to address the requirement for data to be 'freely given' by allowing passengers to pay by scanning a QR code in the app, eliminating the need for palm print usage.

Our application requests consent for the use of personal data (specifically, consent for palm print usage) before allowing access. We use this data for financial operations, specifically in payment processing by palm print. Refusing consent will not impact the use of buses or our application, as an alternative option through QR codes is available. Moreover, we highly value our customers' privacy and offer an option to revoke data consent, ensuring transparency and control over their personal information.

Bus Technology:

1. **Computer Vision for Payment:** We use computer vision to collect payments by having passengers scan their palms when entering and exiting the bus.
2. **Deep Learning:** Deep learning powers computer vision and trains algorithms to accurately identify passengers.
3. **AI Weapon-Scanning Technology:** Weapon scanning is a technology that improves the safety of passengers who use it. They can be confident that it reduces their risk of using weapons to cause injuries to others.
4. **Electric Vehicle (EV):** We've introduced electric vehicles to address the issue of pollution. Many of the existing Thai buses are old, lack air conditioning, and have been in service for 10 to 20 years, resulting in engine malfunctions and the emission of soot. Our solution is to provide eco-friendly electric automobiles to combat this problem.
5. **Microwave Sensors:** Motion sensors use radio waves and collaborate with CCTV to track passenger numbers and seat availability. This technology ensures efficient space management within the passenger compartment.

Bus Features:

1. **Free Wi-Fi:** Providing passengers with an extra service of internet connectivity.
2. **Luggage Storage Area:** A designated area for travelers or those with large luggage, ensuring clear walkways.
3. **Next Station Information:** Passengers are informed of the next station's arrival time and location. This feature helps in navigation, especially for new passengers. Moreover, the display will include a voice that mentions the location when it arrives.
4. **Appearance**
 - **Step Height Adjustment:** To enhance accessibility, we've adjusted the step height for easy entering and leaving, making it more convenient for older people and children.
 - **Contemporary Design:** We have paid careful consideration to the design of our buses. While it may appear to be a minor detail, the appearance is an important aspect of our design. We aimed for a modern and functional design pattern, drawing inspiration from the aesthetics of well-known transportation systems such as the BTS, MRT, and London's ubiquitous buses. Furthermore, our digital itinerary display adds a contemporary touch to the bus's appearance.
5. **Safety Measures:**
 - **Scanning Weapon Detection:** This technology is installed at the door to improve in-vehicle safety.
 - **Payment Palm Scanners:** We've developed a palm-scanning device designed for payment processing. This device is seamlessly integrated with our application to allow you to top up your account. When boarding our electric bus, your palm will be scanned. The system then compares the scanned palm print to the one you used for registration to verify your identity. Scanning your palm not only identifies you but also grants access to your account. The process is repeated when you disembark the bus.
6. **Charger:** We've provided charging cables on our buses so that customers can charge their phones in case of a low battery. Given the increasing use of mobile payments. The cables are three-in-one, with a USB A connection on one end and interchangeable heads that

include USB C, Lightning, and Micro USB. To prevent theft, these cables are securely attached along the window's side.

7. **SOS Call Point:** Our buses feature with SOS call points in the event of an emergency, such as a physical assault, sexual harassment, or a fire. These points are linked to an anti-harm sensor system. They send a signal to the driver, who then assesses the situation. If necessary, the driver will confirm the incident, and the system will immediately notify the company to take appropriate action.

Target customers

1. **Students** - This group typically earns less than 15,000 baht per month and depends on public transportation to get to school and university. Their main concern is the cost of transportation.
2. **Working people** - Working people with an average income of 15,000 to 25,000 baht frequently use buses for their everyday journey to work. They value transportation options that combine affordability and technological convenience.
3. **Foreigners and Tourists** - Visitors to Thailand for either company or pleasure who can afford to use public transportation. Our bus routes are strategically designed to serve areas popular with foreigners. Offering a technologically enhanced service can make their journey more comfortable.
4. **Advertisers** - Our buses serve as an effective advertising medium, attracting the public's attention and promoting commercial brands. This includes collaborations with political campaigns and businesses looking to leverage our bus fleet for communication and brand exposure.

Other Considerations:

1. PDPA (Personal Data Protection Act):

The PDPA law requires us to collect sensitive personal data for payments, such as biometrics (palm prints). To address the requirement that data be "freely given," we provide an alternative method of boarding by scanning a QR code in the app for payment, giving passengers a choice.

2. Concessions

- **GPS** - Our app provides detailed bus descriptions, handling the issue of buses with the same number but different routes, such as those that use or do not use the expressway. This divides us from other existing applications.
 - **GPS Bus Tracking Limitations:** GPS bus tracking is currently only available for BMTA buses in Thailand.
 - **Detailed Route Information:** Our app provides route information that distinguishes between buses that use the expressway and those that do not.
- **Route Allocation:** As a public bus service provider, we engage in the offering of bus routes that serve a larger user base than existing companies.

Value Chain

E-Bus Value Chain Analysis

Firm Infrastructure: Having a strong organizational structure with good ways of making decisions and take care of important departments like management, finance, and legal stuff.

Human Resource Management: Recruitment, Training, Employee Benefits

Technology Development: Research and Development, Application Development

Procurement: Supplier Relationships, Cost Negotiation

Margin

Inbound Logistics

Bus Manufacturing

- Procuring materials
- Inventory

Application System

- Software Development
- Research and gathering of user requirements.
- Coding, develop, and testing.

Operations

Bus Manufacturing

- Vehicle Assembly
- Quality Control

Application System

- Software Deployment and Hosting
- Maintenance and Updates
- Quality Assurance

Outbound Logistics

Bus Manufacturing

- Public Transportation Services

Application System

- App Distribution

Marketing and Sales

Bus

- Digital Marketing
- Advertisement

Application System

- User Onboarding

Service

Bus

- Safety Measures
- Passenger Assistance

Application System

- User guides
- Customer Service
- Customer Support

Value Chain

Primary Activities

1. Inbound Logistics

Our company's inbound logistics are divided into two main parts which are importing components or materials for bus manufacturing and developing applications to meet the needs in alignment with bus production.

- **Bus Manufacturing:**

- **Procuring materials and components:**

- Our company selects materials from reputable partners to ensure the production of high-quality electric buses.
 - We establish partnerships with EV manufacturers and suppliers to maintain a consistent supply.

- **Inventory:**

- Our company maintains a warehouse or factory for storing equipment and tools required in the bus production process.

- **Application System:**

- **Software Development:**

- Research and gathering of user requirements.
 - Coding, development, and testing of software features and functionalities.
 - Collaboration among software engineers, designers, and product managers.

- **Content and Data Management:** For our company, which deals with data-driven applications, managing and processing data is a critical component of our inbound operations.

2. Operations

Our company's operations are divided into two main parts which are bus operations, which involve assembling materials imported from inbound logistics and undergoing quality checks by Quality Control, and Quality Assurance. In terms of application system, we focus on regular updates and the security of customer information.

- **Bus Manufacturing**

- **Vehicle Assembly:** This process includes assembling buses, which involves welding parts, assembling the chassis, and installing the engine.
 - This phase involves preparing various parts for assembling the bus structure. It includes processes such as **nano coating** (immersing buses in paint to prevent rust), spray painting, **electro-deposition painting**, and **checking to ensure a neat appearance**. The goal is to create a unique in-vehicle experience.
- **Quality Control:** Quality checks and testing are performed on buses to ensure they meet established standards.

- **Application System**

- **Software Deployment and Hosting:** Our company ensures that its applications are hosted on reliable servers and made accessible to users. This involves managing cloud infrastructure or data centers.
- **Maintenance and Updates:** We continuously provide updates, bug fixes, and feature enhancements as part of our operations to keep the software/application running smoothly.
- **Security and Data Protection:** We implement security measures to protect user data and maintain the integrity of the application.
- **Quality Assurance:** We ensure that the software/application is free of bugs and errors through rigorous testing and quality control processes.

3. Outbound Logistics

Outbound logistics is an essential part of our value chain, focusing on delivering our products and services to customers and end-users efficiently. It encompasses the following aspects:

- **Bus Manufacturing**

- **Public Transportation Services:** Our company provides public bus transportation services to passengers in various regions of Thailand. This involves the operation of buses along established routes, ensuring the safe and timely transportation of passengers.
- **Customer Engagement:** We actively engage with passengers through various communication channels to gather feedback and initiate service improvement initiatives. This two-way communication helps us enhance the quality of our services.

- **Application System**

- **App Distribution:** Our applications are made accessible to customers through download options available on App Stores, Play Store, and others. This process ensures that customers can easily obtain and use our software.
- **User Data Management:** Managing user information and privacy is a top priority, in compliance with relevant regulations. For example, we take extra care with customer information in areas like identity verification and biometric data which is Palm Print, ensuring its confidentiality and security.

4. Marketing and Sales

Marketing and sales are vital components of our operations, focused on promoting our products and services and expanding our customer base.

- **Bus:**

- **Digital Marketing:** We employ digital marketing strategies, including advertising campaigns, influencer collaborations, and video production on various social media platforms such as YouTube, Twitter, TikTok, and more. These efforts help us reach a broader audience and generate interest in our services.
- **Company Website Advertising:** We promote our E-Bus service on our company's website to provide potential customers with detailed information and encourage them to engage with our services.
- **Advertisement:** We utilize video advertisements displayed on LED screens in high-traffic areas to capture the attention of potential customers and create awareness about our offerings.

- **Application System:**

- **User Onboarding:** We streamline the onboarding process for users, making it simple for them to register and start using our application, ensuring a user-friendly experience.

5. Services

Our services are designed to guarantee a positive and seamless experience for our valued customers. We give utmost priority to their safety, comfort, and contentment by implementing a variety of measures:

- **Bus:**
 - **Safety Measures:** We implement stringent safety protocols and equip passengers with tools to ensure their safety and comfort throughout their journey. This includes the maintenance of clean, well-kept buses and continuous training for our drivers in passenger safety and service excellence.
 - **Passenger Assistance:** To enhance passenger convenience, we provide notifications of upcoming stops and destination alerts. This ensures that passengers disembark at the correct location and enjoy a smooth travel experience.
- **Application System:**
 - **User guides:** We offer training materials and user manuals to assist users in navigating our E-Bus application effectively, making it easy for them to use our software.
 - **Customer Service:** Passenger assistance is a top priority for us, encompassing support during boarding, facilitating seamless fare payments, gathering valuable feedback, and offering real-time route information to elevate the overall user experience.
 - **Customer Support:** We are committed to addressing customer queries, issues, and feature requests promptly, ensuring that our users have a positive experience with our services and software.

Our value chain is intricately linked to these vital passenger-focused services. They serve as the fundamental building blocks that empower us to provide an exceptional and comprehensive transportation experience to our passengers. Customer service, safety emphasis, user-friendly payment options, passenger support, and connectivity are not isolated elements within our operations; instead, they are the interconnected elements that form the heart of our value chain.

Support Activities

1. Firm Infrastructure: The foundational elements that support the overall operations and activities of our Mongkol Company. We can ensure a solid foundation for its operations and continue to lead in the transformation of public transportation in Thailand.

key components:

- **Information Technology (IT) Systems:** Our company has a strong IT system required for the functioning of the cashless transaction system, Palm scanning technology, and bus tracking applications.
- **Data Security and Compliance:** Our company considers the collection of sensitive personal data, including biometrics, a strong emphasis on data security and compliance with regulations such as the Personal Data Protection Act (PDPA) is crucial.
- **Collaborative Partnerships:** We have partnerships with technology providers, payment gateways, and other relevant partners are integral to the success of our business.
- **Legal and Regulatory Compliance:** We monitor and comply with all laws or regulations related to transportation, data protection and environmental sustainability. All of the above are important for the sustainability and growth of our company.
- **Financial Management:** An effective financial management, including budgeting, accounting, and financial reporting, supports our company's growth and stability.
- **Risk Management:** We develop and implement strategies to identify risks. Assessing and mitigating risks is important because the risks associated with changes can create profits or losses for companies and investors. The risks may arise from technology, market changes, or external factors such as economic fluctuations.
- **Customer Support and Relations:** Building strong customer relations contributes to the company's reputation and customer loyalty.
- **Innovation and Research:** Investing in research and development to stay ahead of technological advancements and industry trends is a key aspect of our company infrastructure. This enables our company to continue offering innovative solutions and maintaining a competitive edge.
- **Quality Assurance:** Regular inspections and assessments contribute to the reliability and security of the services we offer across buses and applications.

2. Human Resource Management: We acknowledge that our employees are the heart of our organization. Our focus is on attracting, retaining, and nurturing a workforce that is both skilled and dedicated. This encompasses a diverse range of roles, including engineers, drivers, marketing professionals, and customer support staff, each playing a unique yet essential role in our business's success. Our commitment to employee development significantly contributes to maintaining high service standards and ensuring passenger satisfaction.

- **Recruitment:** Our company attracts and retains skilled and dedicated employees in a variety of roles, whether it's an engineer, driver, marketing expert, or customer support staff. Every position within our company is essential to the success of our business.
- **Training:** Our company offers comprehensive training programs to enhance the skills and productivity of our employees. This will serve as our company's cornerstone for maintaining high standards of service.
- **Employee Benefits:** We have developed compensation and benefits, which are essential for attracting and retaining employees who are top talent in a competitive job market.

3. Technology Development: To support our value-chain activities, we are investing in research and development, we are able to source and integrate cutting-edge EV components efficiently. This ensures that our buses are equipped with the latest technology, including energy-efficient systems, which are essential for our commitment to sustainability. We are also continuously improving bus technology to provide a more comfortable and reliable mode of transportation while reducing operational costs and enhancing customer service through our palm print recognition system.

- **Research and Development:** We continuously invest in research and development because it is essential for improving bus technology. This includes developing and upgrading palm print recognition systems, increasing energy efficiency, and enhancing the overall passenger experience.
- **Application Development:** We are continuously developing and maintaining the E-Bus application, which includes features such as real-time tracking, an electronic payment system, and passenger communication tools. This is critical to maintaining a competitive edge in the market.

4. Procurement:

Procurement is essential for ensuring the service's efficiency and sustainability. To achieve this, our company should maintain strong working relationships with its suppliers, negotiate bulk purchases, and ensure a steady supply of high-quality components. It is also important to negotiate effective cost reductions with suppliers to maintain component quality while keeping procurement costs down.

- **Supplier Relationships:** The establishment of robust and cooperative partnerships with key suppliers is vital for securing advantageous terms, engaging in negotiations for large-scale purchases, and guaranteeing a consistent provision of High-quality components.
- **Cost Negotiation:** Engaging in proactive discussions with suppliers to lower procurement expenses while upholding the quality of components is fundamental for maintaining cost-effective operations.

Value Chain Analysis

The elements of the value chain outlined above together shape a unique and superior transportation experience with alignment with the customer base. Passengers who value modernity, innovation and convenience will be attracted to our services, seeing them as different from traditional public transport.

With a focus on excellence, innovation and customer-centric service. We don't just attract passengers. But we also set premium prices for our high-quality offerings. Passengers are willing to pay more for the additional value and convenience we offer. This results in an increase in revenue per passenger.

Additionally, this strategic approach has helped us generate higher profit margins per passenger compared to our cost-minimized competitors. These margins are superior. coupled with a loyal and expanding customer base This results in increased business profits and long-term viability in the electric transportation sector. Our continued delivery of a leading-edge transportation experience enhances our competitiveness and reinforces our position in the market.

Process Design Concept

Our business process model focuses on three core activities: buses, applications, and customers. This part will provide a more detailed description of the bus manufacturing, bus operation team, and application system processes in our business process model.

Here is a brief summary of the main activities in our business so that they will be clearly shown in the process design.

Bus:

- Inbound logistics: Procure materials and components for manufacturing.
- Operations: Assemble buses, conduct quality control, and provide public transportation services.
- Outbound logistics: Deliver buses to customers and end-users.

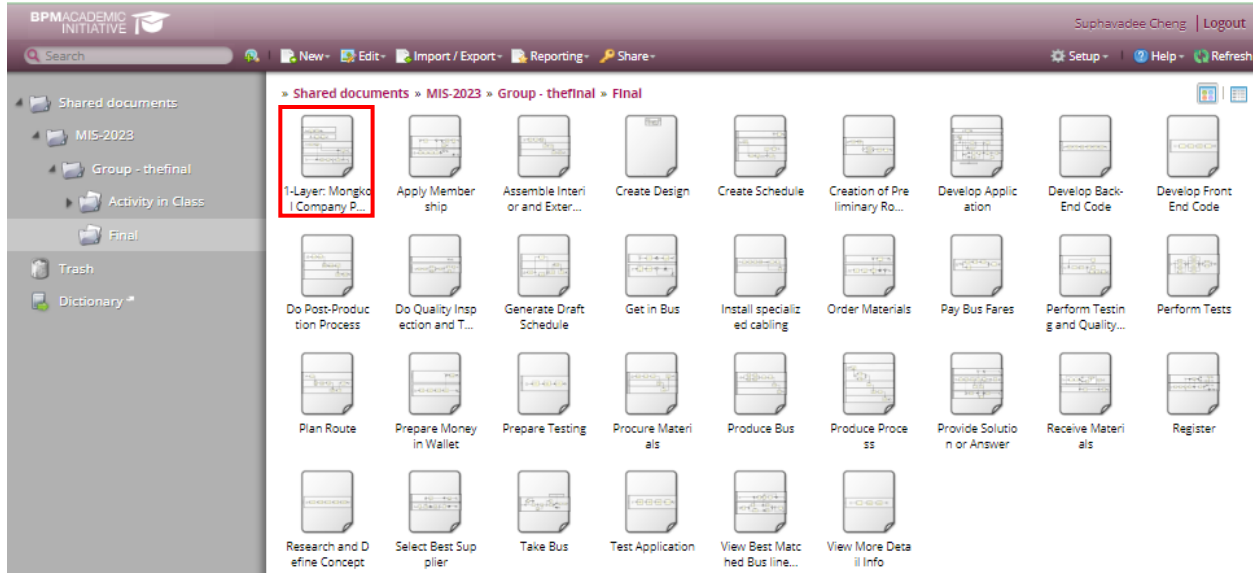
Application System:

- Inbound logistics: Develop software, manage content and data, and perform quality assurance.
- Operations: Deploy and host applications, provide maintenance and updates, and implement security and data protection measures.
- Outbound logistics: Make applications accessible to customers, streamline onboarding, maintain communication, and manage user data.

Customer:

- Primary activity: Use our services and give feedback on both applications and buses.
 - Main Features: View bus schedule, track bus location, purchase bus tickets, report problems.

Signavio



Informing you that you can open the first file named ‘**1-Layer: Mongkol Company Process**’.

Bus

Pool: Bus Manufacturing

- Product Bus (Layer 2):
 - Create design (Layer 3):
 - Produce Process (Layer 3):
 - Procure Materials (Layer 4):
 - ◆ Order Materials (Layer 5):
 - ♥ Select Bus Supplier (Layer 6):
 - ◆ Receive Materials (Layer 5):
 - ◆ Do Quality Inspection and Testing (Layer 5):
 - Assemble Interior and Exterior (Layer 4):
 - Perform Testing and Quality Control of Bus (Layer 4):
 - ◆ Perform Tests (Layer 5):
 - Do Post-Production Process (Layer 3):

Pool: Bus Operations Team

- Plan Route (Layer 2):
 - Creation of Preliminary Route Plan (Layer 3):
- Create Schedule (Layer 2):
 - Generate Draft Schedule (Layer 3):

Application

Pool: Application System

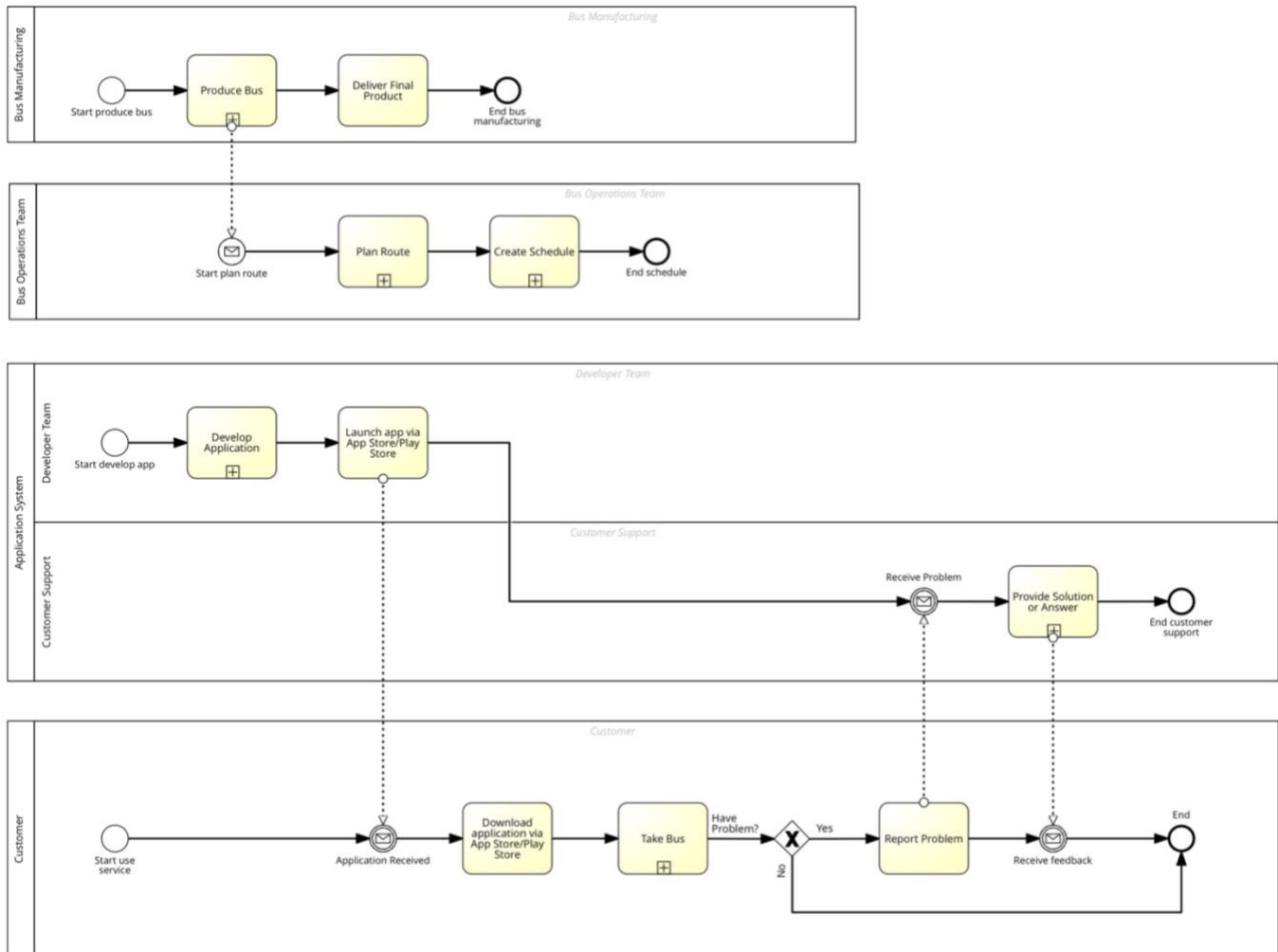
- Develop Application Processing (Layer 2):
 - Research and Define Concept (Layer 3):
 - Develop Front-End Code (Layer 3):
 - Develop Back-End Code (Layer 3):
 - Prepare Testing (Layer 3):
 - Test Application (Layer 3):
- Problem Solution or Answer (Layer 2):

Customer

Pool: Customer

- Take Bus (Layer 2)
 - Register (Layer 3):
 - Apply Membership (Layer 3):
 - View Best Matched Bus line Info (Layer 3):
 - View More Detail Info (Layer 4):
 - Prepare Money in Wallet (Layer 3):
 - Get in Bus (Layer 3):
 - Pay Bus Fares (Layer 4):

Mongkol Company Process - (Layer 1)



Let's start by diving into each pool to see the big picture for each process and easily connect the story.

- **Bus Manufacturing:**

1. **Produce buses:** The manufacturing of buses will begin with the procurement of materials and components. then the assembly team will start to assess all needed materials and implement technology. It is important to confirm that the finished product meets all performance and safety requirements after receiving the final product.
2. **Deliver the final product:** Once the bus has passed all quality checks, it is delivered to the bus operation team.

- **Bus Operation Team:**

1. **Plan route:** When the bus operation team receives a new bus from the bus manufacturing team, they begin planning the route for the bus. This involves considering many factors to plan the best route.
2. **Create schedule:** Once the bus route has been planned, the bus operation team creates a schedule for the bus. This includes determining the bus's start and end times, as well as its stops along the route.
3. **Operate bus:** The bus operation team is responsible for operating the bus on a daily basis. This includes ensuring that the bus is clean and well-maintained, and that it arrives at its stops on time.

- **Application System**

1. **Develop application:** The software development team is responsible for developing the application. This team works with the customer support team to understand the needs of the users.
2. **Launch application:** Once the application has been developed and tested, it is launched to the public. Customers can download the application from the App Store or Google Play Store.
3. **Provide customer support:** The customer support team is responsible for providing support to users of the application. This includes answering questions, resolving problems, and collecting feedback.
4. **Receive feedback:** The customer support team collects feedback from users of the application and bus operation.
5. **Provide solution:** When a user reports a problem with the application, the customer support team investigates the problem and provides a solution.
6. **Respond to user:** The customer support team responds to the user with the solution to their problem.

- **Customer**

1. **Download app:** Once the application system has been launched, customers can download it from the App Store or Google Play Store.
2. **Take bus:** Customers can use the application to purchase bus tickets, view their bus schedule, and track the location of their bus in real time.

3. **Report problem:** If a customer has a problem with the bus or the application, they can report it to the customer support team.
4. **Receive solution:** The customer support team will investigate the problem and provide a solution.

Overall Process Timeline

Bus manufacturing begins with the production of the bus chassis and body. Once the bus is assembled, the bus manufacturing team notifies the bus operation team to start working on the schedule. The bus manufacturing team continues to produce buses until the final bus is completed. The bus manufacturing team then delivers the final bus to the bus operation team.

The bus operation team begins by gathering data to plan the route, such as traffic patterns, community needs, and bus capacity. Once the data is gathered, the bus operation team creates a schedule based on the plan. The bus operation team then operates the buses on a daily basis, ensuring that they are clean, well-maintained, and arrive at their stops on time.

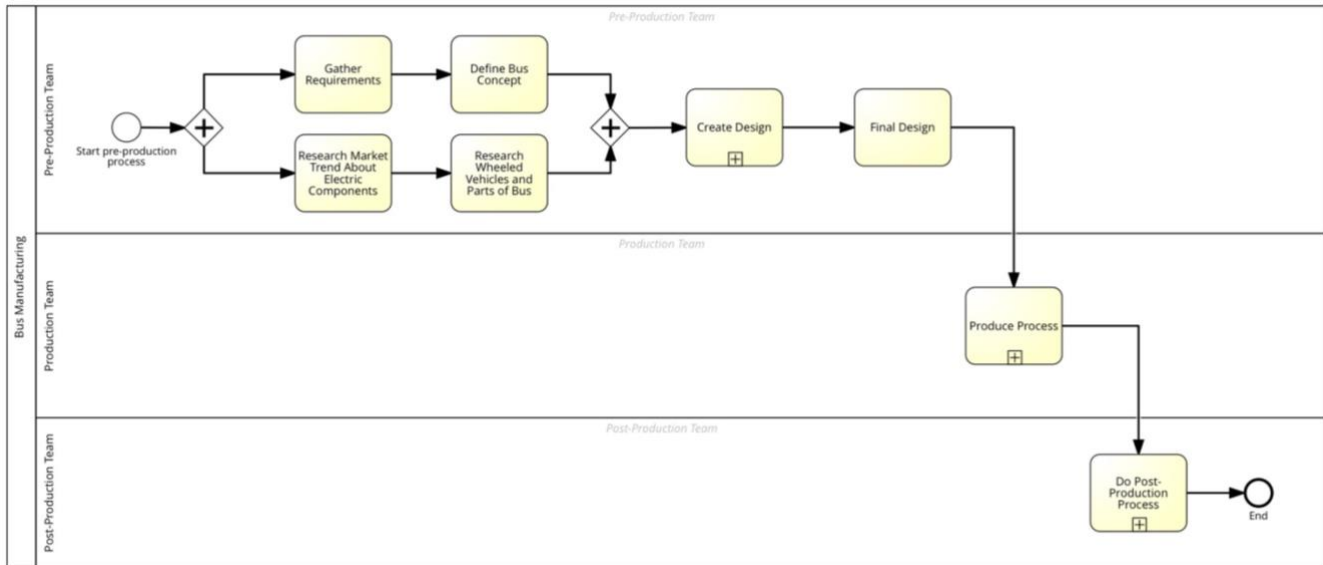
In parallel, the development team develops the application, working with the bus operation team and customer support team to understand the needs of the users. Once the application is developed, the development team conducts QA and testing. After the QA and testing process is complete, the development team launches the application.

Customers download the application from the App Store or Google Play Store. Customers use the application to purchase bus tickets, view the bus schedule, and track the location of the bus in real time. Customers can also provide feedback or report problems through the application channel. The customer support team reviews and responds to customer feedback.

Bus

Bus Manufacturing

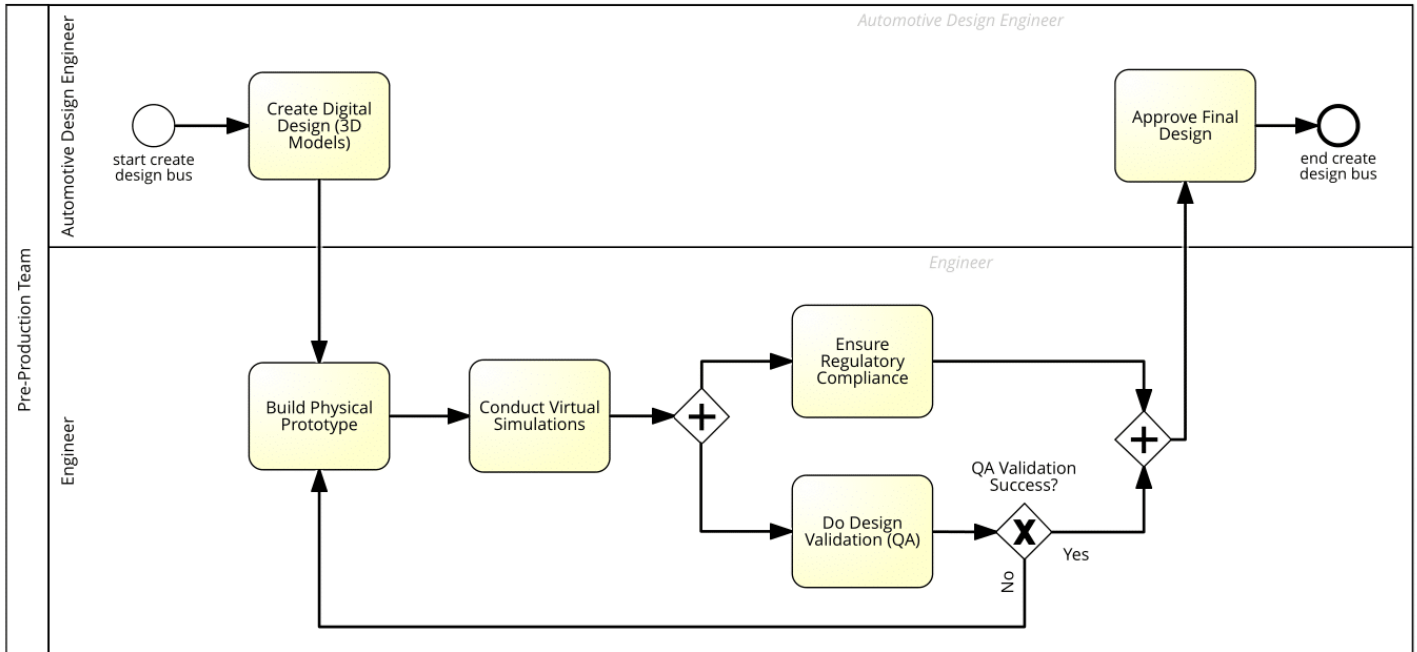
- **Product Bus (Layer 2):**



The product bus Manufacturing process encompasses various stages, from gathering requirements to post-production. This description outlines the major steps in the process.

Pre-production team start pre-production process with gather requirements and research market trend about electric components at the same time. After gathering requirements, the information will be defined bus concept, and the team will research wheeled vehicles and parts of bus after researched market trend about electric components. After two sub-processes are done, the team will create the design and finish by final design. The result of final design will be sent to the production team to produce the bus, then they will send the production to the post-production team to do post-production process.

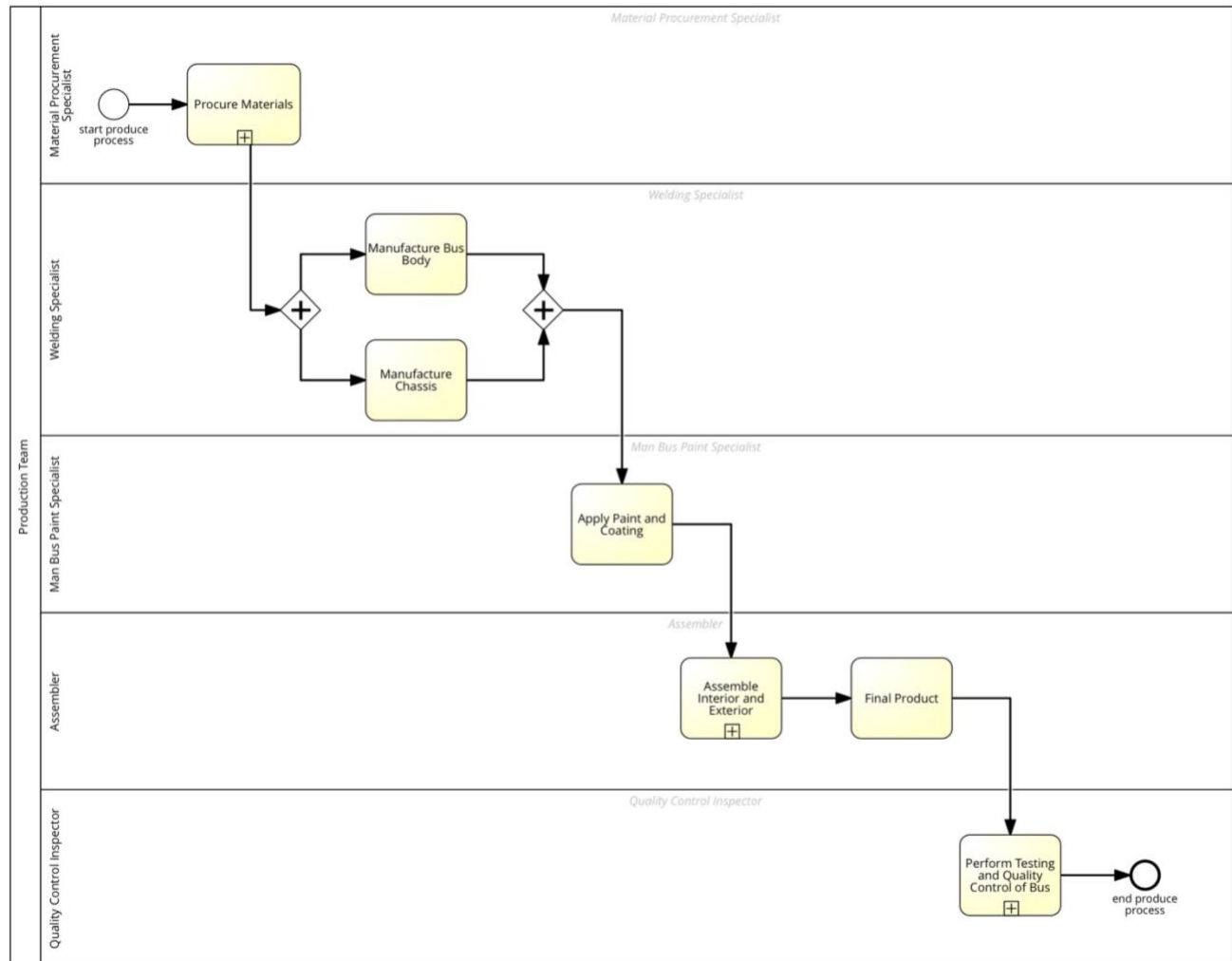
○ Create design (Layer 3):



This process involves the creation of a design by an automotive design engineer, from digital design development to validation and approval.

The digital design in the form of a 3D model is then used to create a physical prototype. The digital design is then used to create a physical prototype by the engineer. The physical prototype will be conducted virtual simulations. After that, engineer will ensure regulatory compliance and do design validation (QA) in the meantime. Upon successful validation and regulatory compliance, the design is sent to the automotive design engineer for final approval. If the design validation fails, return to rebuild the physical prototype to fix the engine or other problems.

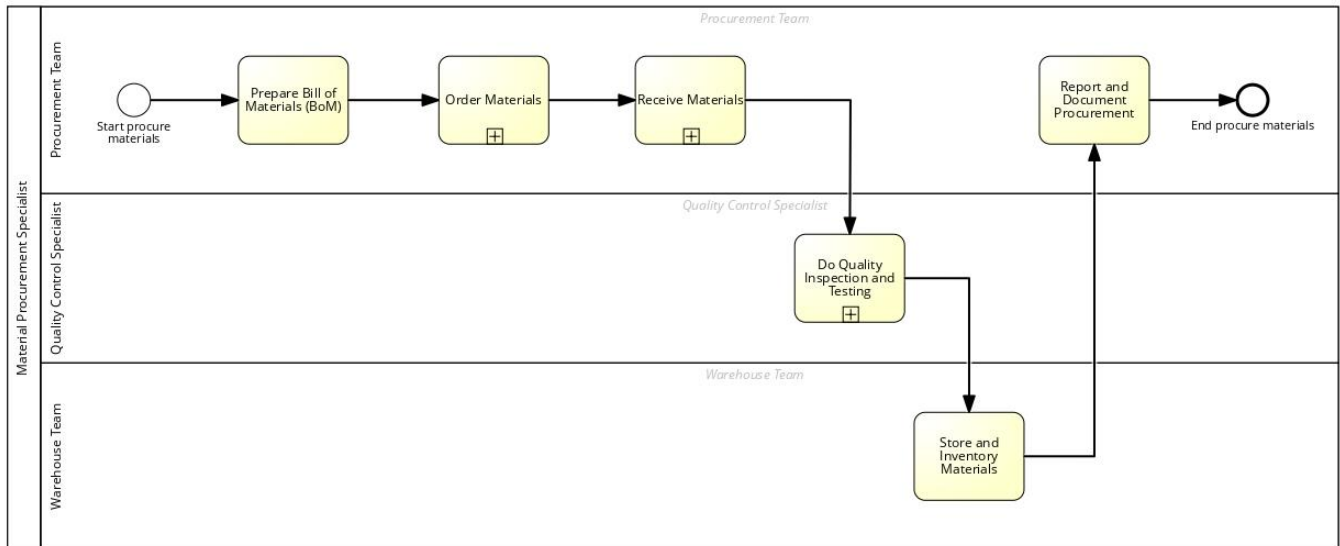
○ Produce Process (Layer 3):



This process involves the production of a bus, encompassing material procurement, bus body and chassis manufacturing, painting, assembly, and quality control.

The material procurement Specialist initiates the process by procuring the necessary materials for bus manufacturing. The welding Specialist begins manufacturing the bus body in parallel with the chassis manufacturing. In parallel with bus body manufacturing, the welding specialist works on manufacturing the chassis. Once the bus body and chassis are complete, the man bus paint specialist applies paint and coating to the bus. After painting, the bus is sent to the assembler for interior and exterior assembly. The quality control inspector performs testing and quality control of the final bus product.

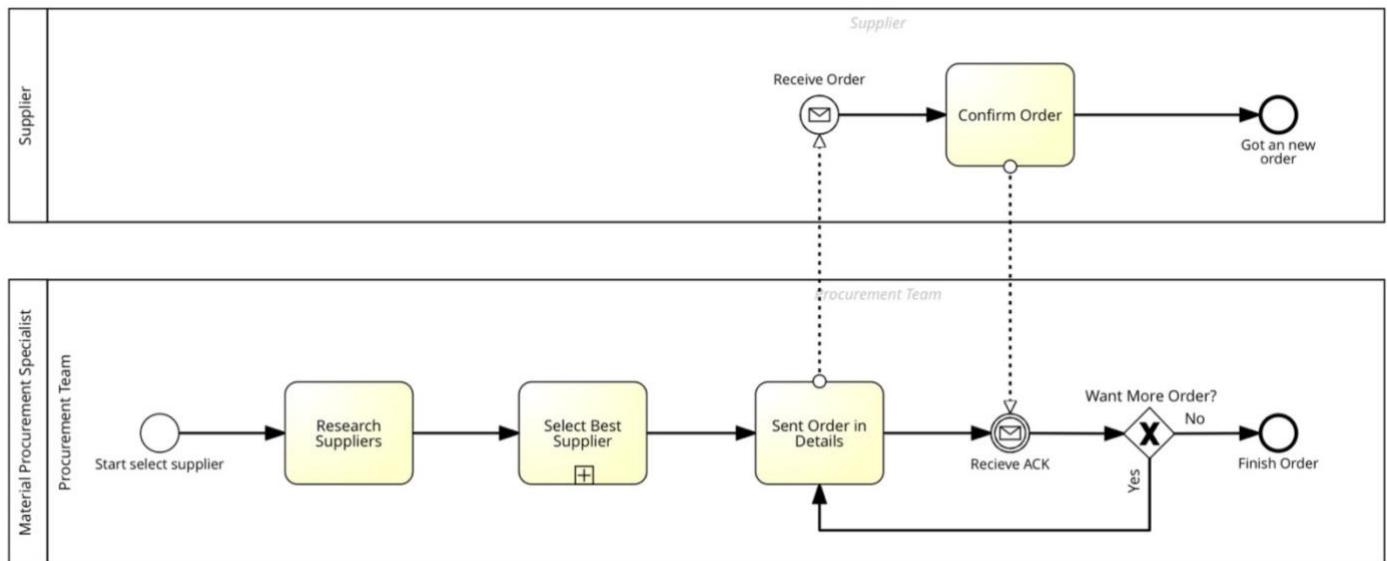
■ Procure Materials (Layer 4):



This process outlines the steps involved in material procurement, including preparing bill of materials (BoM), ordering materials, quality inspection and testing, inventory management, and procurement documentation.

The procurement team initiates the process by identifying the material requirements. Once the material requirements are identified, the procurement team proceeds to order the necessary materials. After ordering, materials are received and checked for accuracy and completeness. The quality control specialist conducts quality inspections and testing on the received materials to ensure they meet specified standards. Upon passing quality inspection, the warehouse team stores and manages the materials in inventory. The Procurement Team completes the process by documenting and reporting the procurement activities.

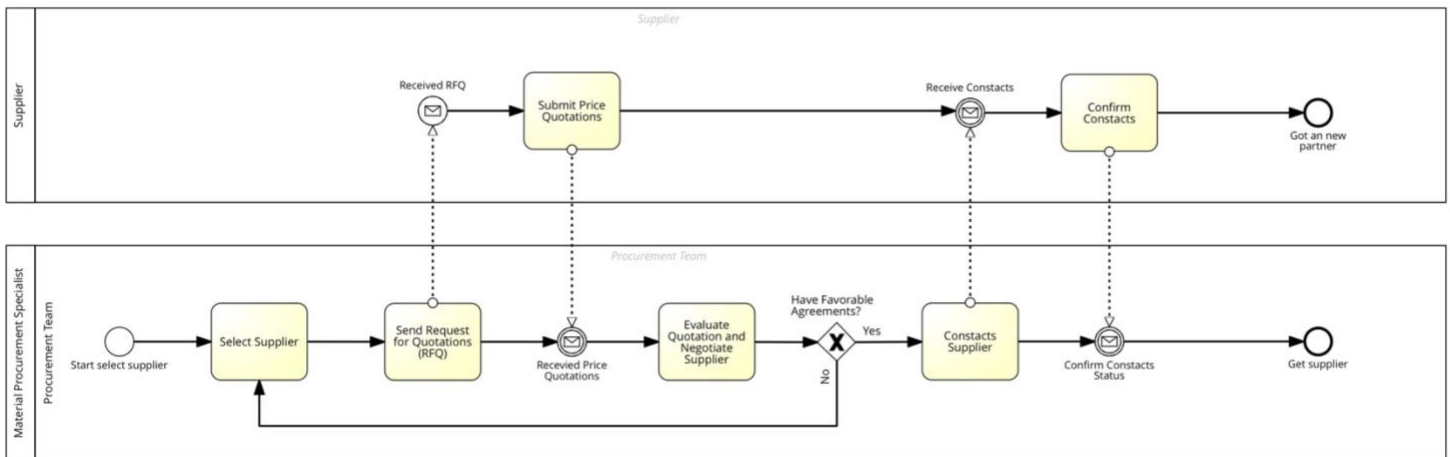
◆ Order Materials (Layer 5):



This process outlines the steps involved in ordering materials, including researching suppliers, selecting the best supplier, sending detailed orders, and handling supplier confirmations.

The procurement team initiates the process by researching potential suppliers. Based on the research, the team selects the best supplier for the materials. The procurement team sends a detailed order to the selected supplier, specifying the required materials and quantities. Upon receiving the order, the supplier confirms the order's receipt. The procurement team receives an acknowledgment (ACK) from the supplier confirming the order. If the procurement team decides not to proceed with the order, the process is completed. If the team wishes to continue with the order, the process loops back to send order in details step. The process concluding when the supplier got a new order and production team finished the order.

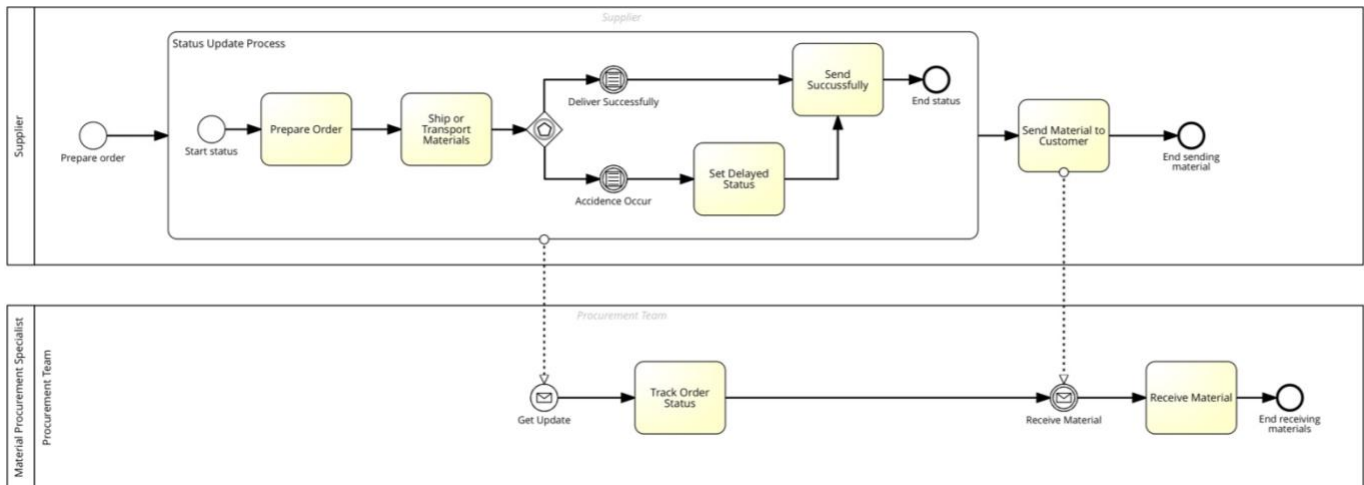
♥ Select Bus Supplier (Layer 6):



This process details the steps involved in selecting a bus supplier, including requesting quotations, evaluating quotations, negotiation, contract creation, and contract confirmation.

The procurement team initiates the process by selecting a potential supplier. The procurement team sends a request for quotations (RFQ) to the selected supplier, specifying the requirements. The supplier receives the RFQ, submits their price quotations, and sends them back to the procurement team. The procurement team is waiting until receives and evaluates the price quotations. If a favorable agreement is reached, the procurement team proceeds to create a contract with the supplier. If a favorable agreement is not reached, the procurement team may need to re-select a different supplier. When the supplier received the contract, the supplier confirms its acceptance. The procurement team is waiting for the confirm the contract, confirm the contract status, and concludes the process with supplier got a new partner and production team got a supplier.

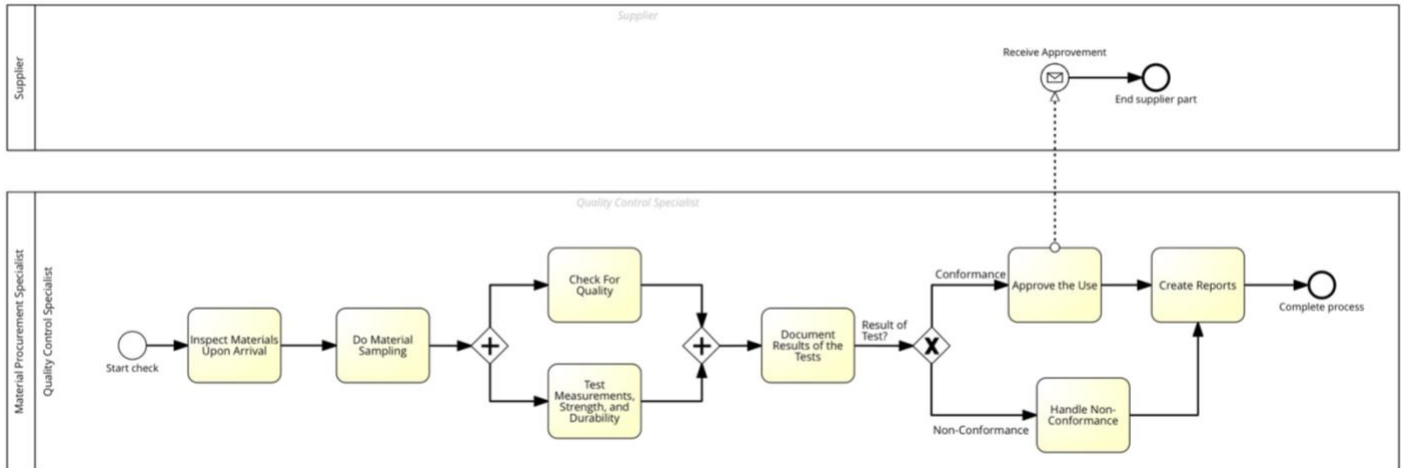
◆ Receive Materials (Layer 5):



This process outlines the steps involved in receiving materials from a supplier, including order preparation, status updates, shipping, and delivery tracking.

The supplier initiates the process by preparing the materials for shipment. Status update process is a sub-process within the receive materials process. The sub-process begins with the start of the status update. The order preparation is confirmed within the sub-process. The materials are shipped or transported to the customer. If an accident occurs, set a delayed status, and proceed to send material to customer. If the shipping or transport is successful, proceed to send material to customer. The supplier sends the materials to the customer. The procurement team receives an update from the supplier regarding the order status. The procurement team receives an update from the Supplier regarding the order status. The procurement team tracks the status of the order. The procurement team awaits the receipt of the materials from the supplier.

◆ Do Quality Inspection and Testing (Layer 5):

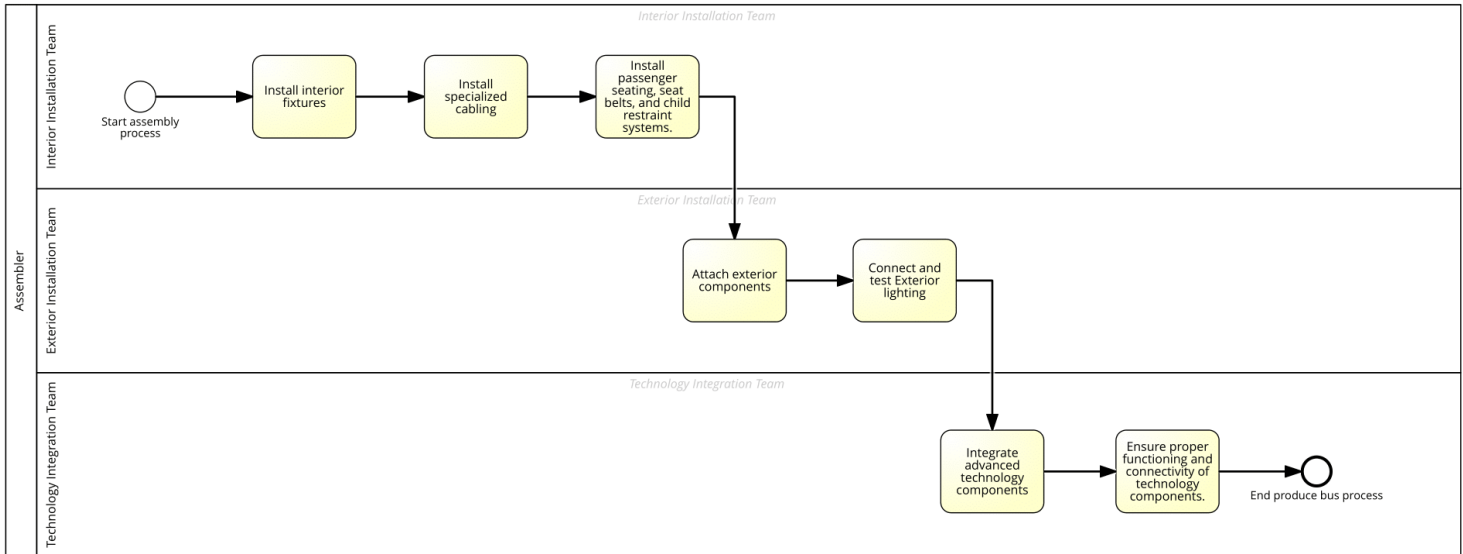


This process describes the steps involved in quality inspection and testing of materials, including material inspection, sampling, quality checks, strength and durability testing, and handling conformance or non-conformance.

The Quality Control Specialist initiates the process by inspecting materials upon their arrival. The Specialist proceeds to sample materials for testing. Two steps are performed simultaneously. 1) Quality Check: The Specialist checks the quality of the materials. 2) Strength and Durability Testing: The Specialist tests the materials for strength and durability.

After completing the quality check and testing, the Specialist documents the results of the tests. If the test results are in conformance, proceed to Approve and Send Approval to Supplier. In the case of conformance, the Specialist approves the materials for use and sends an approval message to the supplier. If the test results are non-conformance, proceed to Handle Non-Conformance and Create Reports. In the case of non-conformance, the Specialist handles the non-conformance and proceeds to create reports detailing the issues. The supplier receives the approval message from the Specialist. Reports are created by the Specialist, whether they are reports on conformance or non-conformance.

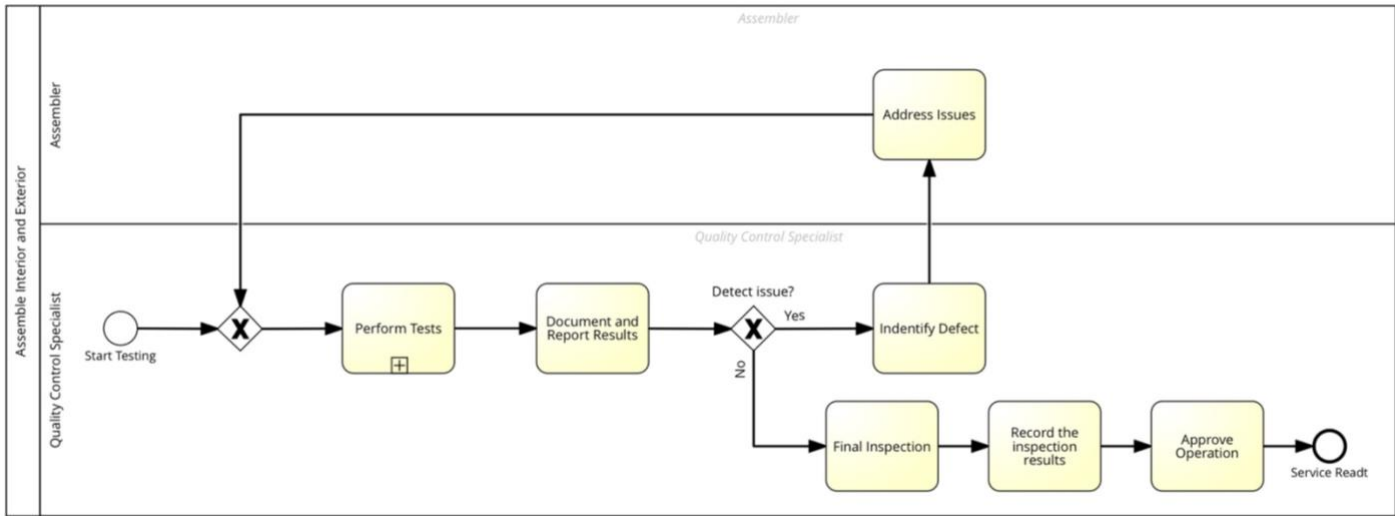
■ Assemble Interior and Exterior (Layer 4):



This process describes the steps involved in assembling the interior and exterior components of a product, including interior installation, exterior installation, and technology integration.

Interior installation team start the assembly process by installing interior fixtures. Then, install specialized cabling. After that, install passenger seating seat belts and child restraint systems. After the previous step is done, exterior installation team attach exterior components, connect, and test exterior lighting. Once the interior and exterior components are in place. technology integration team integrate advanced technology components and ensure proper functioning and connectivity of technology components.

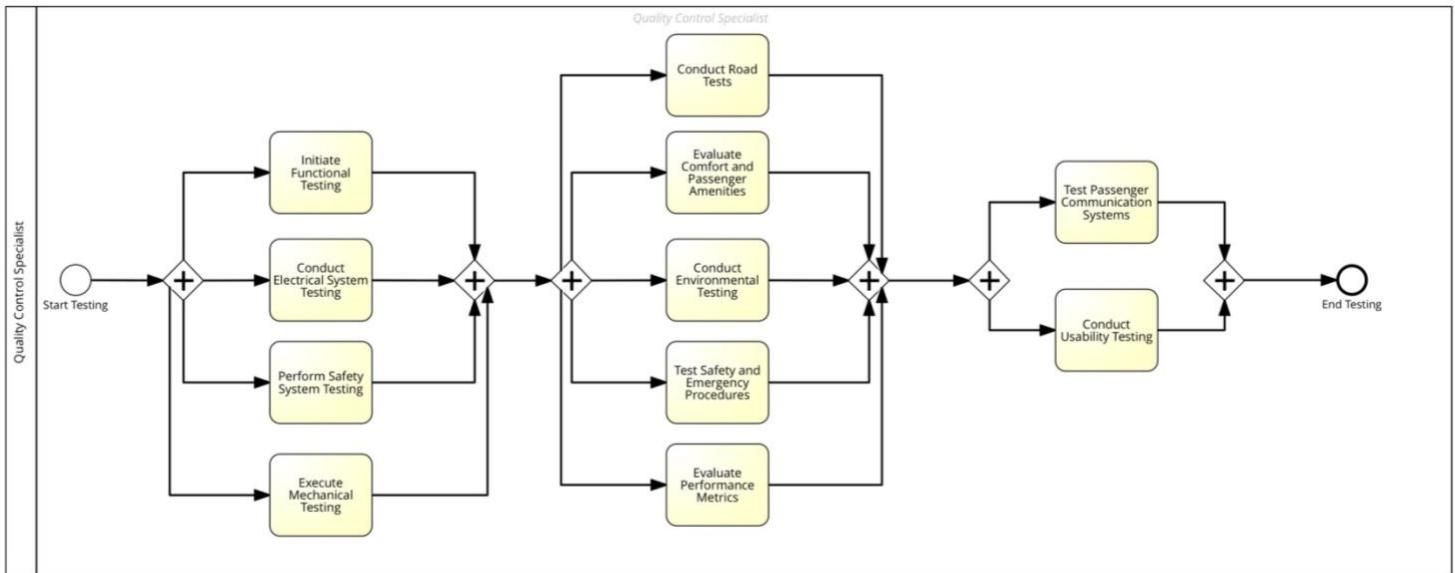
■ Perform Testing and Quality Control of Bus (Layer 4):



This process outlines the steps involved in testing and quality control of a bus, addressing issues, identifying defects, and documenting results.

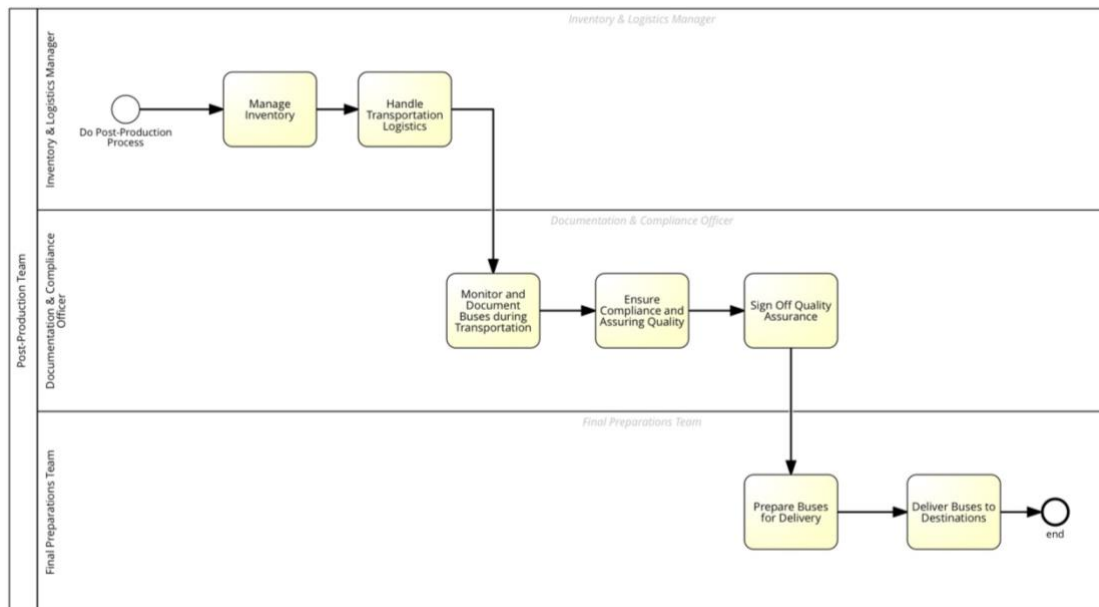
The quality control specialist initiates the testing process. The assembler addresses any known issues with the bus before quality control testing begins. The quality control specialist performs tests. After testing, the specialist documents and reports the test results. If the quality control specialist detects an issue, proceed to final inspection. In case of issue detection, the specialist identifies the defect and sends the issue details to the assembler to address and fix the issues. In case of issue detection, the Specialist identifies the defect and sends the issue details to the assembler to address and fix the issues. If no issues are detected, proceed to If no issues are detected during testing, proceed with a final inspection of the bus. After the final inspection, record

◆ Perform Tests (Layer 5):



This process consists of several parallel branches, where the quality control specialist initiates the testing process, conducts functional, electrical system, safety system, and mechanical testing in parallel. After finishing these tests, the specialist moves on to parallel tasks for road tests, comfort and passenger amenities evaluation, environment testing, safety and emergency procedures testing, and performance metrics evaluation. Finally, the specialist conducts parallel testing of passenger communication systems and usability, with the process concluding when the tests end.

○ Do Post-Production Process (Layer 3):

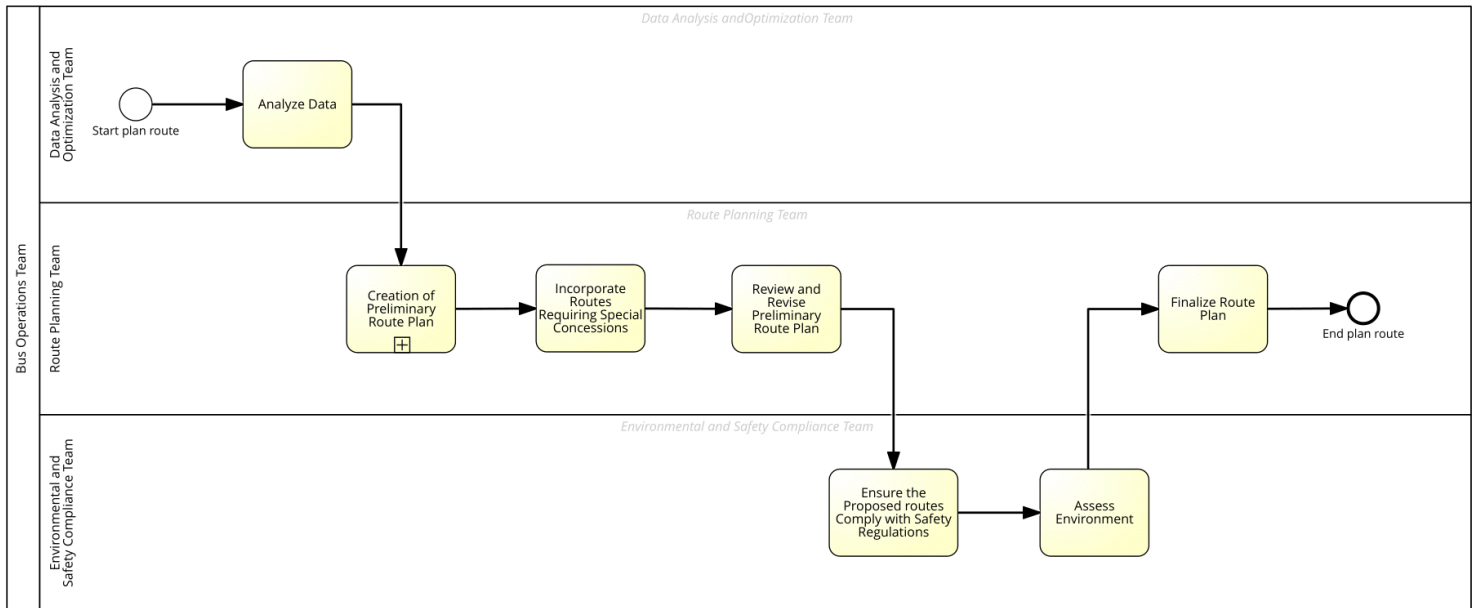


This process details the steps involved in post-production activities, including inventory management, transportation logistics, monitoring, compliance, quality assurance, and delivery preparation.

The inventory & logistics manager initiates the post-production process. The manager handles inventory management tasks. Transportation logistics tasks are managed in parallel with inventory management. The documentation & compliance officer begins monitoring and documenting buses during transportation. compliance and quality assurance activities are conducted in parallel with monitoring. Once compliance and quality assurance are completed, the process proceeds to sign off on quality assurance. The final preparations team initiates preparations for the delivery of buses. Buses are delivered to their designated destinations.

Bus Operations Team

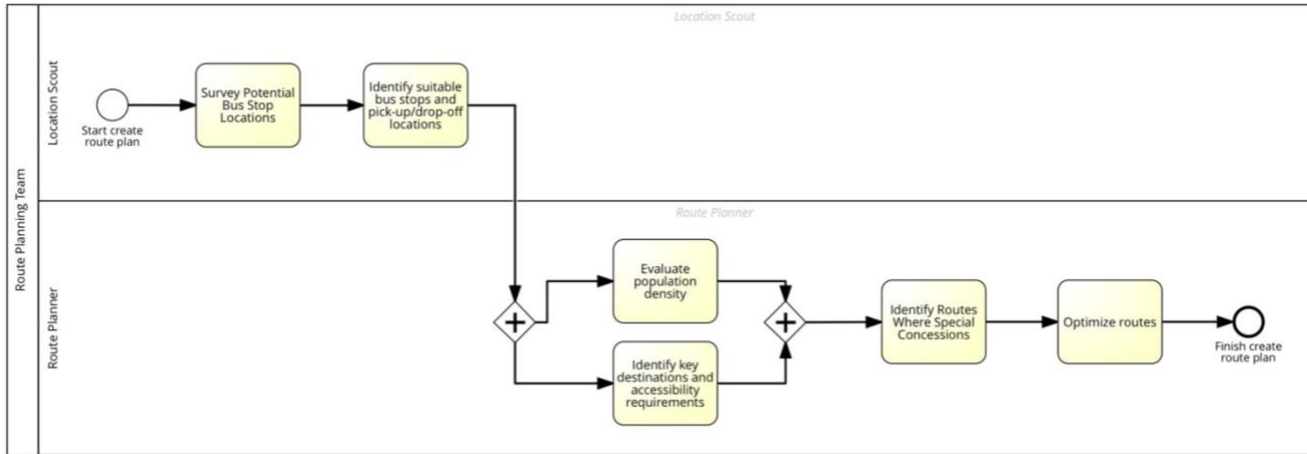
- **Plan Route (Layer 2):**



This process details the steps involved in planning routes for bus operations, including data analysis, preliminary route planning, special concessions, safety compliance assessment, and finalizing the route plan.

The process begins with planning the route and analyzing data, which is conducted by the data analysis and optimization team. The route planning team creates a preliminary route plan. The team incorporates routes that require special concessions into the preliminary plan. The preliminary route plan is reviewed and revised as needed. The environmental safety and compliance team assesses the proposed routes for safety compliance and environmental impact. The route planning team finalizes the route plan based on the assessments and revisions.

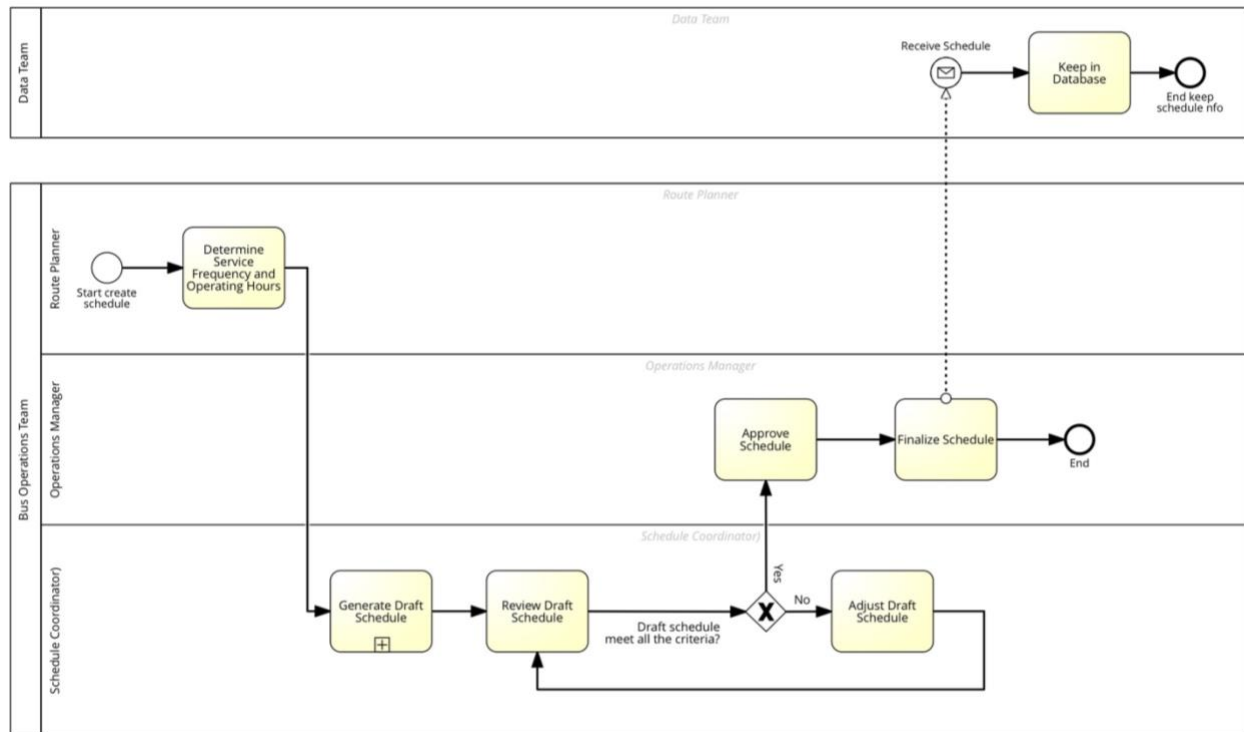
○ Creation of Preliminary Route Plan (Layer 3):



This process details the steps involved in creating a preliminary route plan, including location scouting, identifying bus stops, evaluating population density, identifying key destinations, considering accessibility requirements, and optimizing routes.

The process begins by location scout creates route plan. The location scout conducts surveys to identify potential bus stop locations and suitable pick-up/drop-off points. After that, the route planner evaluates population density in parallel with identifies key destinations and considers accessibility requirements. Based on the evaluation and requirements, routes requiring special concessions are identified. The routes are optimized based on the identified special concessions and requirements.

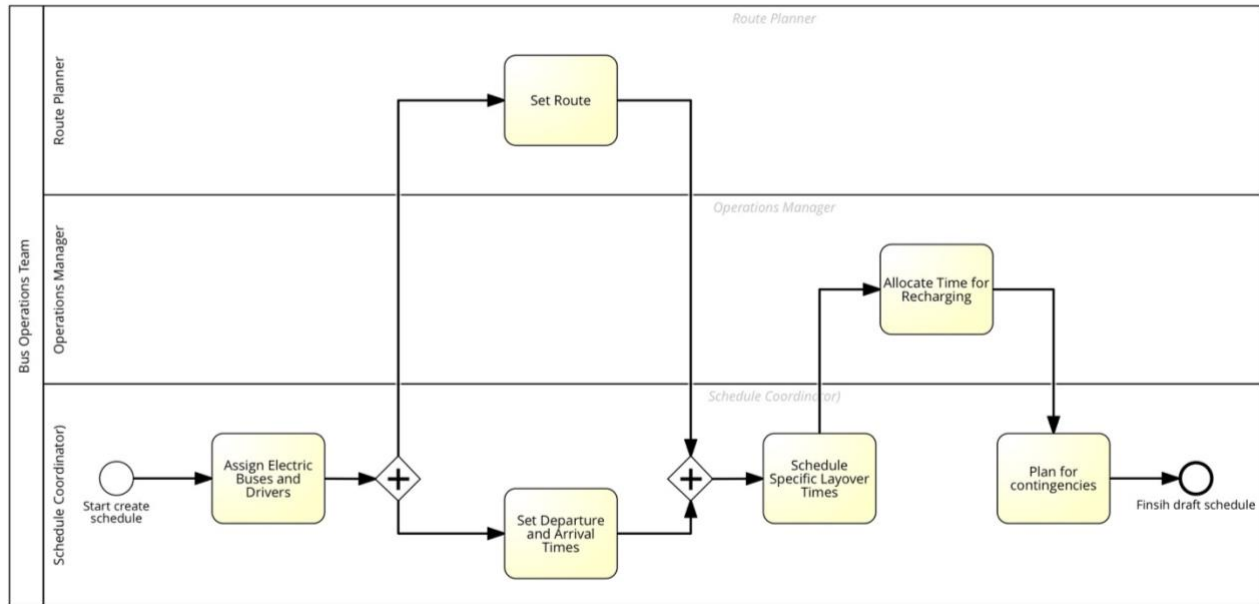
- **Create Schedule (Layer 2):**



This process details the steps involved in creating a schedule, including determining service frequency, generating a draft schedule, reviewing the draft schedule, and obtaining approvals.

The process begins with the route planner creating the schedule. The schedule planner determines the service frequency and operating hours for the schedule. The schedule coordinator generates a draft schedule based on the determined frequency and hours and review the draft schedule. If the draft schedule meets all criteria, proceed to operation manager approves schedule and finalizes. If the draft schedule meets all criteria, it is approved and finalized by the operation manager. If the draft schedule does not meet all criteria, proceed to adjust draft schedule. If the draft schedule doesn't meet all criteria, it is adjusted. Once the schedule is complete or finalized, the data will be sent to the data team to store the data in the database for further use.

○ Generate Draft Schedule (Layer 3):

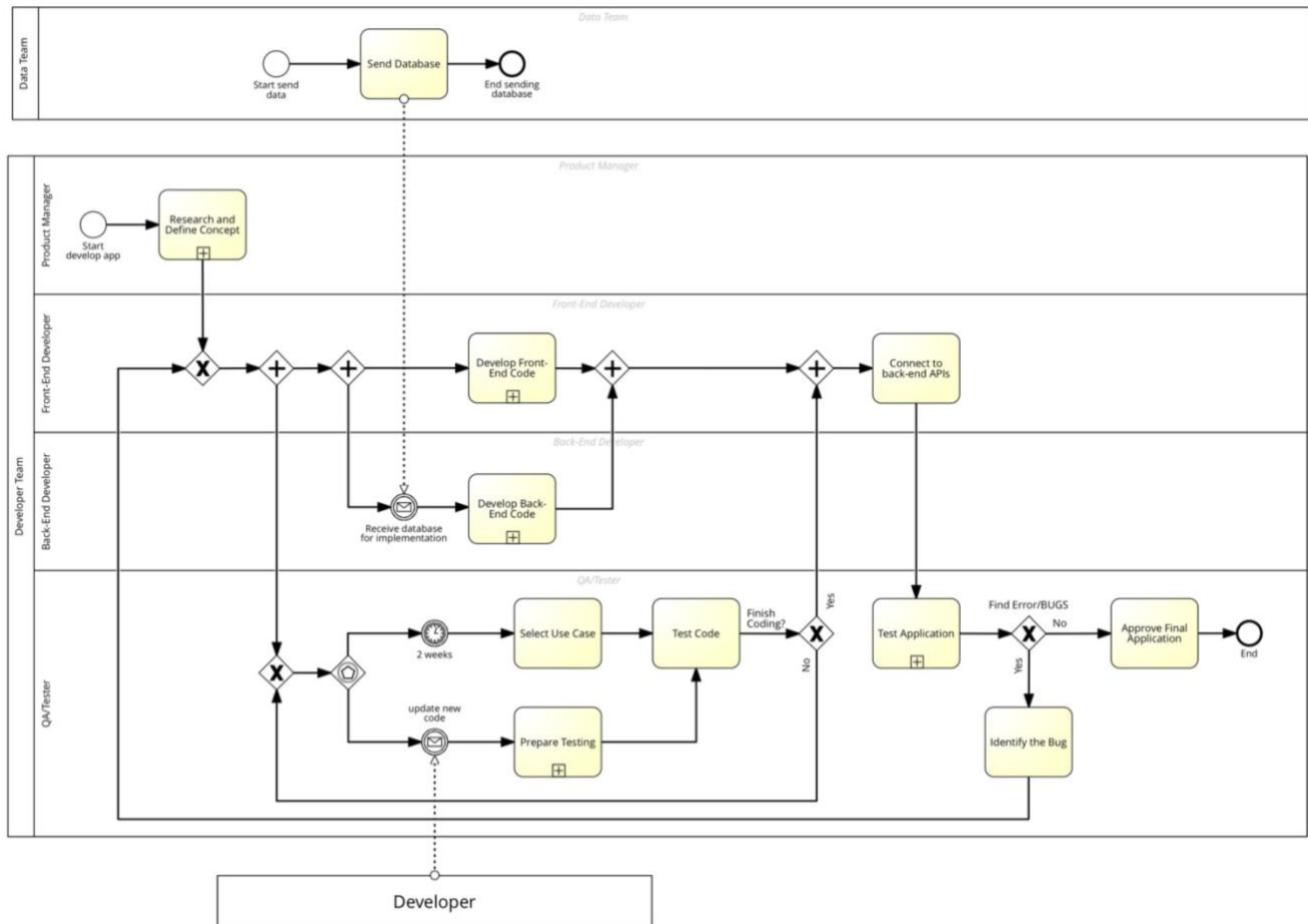


This process details the steps involved in generating a draft schedule, including assigning buses and drivers, setting departure and arrival times, planning routes, scheduling layover times, allocating recharging time, and planning for contingencies.

The process begins with the schedule coordinator creating the draft schedule. In parallel, the schedule coordinator assigns electric buses and drivers while simultaneously setting departure and arrival times. After that, the route planner sets the route for the schedule. After completing parallel tasks, schedule coordinator schedule specific layover times and operation manger allocate time for recharging. The schedule coordinator plans for contingencies in case of unexpected events or changes.

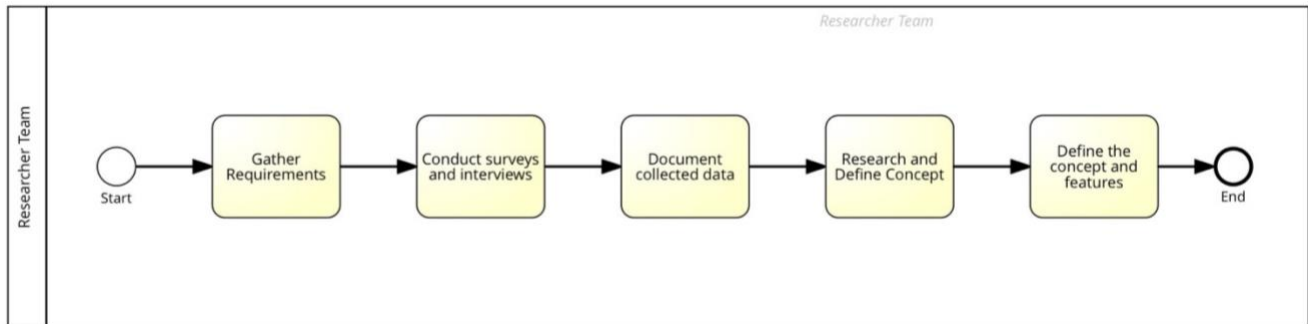
Application System

- **Develop Application Processing (Layer 2):**



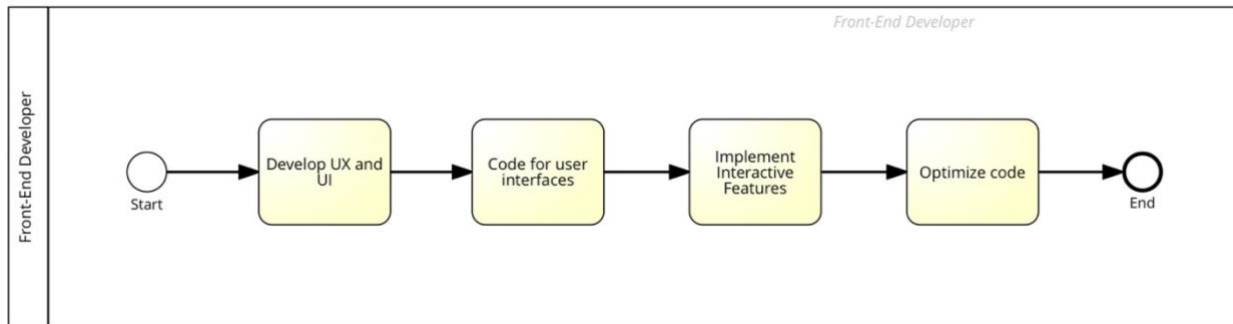
In the process of application development, the initial step involves searching for information and concepts to create applications that meet user needs. Subsequently, the web page/frontend and backend are developed. The backend developer includes tasks such as receiving bus route information or a database from the data team to enhance the application's data accuracy. Concurrently, system testers and QA execute test cases every two weeks. In cases of code updates, developers communicate the information, and testers prepare additional test cases. After that, they will test the code. Once everything is in order, the application undergoes testing to identify and rectify errors. If errors are detected, corrections are made, and development resumes. If no errors are found, approval is granted to proceed with exporting the final application.

○ Research and Define Concept (Layer 3):



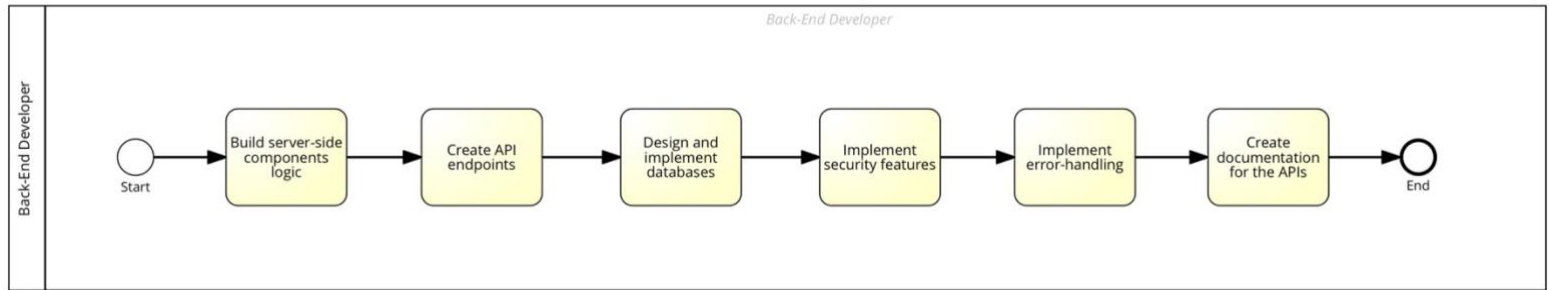
This process commences with the Gather Requirements, entailing the collection of information from stakeholders to comprehend the research's purpose, the target audience, and the essential questions requiring answers. After gathering requirements, the research team conducts surveys and interviews to procure data from the target audience. Subsequently, the collected data is documented in a report. Following this, the research team drives into researching and defining the concept of the document. This step involves synthesizing findings from data collection and surveys to identify key themes and insights. Finally, the research team defines the concept and features of the document, entailing the development of a detailed outline encompassing the main topics and sub-topics to be covered.

○ Develop Front-End Code (Layer 3):



This process starts with the development of UX and UI design. It involves creating wireframes and mockups of the user interface to get feedback from stakeholders. Once the design has been finalized, the front-end developer begins Coding the user interface. This involves writing the HTML, CSS, and JavaScript code to implement the design. Once the user interface has been coded, the front-end developer Implements interactive features. This involves adding functionality to the user interface, such as buttons, menus, and forms. The front-end developer also Tests and debugs the code to ensure that it is working properly. Once the code has been tested and debugged, the front-end developer Optimizes the code by minifying and compressing it. This reduces the size of the code and improves its performance. Finally, the front-end developer Deploys the code to production. This makes the code available to users.

○ Develop Back-End Code (Layer 3):

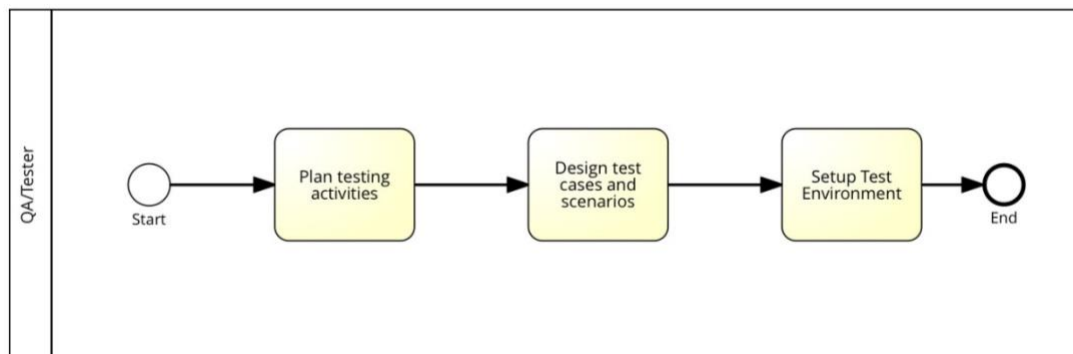


The process starts with the Build server-side components' logic. This logic involves writing the code that will power the back end of the application. This code might include logic for processing requests, managing data, and interacting with other systems.

Once the server-side components have been built, the back-end developer Implements logic for API endpoints. API endpoints are interfaces that allow other applications to interact with the back end of the application. The back-end developer implements the logic for each API endpoint to specify how the endpoint should respond to different requests. The back-end developer also Implements security features to protect the API endpoints from unauthorized access. These security features might include authentication and authorization mechanisms. In addition, the back-end developer Implements error handling to ensure that the API endpoints handle errors. This might involve returning error messages to clients or logging errors for troubleshooting purposes.

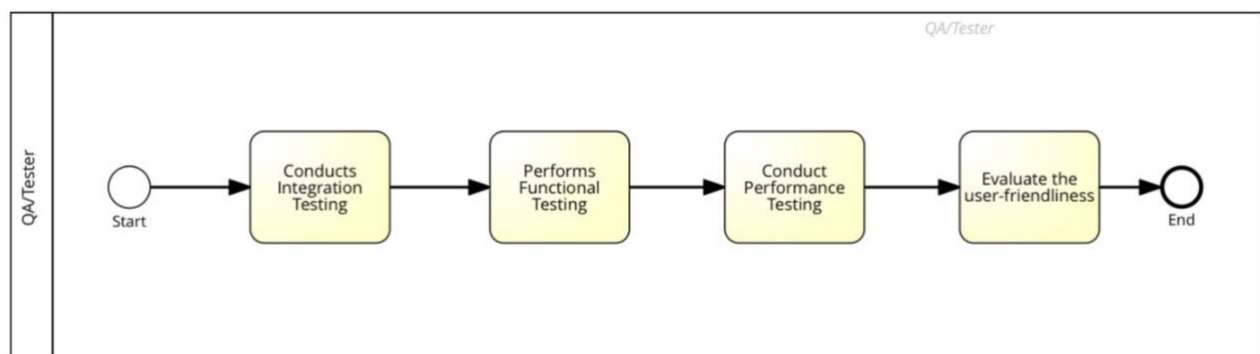
Finally, the back-end developer Creates documentation for the API endpoints. This documentation should explain how to use the API endpoints and provide examples of how to make requests. Next, the back-end developer Creates API endpoints by designing and implementing the API endpoints that will be used to access the back end of the application. The back-end developer also Tests and debugs the API endpoints to ensure that they are working properly. Once the API endpoints have been tested and debugged, the back-end developer Deploys the API endpoints to production and deploys them to a web server.

○ Prepare Testing (Layer 3):



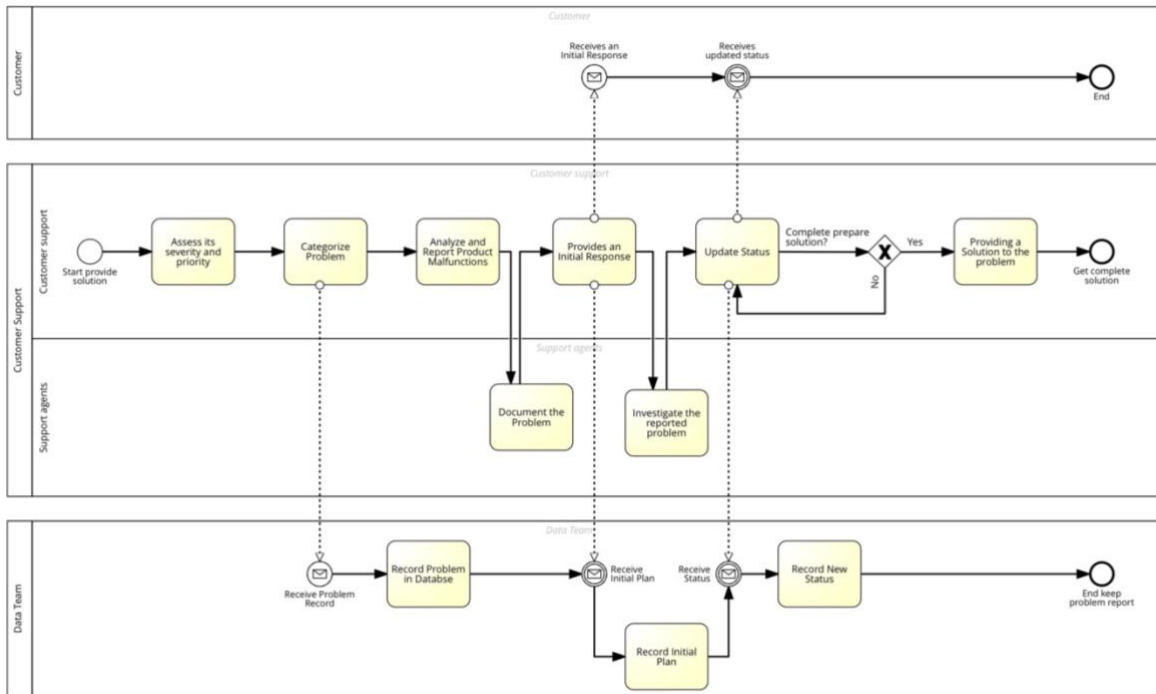
In this process, testers will prepare and plan test cases to be applied to the application. Test cases are designed to cover various situations that may occur for users or aspects that need consideration. If a problem arises, the Test Environment setting is configured. The test environment simulates different weather conditions and mechanical stresses that occur with use. Environmental testing exposes weaknesses in the design or functionality of the application. Finally, the Tester/QA will prepare a test case to test the application.

○ Test Application (Layer 3):



The "Test Application Process" initiated by a Tester/QA begins with integration testing, ensuring the seamless operation of different components. Then, functional testing verifies adherence to specified requirements, while performance testing evaluates responsiveness and scalability. Finally, Tester/QA will assess user-friendliness, focusing on the interface and overall user experience.

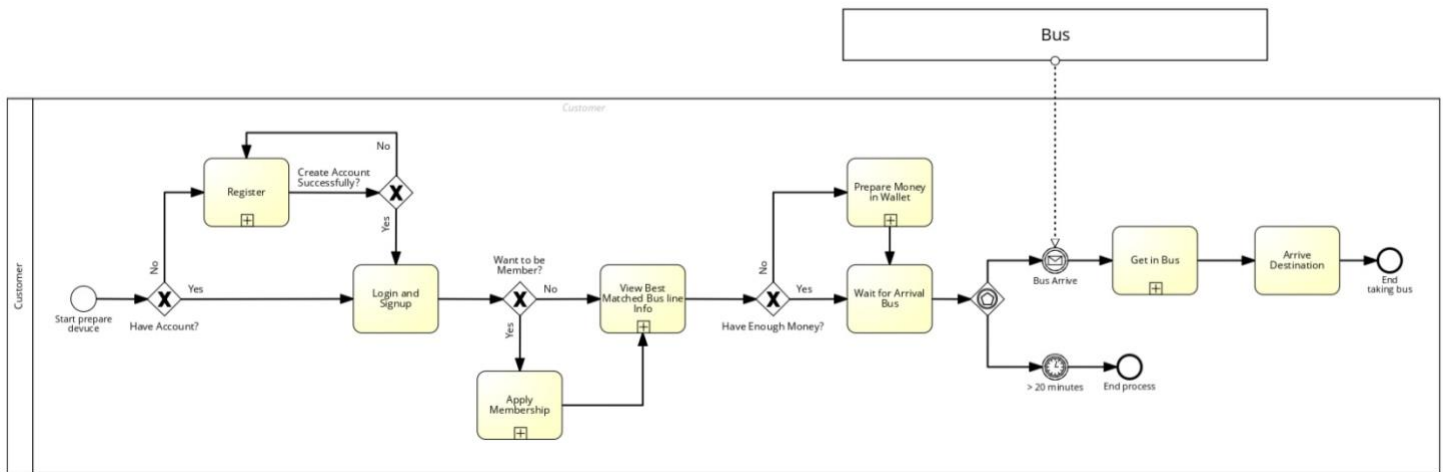
- **Problem Solution or Answer (Layer 2):**



The process is initiated and triggered when a customer reports a problem through various channels such as phone, email, or chat. After the customer support team receives the problem report, they record it in the customer support database and subsequently provide the customer with an initial response. This response may include information about the problem, the estimated time to resolution, and a response. The severity of the problem is then assessed and categorized, considering factors like its impact on the customer and complexity. If the issue is related to a product or bus malfunction, the customer support team analyzes and reports it to the bus manufacturing team. Another initial response is provided to the customer, followed by updating the problem status in the customer support database and completing necessary preparations for resolution, which may involve gathering information from the customer, the data team, and other stakeholders. The customer support team then offers a solution to the problem, which may involve providing a workaround, fixing the problem, or replacing the product. Finally, the solution is recorded in the customer support database, and the problem status is updated to "resolved." The process concludes when the customer expresses satisfaction with the solution.

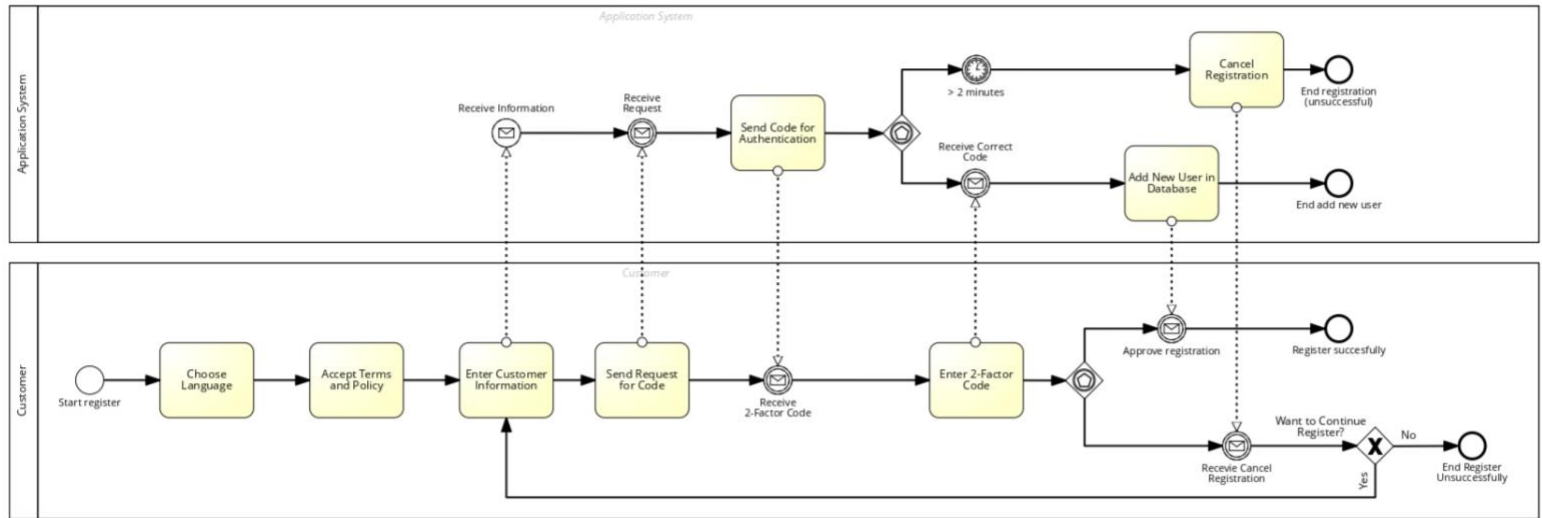
Customer

- **Take Bus (Layer 2)**



This part happens after the customer has downloaded the application. The next step is to prepare their device by checking if they have an account. If not, they need to register first. If the customer's registration is unsuccessful, they cannot continue to the login step. Next, the customer is asked if they want to apply for a membership. If so, they can do so and then view the best matched bus line information. At this step, customers will know which bus line they can take to their destination. The customer can then check their wallet balance in the application. If they do not have enough money, they need to add money to their wallet first. Once they have enough money in their wallet, they can wait for the bus to arrive. If the bus is more than 20 minutes late, the customer may choose to leave and report the problem on the system. Otherwise, the customer can board the bus and arrive at their destination.

○ Register (Layer 3):

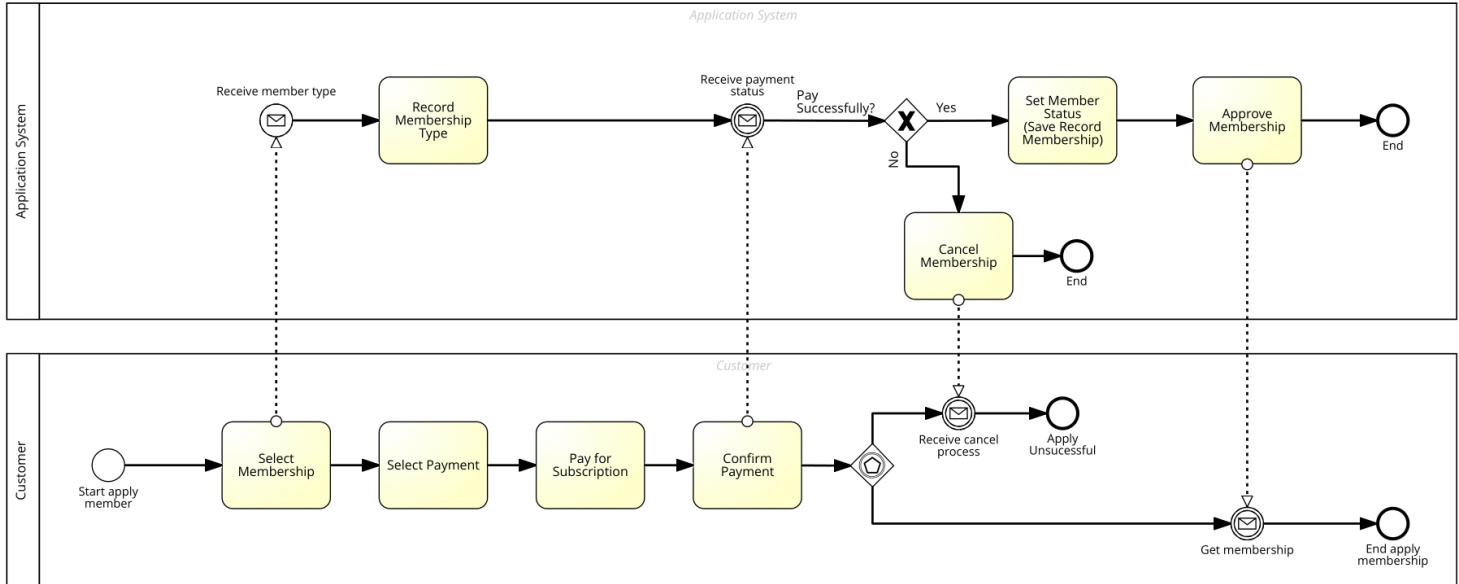


The customer must first create an account by registering. The first page that the application shows when registering is the language selection page. The customer needs to choose a language and then accept the terms and conditions to use the application. Then, they enter their information, such as their first name, last name, email address, and password.

Once the customer has entered their information, the system will receive it. Then there is a button to request the code, and the customer has to do it. The system will receive this request and send a code back to the customer for authentication. The customer must enter this code to authenticate their account. If the authentication is successful, the system will add the new user to the database and let the user know that their account has been approved and created. Otherwise, if it is more than 2 minutes after the customer receives the code, the system will cancel the registration and send a notification to the customer.

After receiving this notification, the customer can choose whether to continue or not. If they still want to register, they need to send a request and get the code again for registration.

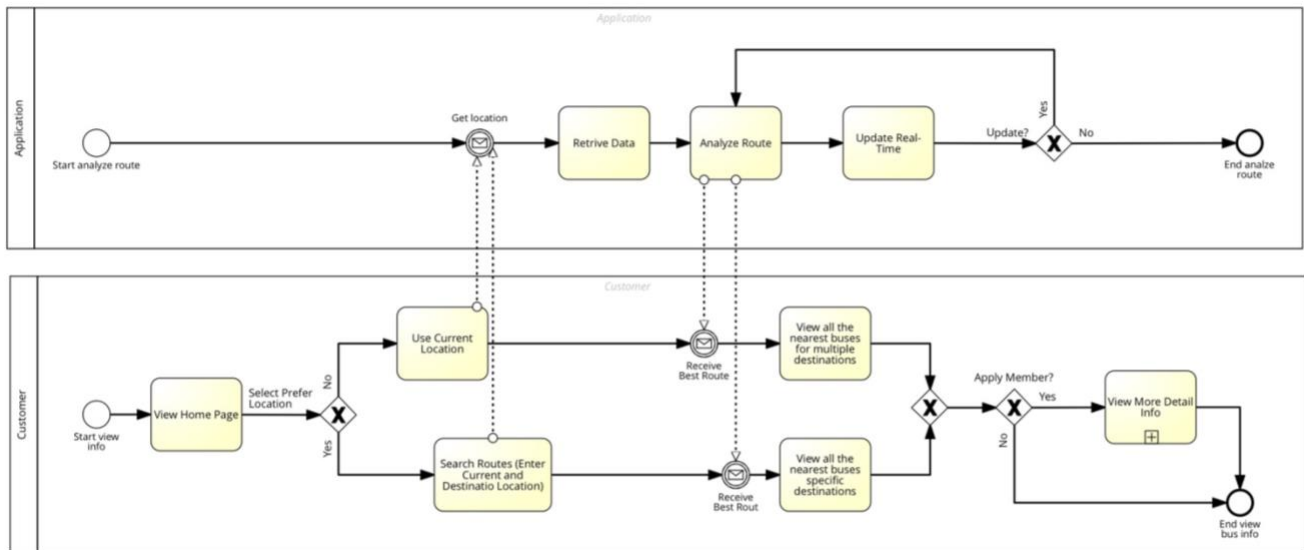
○ Apply Membership (Layer 3):



To apply for a membership, the customer first needs to select a membership type. The application will then retrieve the member type that the customer has chosen and record it in the system. Next, the customer needs to pay for the subscription by selecting a payment method and paying the price and confirming the payment.

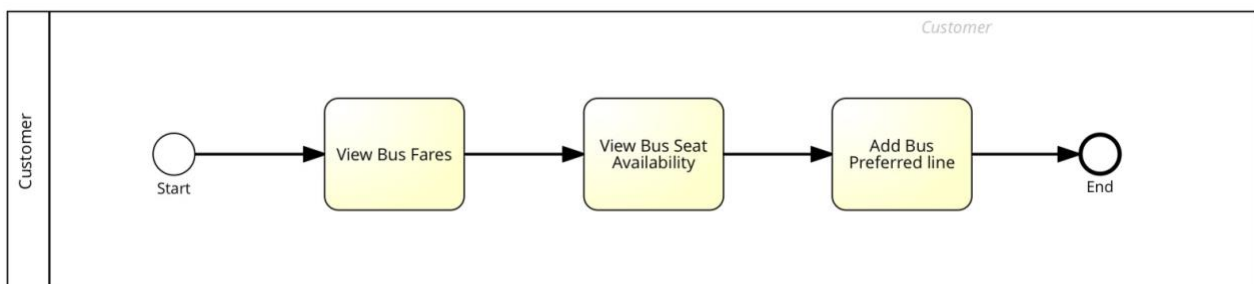
When the customer confirms the payment, the system will be notified of whether the payment was successful or not. If the payment is successful, the system will set the customer's member status and approve the membership, informing the customer that this step was successful. If the payment is not successful, the system will cancel the membership and let the customer know that the process was not successful. The process will then end, and the customer's member status will remain the same.

○ View Best Matched Bus line Info (Layer 3):



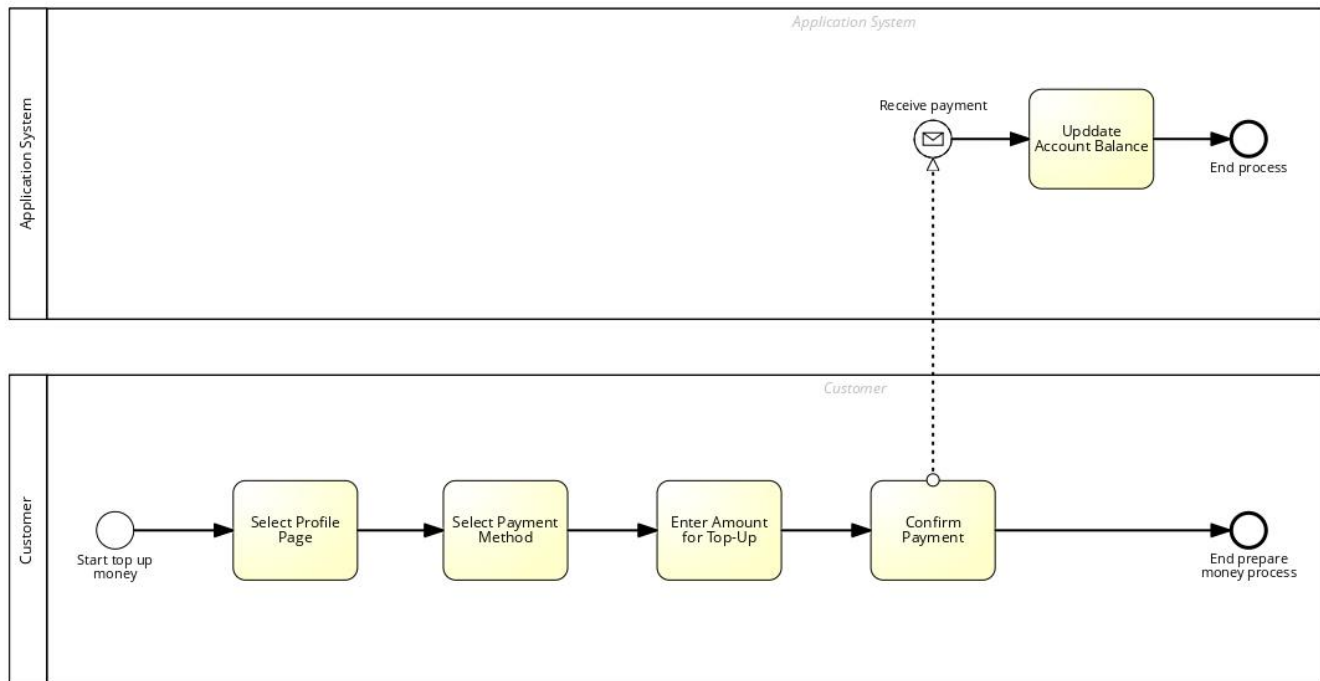
When a customer wants to view the best matched bus line information, they first need to go to the home page. If they want to select a preferred location, such as the source and destination, they can do so. The application will then find the bus line based on the customer's input. The result that the application sends back is the information of the nearest bus with the bus line that is associated with the specific destination. However, if the customer does not provide any input, the system will assume the default selection, which is to choose the current location to find the route. The result that the application sends back is the information of the nearest bus with multiple bus lines that can go to many destinations. After viewing this information, customers who are members can view more detailed information.

▪ View More Detail Info (Layer 4):



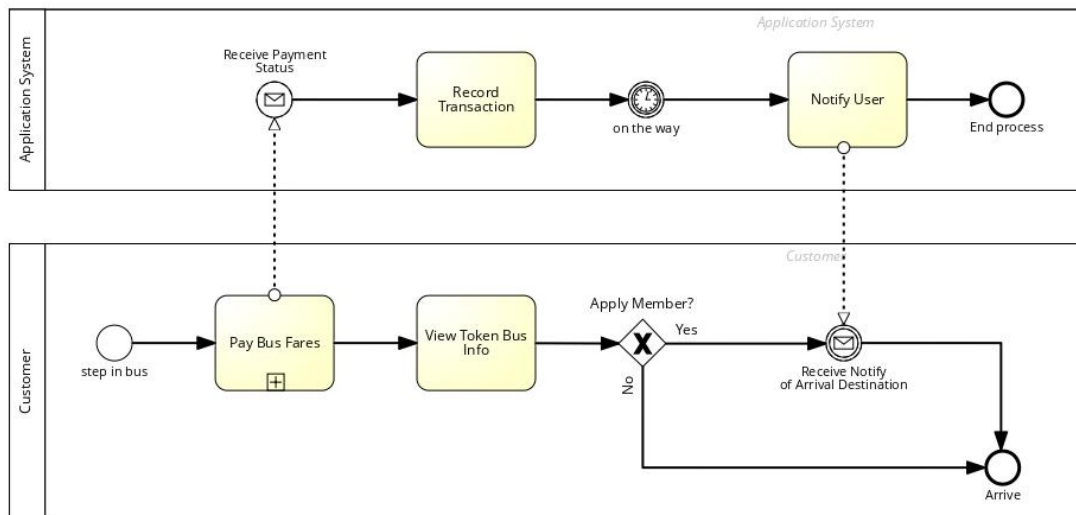
The additional features for customers who are members are the ability to view the bus fare, see the available seats, and add the bus to their preferred lines after seeing all of the information.

○ Prepare Money in Wallet (Layer 3):



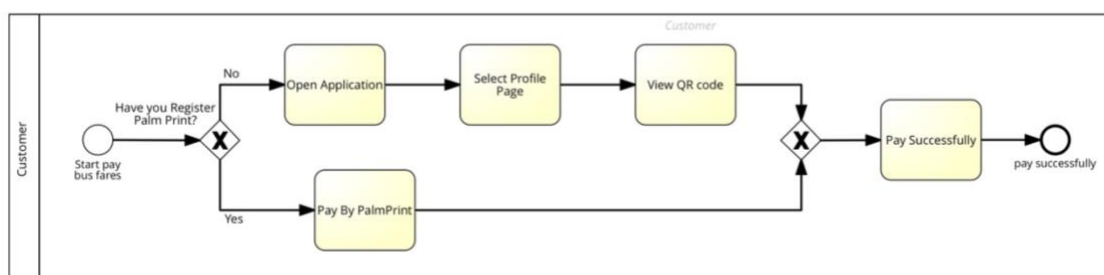
To prepare money in the wallet, the customer must go to the profile page and top up their money. First, they select a payment method, such as PromptPay, credit/debit card, KMA, Bualuang mBanking, KTB NEXT, KPLUS, SCB Easy, Google Pay, or TrueMoney Wallet. Then, they enter the amount of money they want to top up and confirm the payment. The system will then receive the confirmation and update the customer's account balance.

○ Get in Bus (Layer 3):



When customers get on the bus, they must first pay for the bus fare. The system will receive the payment and record the transaction when the customer has already paid. Customers can also view the token bus information, such as the current location of the bus and the estimated time of arrival at the destination. Once the bus is on its way to the destination and arrives, the system will send a notification to the customer who is one of our members to indicate that it's arrived. Customers who are not members will not receive a notification.

▪ Pay Bus Fares (Layer 4):



To start paying the bus fare, the system first checks if the customer has registered their palm print. If so, the customer can pay by placing their palm on the reader. If not, the customer must open the application and select the profile page, where the QR code is located. Customers can use the QR code to scan instead of using their palm print. Once the payment is successful, the customer will be able to board the bus.

ODOO

The ODOO section belongs to the bus assembly chain. Odoo assists us in managing the complex requirements of this industry. The fundamental components that comprise our bus assembly operations are Manufacturing, Inventory, Purchase, Accounting, and Quality Control. Every individual core module provides a unique important function in assuring the effective assembly of electric buses.

Core Modules:

1. Manufacturing:

Explanation: The process involves the comprehensive lifecycle of electric bus assembly, starting with the coordination of production orders and concluding with the reporting of completed buses that have been successfully assembled. This module facilitates the effective coordination of the manufacturing process through the installation of critical tools and functionalities, such as work center scheduling, bill of materials management,

Why Choose as Core: Manufacturing is at the heart of our business because it enables us to streamline the production process, maintain quality standards, and ensure the timely assembly of electric buses. It provides tools for resource allocation, bill of materials management to guarantee that the right components, and work center scheduling, which are essential for efficiently assembling our buses.

2. Inventory:

Explanation: The Inventory module facilitates the management of all bus assembly-required materials, components, and spare parts. It assists in maintaining optimal inventory levels by monitoring material movements and tracking stock levels.

Why Choose as Core: Inventory is a core module because it ensures that we have the right materials and components available when needed for bus assembly. Effective inventory management prevents stockouts, reduces storage costs, and enhances the overall efficiency of our production process.

3. Purchase:

Explanation: The Purchase module facilitates the procurement of materials and components required for bus assembly. It manages purchase orders, and invoicing, helping us source materials efficiently.

Why Choose as Core: Purchase is a core module because it's essential for securing the necessary materials and components. This module enables us to source the necessary materials and components efficiently, ensuring that we have the right items on hand when needed for bus assembly. Purchase provides tools to manage and control costs, ensuring that we can obtain materials at competitive prices, thereby contributing to cost-effective bus production.

4. Invoicing:

Explanation: The Invoice module assumes an important part in our bus assembly operations, particularly in the effective management of financial transactions related to the acquisition of materials and components. This module facilitates the creation of invoices, which involves recording the financial particulars of transactions conducted with our vendors.

Why Choose as a Core: Because of its vital role in maintaining financial transparency and compliance in our bus assembly business, the invoice has been designated as a core module. We can record and handle the financial transactions related to the purchase of materials by using the Invoice module. This includes transactions conducted with vendors and keeping track of payments.

5. Accounting:

The utilization of this module incurs a cost. The incorporation of this module into our bus assembly operations would undeniably yield a significant enhancement to the comprehensiveness and quality of our assembly process.

Explanation: The Accounting module is used to maintain financial records, manage accounts, and generate financial reports. It helps in maintaining financial transparency and compliance.

Why Choose as Core: Accounting is at the core of our business, ensuring that our financial records are accurate. The module includes tools for creating financial reports such as balance sheets, income statements, and cash flow statements, which provide valuable insights into the financial performance of the organization.

6. Quality Control:

The availability of the Quality Control module within our Odoo application does not include a free option. Nevertheless, the integration of this module into our bus assembly operations would certainly make a substantial contribution to the comprehensiveness and quality of our assembly process. This decision is driven by the following primary factors:

Explanation: The Quality Control allows us to establish and enforce quality control standards in our manufacturing process. The implementation of Quality Control allows for the establishment and strict enforcement of quality control standards across our manufacturing process. This ensures that our electric buses consistently adhere to the best standards of quality, safety, and performance.

Why Choose as a Core: Quality Control is designated as a core module because it addresses a critical aspect of the bus assembly process. By incorporating Quality Control as an essential component, we emphasize our commitment to producing electric buses that are widely recognized for their high quality, safety, and performance.

Plugins:

1. Merge RFQ:

Explanation: The Merge RFQ module, which has been developed by Cybrosys Techno Solutions, serves as an additional component to our bus assembly. This module focuses on the specific requirement of effectively managing and optimizing the consolidation of purchase orders that are currently in the RFQ (Request for Quotation) or RFQ Sent state. The module's main characteristics and capabilities play a crucial role in improving the efficiency and effectiveness of our procurement processes.

Why Choose as a Plugin: The Merge RFQ module enhances the efficiency of purchase order management through its provision of various options, such as cancellation, deletion, and merging of orders. The module provides users with a range of options for managing purchase orders, including the ability to cancel a group of selected orders and create a new one, delete selected orders and create a new one, merge orders onto an existing selected order while canceling others, or merge orders onto an existing selected order while deleting others. The adaptability of our procurement strategy ensures that it is in line with the ever-changing requirements of our bus assembly operations.

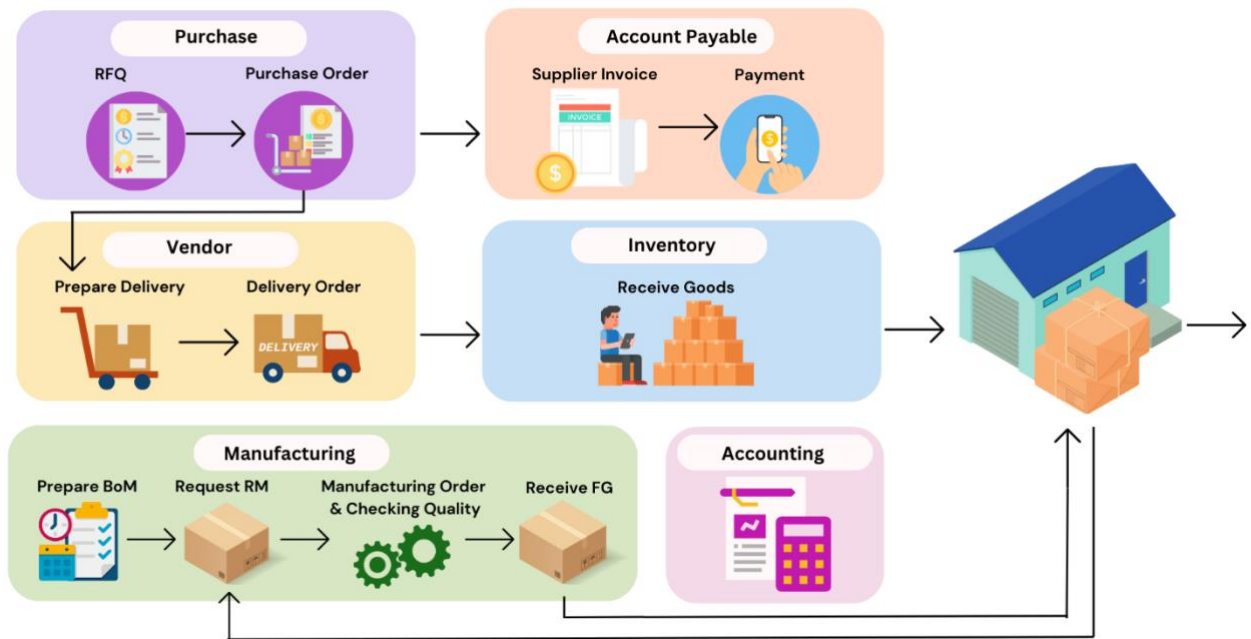
If, in the future, there is an increase in the number of vendors. The ability to choose an alternative vendor during the process of merging offers the opportunity to adjust to evolving supplier relationships or engage in more favorable negotiations. The module incorporates validation mechanisms to enforce the selection of at least two purchase orders, which must be in either the RFQ or RFQ Sent state. The implementation of these validations serves to reduce errors and increase compliance with the established procurement workflow.

2. Purchase History of Products:

Explanation: The "Purchase History of Products" module, also developed by Cybrosys Techno Solutions. It is a significant enhancement to our business, this module improves the visibility and monitoring of the purchasing history of products, offering valuable insights into procurement patterns and trends.

Why Choose as a Plugin: The module provides a centralized perspective on the purchase history of products and their respective variants. This feature enables us to retrieve comprehensive data regarding past purchases, encompassing quantities, prices, and suppliers. The capability to access and examine the purchase history according to its status, such as Request for Quotation (RFQ), enables us to effectively analyze the flow of products within the procurement workflow. This feature offers notable advantages in terms of order tracking and comprehension of the procurement process's effectiveness. The module greatly improves the ability to access and analyze the historical records of product purchases. The tracking of materials and components is of utmost importance in bus assembly operations, as it plays a critical role in maintaining optimal inventory levels, making informed purchasing decisions, and ensuring the quality and reliability of supplies.

ODOO Implementation diagram



Odoo Implementation in Bus Assembly

1. Define the Bill of Materials (Manufacturing)

To utilize the manufacturing module to define the bill of materials required for bus assembly. This includes specifying the components and quantities for each part needed in the production process.

Bill of Materials

Product: EV Bus	
Quantity: 1	
Component	Quantity
Battery Pack	1.00
Body Control Module (BCM)	1.00
Braking system	2.00
CCTV	3.00

Charger	30.00
Composite Monocoque Body	1.00
Electric Axle	2.00
Electrical system (low voltage)	1.00
Exterior Paneling	10.00
Front axle	1.00
Intelligent Driver Assist (IDA) System	1.00
Motor Controller	2.00
Rear axle	1.00
Screen	4.00
Seat	35.00
Speaker	8.00
Steering gear	1.00
Supervisory Controller	1.00
Suspension	6.00
Tires and wheels	4.00

2. Purchase Raw Materials (Purchase)

Using the information from the bill of materials, the purchase module generates purchase orders for acquiring the necessary raw materials and components. The procurement process aligns with production demands and helps maintain an uninterrupted supply chain.

Request for Quotations

Vendor: ALIBABA GROUP HOLDING COMPANY LIMITED			
Product	Description	Quantity	Unit Price (Per product including VAT 7%)
Battery Pack	633 V DC (lithium-ion batteries)	1	209,995.75
Body Control Module (BCM)	Body Control Module (BCM)	1	4629.1731
Braking system	Full air brake	2	45,149.0352
CCTV	360 PTZ outdoor security camera in wireless	3.00	3,557.2899
Charger	USB Charger	30.00	35.6203
Composite Monocoque Body	Composite Monocoque Body	1.00	185,000.004
Electric Axle	Electric Axle Motor	2.00	13,891.6067
Electrical system (low voltage)	Electrical system (low voltage)	1.00	7,122.9044
Exterior Paneling	Exterior Paneling	10.00	2,799.9974
Front axle	Front axle	1.00	13,499.0344
Intelligent Driver Assist (IDA) System	Intelligent Driver Assist (IDA) System	1.00	13,171.5823
Motor Controller	Motor Controller	2.00	7,117.2976
Rear axle	Rear axle	1.00	21,498.0548
Screen	Screen	4.00	3,749.9969
Seat	Back throne chair plastic bus	35.00	996.8441
Speaker	Speaker	8.00	1,200.005
Steering gear	Steering gear	1.00	2,135.0673
Supervisory Controller	Supervisory Controller	1.00	2,099.2223
Suspension	Suspension	6.00	42,695.996
Tires and wheels	Tires and wheels	4.00	28,409.998

3. Receive Product (Inventory)

The Inventory module is essential in the bus assembly process as it oversees the careful reception and handling of the purchased materials that are necessary for the bus assembly.

4. Operation & Work Center (Manufacturing)

Within the manufacturing module, the assignment of tasks and resources to different work centers occurs. Each work center is responsible for specific operations, such as assembly, and quality checks.

Bill of Material

Operation			
Operation	Work Center	Duration Computation	Duration (minutes)
Assemble Station of Bus body	Assembly Station of Bus body	Set duration manually	1440:00
Chassis	Assembly Station for Chassis	Set duration manually	2880:00

5. Plan an Order (Manufacturing)

The manufacturing module is in charge of coordinating and supervising the bus assembly process. It effectively plans and schedules the production tasks, making sure they align with the available resources and timelines.

Operation

Manufacturing Order		
Product	Quantity	Bill of Material
Braking system	1.00	Chassis
CCTV	3.00	Assemble Station of Bus body
EV Bus	4.00	Assemble Station of Bus body
EV Bus.	2.00	Assemble Station of Bus body
Electric Axile	1.00	Chassis
Motor Controller	1.00	Assemble Station of Bus body
Screen	5.00	Assemble Station of Bus body
Speaker	13.00	Assemble Station of Bus body
Suspension	9.00	Chassis
Tires and wheels	5.00	Assemble Station of Bus body

*We assume that all three processes in the signavio are one manufacturing process.

6. Add Quality Check (Quality)

Upon the completion of assembly, adding the quality control steps in to ensure the assembled buses meet predefined quality standards.

7. Check Quality Test

This stage involves testing to verify that the assembled buses meet stringent quality before they are released for the final delivery.