

Chapter 3

METHODOLOGY

3.1 Agile Scrum Methodology in the Project

Agile Scrum is an iterative project management framework that structures work into time-boxed sprints typically spanning two to four weeks to deliver incremental value, accommodate evolving requirements, and prioritize stakeholder input. Within public consultation initiatives, this approach facilitates adaptable design, enables responsive action to community needs, and ensures ongoing alignment with policy objectives, effectively addressing the dynamic character of public engagement and the diversity of stakeholder expectations.



Figure no. 1 Agile Scrum Framework

3.2 Roles and Responsibilities

Each role in the project team carries significant responsibilities that directly influence the success and overall performance of the capstone project. The table below outlines the key duties assigned to each team member:

Name	Role	Responsibilities
Ms. Richelyn Villasor	Research Adviser	A research adviser (also called a supervisor or mentor) guides and supports researchers throughout their project lifecycle, ensuring work is rigorous, ethical, and aligned with academic or organizational goals. Their responsibilities span technical, professional, and developmental domains
Ms. Richelyn Villasor	Product Owner	Represents the LGU's interests (typically a designated staff member). They are responsible for defining and prioritizing key system features—such as public submission handling, concern categorization, and tracking functionalities—within the Product Backlog
Mr. Ombina, Julios	Project Manager	A Project Manager (PM) is accountable for planning, executing, and closing projects to deliver agreed-upon goals on time, within budget, and to the required quality standard. Their role integrates leadership, coordination, and strategic oversight across all project phases

Ms. Richelyn Villasor	Developer/Lead Programmer	Combines technical expertise with leadership to oversee software development projects, ensuring solutions are high-quality, scalable, and aligned with organizational goals. Their role spans coding, team management, architecture design, and stakeholder collaboration
Ms. Richelyn Villasor	QA Tester	A QA (Quality Assurance) Tester ensures software, systems, or products meet defined quality standards, function as intended, and deliver a positive user experience. Their role focuses on identifying defects, validating requirements, and supporting reliable delivery across all project phases
Ms. Richelyn Villasor	Documentation Specialist	A Documentation Specialist creates, organizes, and maintains clear, accurate, and accessible materials that support users, teams, and stakeholders. Their work ensures information is consistent, up-to-date, and aligned with organizational goals and standards
Ms. Richelyn Villasor	Security Lead	A Security Lead oversees an organization's or project's information security strategy, ensuring systems, data, and processes are protected from threats while maintaining compliance with regulations. Their role balances technical expertise, risk management, and cross-functional leadership

Table no.1 Roles and Responsibilities

3.3 Sprint Cycles

Sprint cycles include participation into every phase of project development, allowing for quick adjustments and guaranteeing that community voices influence results in real time, in contrast to typical linear consultation, which frequently gathers input only at specific milestones. Addressing gaps such as delayed feedback loops, low public trust, and a mismatch between government plans and community demands is the main objective

To Do	In Progress	Done
Backlog grooming, feature prioritization	Development, testing, integration	Deployed and reviewed features
Password encryption design, registration UI	Email verification, session handling	User registration, secure login, logout
Announcement scheduling, notification settings	Profile management, session timeout	Create/view announcements, dashboard update

Table no. 2 Scrum Board

3.4 Scrum Artifacts

3.4.1 Product Backlog (User Stories)

User Story No.	Features/ Task	User Stories	Priority	Status
MODULE 1: Authentication & User Management				
F1	User Registration	As a new user, I want to register an account with email and password so that I can create a profile and access the consultation management portal securely.	High	Completed
F2	User Login	As a registered user, I want to log in securely using my credentials so that I can access my personalized dashboard and consultation history.	High	Completed

F3	Password Reset	As a user, I want to reset my forgotten password via an email verification link so that I can regain access to my account without contacting support.	High	In Progress
F4	User Logout	As a user, I want to securely log out from my account so that my session is terminated and my data is protected on shared devices.	High	Completed
F5	Email Verification	As a new user, I want to verify my email address during registration	High	In Progress

		so that the system ensures I have a valid contact email		
F6	Account Deactivation	As a user, I want to deactivate my account temporarily or permanently so that I can manage my online presence and privacy.	Medium	Not Started
F7	Two-Factor Authentication Setup	As a security-conscious user, I want to enable two-factor authentication on my account so that my account is protected with an	Medium	In Progress

		additional security layer.		
F8	Remember Me Functionality	As a user, I want the option to "remember me" on login so that I don't have to re-enter credentials on trusted devices.	Medium	Completed
F9	Session Management	As an admin, I want to view and manage active user sessions so that I can log out inactive or suspicious sessions.	Medium	Not Started
F10	User Profile Management	As a user, I want to update my profile information, upload	High	Completed

		a profile picture, and manage my personal data so that my profile accurately reflects my information.		
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MODULE 2: Announcements & Notification

F11	Create Announcements	As an admin, I want to create and publish announcements to all users so that important system updates and policy changes are communicated effectively.	High	Completed
F12	Manage Announcements	As an admin, I want to edit, schedule, or delete announcements so	High	In Progress

		that I can manage the lifecycle of communication with users.		
F13	View Announcements	As a user, I want to view all active announcements prominently on my dashboard so that I stay informed about system updates and policy changes.	High	Completed
F14	Announcement Categories	As an admin, I want to categorize announcements by type so that users can filter and find relevant	Medium	In Progress

		announcements easily.		
F15	Announcement Scheduling	As an admin, I want to schedule announcements to be published at specific dates and times so that I can plan communications in advance.	Medium	In Progress
F16	Announcement Expiration	As an admin, I want to set expiration dates for announcements so that outdated information is automatically hidden from users.	Medium	Not Started

F17	Announcement Analytics	As an admin, I want to track announcement views, clicks, and engagement metrics so that I can measure the effectiveness of communications.	Low	Not Started
F18	Rich Text Editor for Announcements	As an admin, I want to use a WYSIWYG editor with formatting options so that I can create visually appealing announcements with images and links.	Medium	In Progress

F19	Email Notification System	As a user, I want to receive email notifications for new announcements so that I stay informed even when not actively using the system.	Medium	In Progress
F20	Send Targeted Notifications	As an admin, I want to send targeted notifications to specific user groups or departments so that important information reaches the right audience.	Medium	Completed

F21	Push Notifications	As a user, I want to receive real-time push notifications for important events so that I stay updated even when I'm not actively using the system.	Medium	In Progress
F22	Notification Preferences	As a user, I want to customize my notification settings so that I receive only the types of notifications I'm interested in.	Medium	In Progress
F23	Notification History	As a user, I want to view my notification history so that I can reference past	Low	Not Started

		notifications and updates.		
F24	SMS Notifications	As a user, I want to receive SMS notifications for critical alerts so that I'm informed even without internet access.	Low	Not Started
MODULE 3: Posts & Consultation				
F25	Features/Task	As a citizen or official, I want to create consultation posts or feedback submissions so that I can share my views and participate in public consultations.	High	Completed

F26	Edit Posts	As a post author, I want to edit my posts before they're reviewed so that I can correct errors or add additional information.	Medium	In Progress
F27	Delete Posts	As a post author, I want to delete my posts so that I can remove content I no longer want to share.	Medium	In Progress
F28	Post Categories/Tags	As a user, I want to categorize posts with tags so that others can find relevant discussions easily.	Medium	In Progress

F29	Attach Files to Posts	As a user, I want to attach supporting documents or files to my consultation posts so that I can provide additional context and evidence.	Medium	Not Started
F30	View/Browse Posts	As a user, I want to view all posts and consultations with filtering and search capabilities so that I can find relevant discussions and feedback.	High	Completed
F31	Post Details View	As a user, I want to view detailed information about a post including all comments and	High	Completed

		metadata so that I can understand the full context of a discussion.		
F32	Comment on Posts	As a user, I want to view detailed information about a post including all comments and metadata so that I can understand the full context of a discussion.	High	In Progress
F33	Like/Vote on Posts	As a user, I want to like or vote on posts to show support so that popular ideas and concerns are	Medium	In Progress

		highlighted for officials.		
F34	Reply to Comments	As a user, I want to reply to specific comments so that I can continue nested conversations and provide direct feedback.	Medium	In Progress
F35	Comment Moderation	As a moderator, I want to approve, flag, or delete inappropriate comments so that discussions remain respectful and on-topic.	High	In Progress
F36	Pin Important Posts	As an admin, I want to pin	Low	Not Started

		important posts to the top of the feed so that critical consultations receive maximum visibility.		
F37	Post Search and Filter	As a user, I want to search and filter posts by date, author, category, and status so that I can quickly find relevant discussions.	High	In Progress
F38	Post Status Tracking	As a user, I want to see the status of my posts (pending, approved, rejected) so that I understand where	High	In Progress

		they are in the review process.		
F39	Post Notification Subscriptions	As a user, I want to subscribe to updates on specific posts so that I'm notified when new comments or status changes occur.	Medium	Not Started
F40	Post Moderation Dashboard	As an admin, I want to approve, reject, or flag inappropriate posts for moderation so that the platform remains safe and respectful.	High	Not Started
MODULE 4: Analytics & Reporting				

F41	System Dashboard	As an admin, I want to view system statistics, activity overview, and key performance indicators so that I can monitor the health and usage of the platform.	High	Completed
F42	User Analytics	As an admin, I want to track user engagement metrics, login patterns, and activity trends so that I can understand how citizens are using the platform.	Medium	In Progress

F43	Audit Logs	As an admin, I want to view detailed audit logs of all system actions and user activities so that I can ensure compliance and track important events.	High	Completed
F44	Report Generation	As an admin, I want to generate and export reports in PDF and CSV formats so that I can share findings with stakeholders and conduct analysis.	Medium	Not Started

F45	User Engagement Metrics	As an admin, I want to track metrics like post creation rate, comment frequency, and consultation participation so that I can measure platform adoption.	Medium	In Progress
F46	Performance Monitoring	As an admin, I want to monitor system performance, API response times, and database query performance so that I can identify and fix bottlenecks.	High	In Progress

F47	Citizen Feedback Sentiment Analysis	As an admin, I want to analyze sentiment (positive, neutral, negative) from consultation posts and comments so that I can better understand public perception and prioritize policy responses.	Medium	Not Started
F48	Consultation Participation Reports	As an LGU official, I want to generate reports showing participation rates per consultation topic, date, and barangay so that engagement levels can be evaluated	High	Not Started

		and gaps in participation can be identified		
F49	Data Privacy & Consent Tracking	As a system administrator, I want to track user consent and data usage acknowledgements so that the system complies with data privacy regulations and maintains public trust.	High	Not Started
F50	Decision Support Dashboard	As a decision-maker, I want a dashboard that summarizes key consultation insights (top	High	Not Started

		<p>concerns, trends, and recommendations) so that policy decisions are evidence-based and aligned with citizen input.</p>		
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Table no. 3 Product Backlog

3.4.2 Product Backlog for EIS Information Security

EIS No.	EIS User Stories	EIS IS Priority	Revision Priority	Status
IS-1	As a system administrator, I want all user passwords to	High	Medium	Completed

	be encrypted using bcrypt hashing so that user credentials are protected even if the database is compromised.			
IS-2	As a security officer , I want all forms to be protected against CSRF attacks using secure tokens so that malicious actors cannot trick users into performing unintended actions.	High	High	Not Started
IS-3	As a system administrator , I want sessions to have automatic timeout after inactivity so that unauthorized access is	High	Medium	In Progress

	prevented if a user leaves their device unattended.			
IS-4	As a developer , I want all user inputs to be validated and sanitized so that SQL injection and other input-based attacks are prevented.	High	Medium	Not started

Table no. 4 Product Backlog for EIS Information Security

3.4.3 Product Backlog for EIS Standards

3.4.3.1 UI/UX (Icons, Color, etc...)

EIS Standard No.	EIS Standard User Stories	EIS Standard Priority	Revision Priority	Status
UI-1	As a UI/UX designer, I want to implement a	High	High	Completed

	consistent color palette with primary (#2c3e50) and secondary (#27ae60) colors so that the system maintains visual consistency and brand identity.			
UI-2	As a frontend developer , I want custom scrollbar styling with gradient effects and smooth animations so that the user experience is enhanced with modern visual elements.	Medium	Medium	In Progress

UI-3	Implement dark mode theme	Low	Low	Completed
UI-4	As a designer , I want standard button styles (Primary, Secondary, Danger, Success) with consistent hover and active states so that users have a unified interaction experience.	High	High	In Progress

Table no. 5 Product Backlog for EIS Standards

3.4.4 Product Backlog for EIS Integration

EIS Integration No.	EIS Integration User Stories	EIS Integration Priority	Revision Priority	Status
INT-1	<p>As a backend developer, I want to implement RESTful API endpoints (users_api.php, consultations_api.php, analytics_api.php, audit_logs_api.php) so that core public consultation modules can securely exchange data and support transparent LGU operations.</p>	High	High	In Progress
INT-2	<p>As an admin, I want to integrate an email notification system for announcements, account verification,</p>	High	Medium	In Progress

	and consultation updates so that citizens and officials receive timely public information even outside the platform.			
INT-3	As a system architect, I want to integrate consultation management with APIs to handle citizen feedback submission, moderation, and status tracking so that public consultations are processed efficiently and transparently.	High	High	In Progress
INT-4	As an admin, I want to integrate an SMS notification service for	Medium	Low	Not Started

	critical advisories and consultation updates so that citizens without reliable internet access remain informed and included			
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Table no. 6 Product Backlog for EIS Integration

3.4.5 Product Backlog for Analytics

3.4.5.1 Application System Analytics

EIS Integration No.	EIS Integration User Stories	EIS Integration Priority	Revision Priority	Status
ASA-1	As a Presiding Officer, I want to track how many days an ordinance stays in "Committee Review" on average so that I can identify bottlenecks in the	High	Medium	In Progress

	review process and improve efficiency.			
ASA-2	As a UX Lead, I want to see which legislative search filters (Date, Author, Keyword) are used most frequently so that I can optimize the interface and improve user experience.	Medium	Low	In Progress
ASA-3	As a staff member, I want to monitor the system's storage capacity and file sizes so that I can ensure large scanned PDFs don't slow down the system.	High	Medium	Not Started
ASA-4	As a supervisor, I want to track the "Edit	Medium	High	Not Started

	History" of draft documents to see who made the most recent legal modifications so that I can maintain accountability and audit trails.		
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Table no. 7 Product Backlog for Analytics

3.4.5.2 EIS Analytics

EIS Analytics No.	EIS Analytics Stories	EIS Analytics Priority	Revision Priority	Status
EA-1	As an admin, I want to track user login patterns and system activity through get_user_logs_api.php	High	Medium	Completed

	so that I can analyze user engagement and identify usage trends.			
EA-2	As an admin, I want to measure post and consultation effectiveness using engagement metrics so that I can assess the impact of public participation initiatives.	Medium	High	In Progress
EA-3	As an admin, I want to collect user satisfaction ratings and Net Promoter Scores (NPS) so that service quality and trust levels can be evaluated.	Low	Medium	Not Started
EA-4	As an admin, I want to access a citizen engagement dashboard	High	High	In Progress

	so that consultation performance can be monitored in real time.			
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Table no.8 EIS Analytics

3.4.6 Sprint Backlog (User Stories)

Task No.	User Story No.	User Stories	Tasks	Timeline	Responsible Team Member/s
SPRINT 1: Core Authentication & Security					
S1_1	IS-1	As an admin, I want user passwords encrypted using	Planning Design Coding Documentation	Week 2	Ombina

		bcrypt so that user credentials remain secure even if the database is compromised.			
S1_2	IS-2	As an admin, I want CSRF protection implemented so that malicious requests are prevented.	Planning Design Implementation Security Testing	Week 2	Ombina
S1_3	F-1	As a user, I want to register using email and password so that I can securely access the system.	UI Design Backend Integration Testing	Week 2	Ombina
S1_4	F2	As an admin, I want to log in securely so that I can access my dashboard.	Authentication Testing	Week 2	Ombina
S1_5	F-3	As an admin, I want to verify my email so that my account is valid and secure.	Email Service Setup Validation Testing	Week 3	Ombina
SPRINT 2: User Management & Announcement					

S2_1	IS-3	As an admin, I want inactive sessions to timeout automatically so that unauthorized access is prevented.	Session Configuration Auto-Logout Logic Testing	Week 4	Ombina
S2_2	IS-4	As an admin, I want user inputs validated and sanitized so that SQL injection and XSS attacks are avoided.	Form Validation, SQL Injection Prevention, Testing	Week 4	Ombina
S2_3	F-4	As an admin, I want to update my profile information so that my account details stay accurate.	Profile UI Update Image Upload Testing	Week 5	Ombina
S2_4	F5	As an admin, I want to create announcements so that users are informed of updates.	Admin UI CRUD Functions Testing	Week 6	Ombina
S2_5	F-6	As an admin, I want to manage announcements	Edit, Delete, Schedule Logic, Testing	Week 4	Ombina

		so that outdated information can be edited or removed.		
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Table no. 9 Sprint Backlog (User Stories)

3.4.6.1 Sprint Burndown Chart

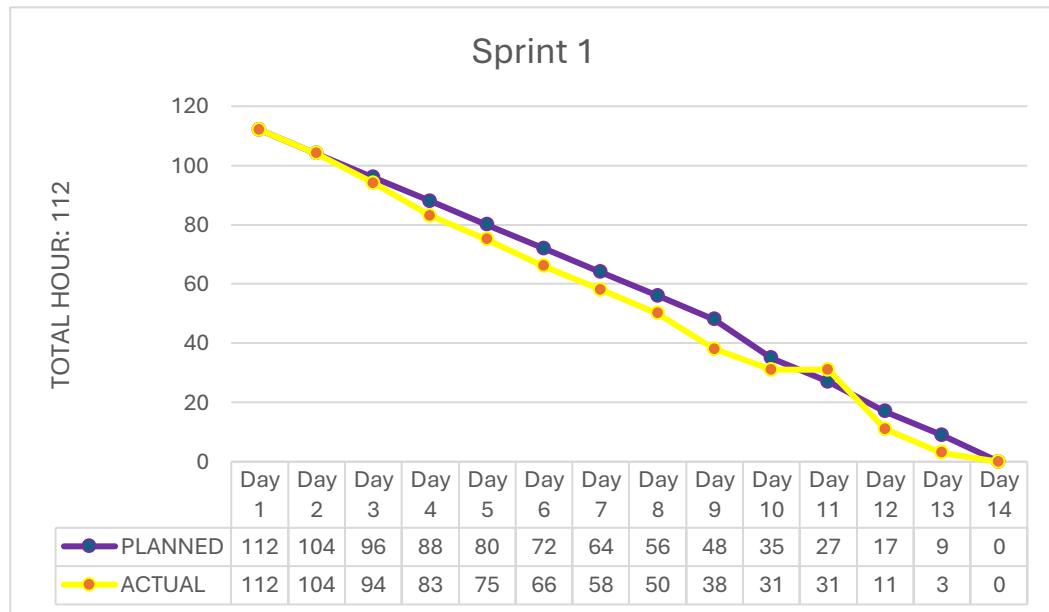


Figure no. 2 Burndown Chart

3.4.7. Increment

Sprint No.	Increment / Feature Delivered	User Story / Backlog Reference	Definition of Done (DoD) Criteria	Status	Remarks
Sprint 1	User Authentication & Security Module	F1, F2, IS-1	<ul style="list-style-type: none"> - Code completed - Passwords encrypted -Unit & security tested Documentation updated 	Done	Basic and secure authentication operational
Sprint 1	Database Schema Setup	F-1	<ul style="list-style-type: none"> - Database schema created - Tables normalized - Tested using sample 	Done	Ready for system integration

			consultation data		
Sprint 2	Product Catalog Module	IS-3, IS-4	<ul style="list-style-type: none"> - User interface designed - Core CRUD operations functional - Tested in staging environment 	In Progress	Pending UI review
Sprint 2	Shopping Cart	F-4	<ul style="list-style-type: none"> - Add and remove items functionality working - Session persistence implemented - Unit testing completed 	In Progress	Requires integration with succeeding modules
Sprint 3	Checkout & Payment Integration	IS-5, F-5	<ul style="list-style-type: none"> - Payment integration configured - Secure connection implemented - Secure connection implemented - Error handling mechanisms in place 	Planned	To be developed in Sprint 3

Table no. Increment

3.5 Microservices Architecture

The PCMS may initially be developed using a simpler architecture due to project scope, **Microservices Architecture (MSA)** offers a long-term vision for scalability, modularity, and integration with future LGU systems..

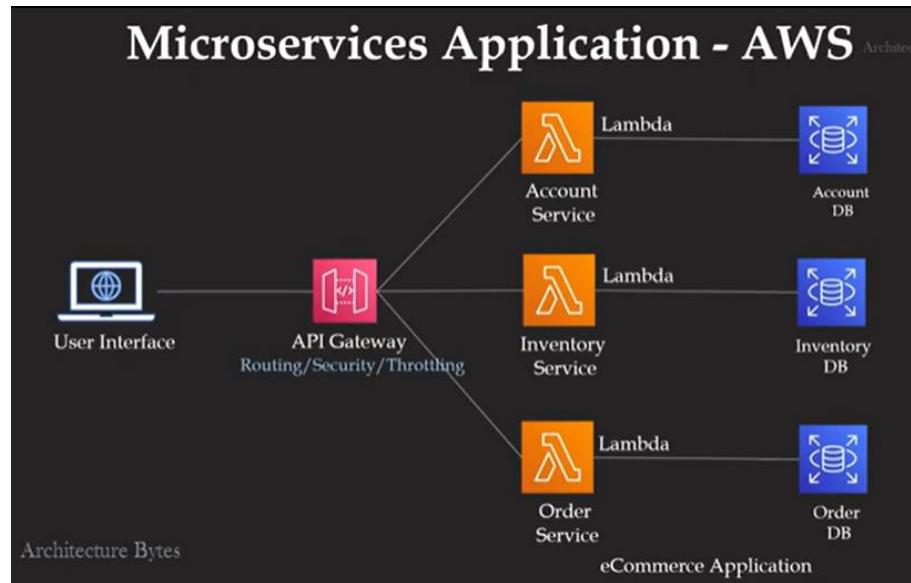


Figure no. 3 Microservices Diagram

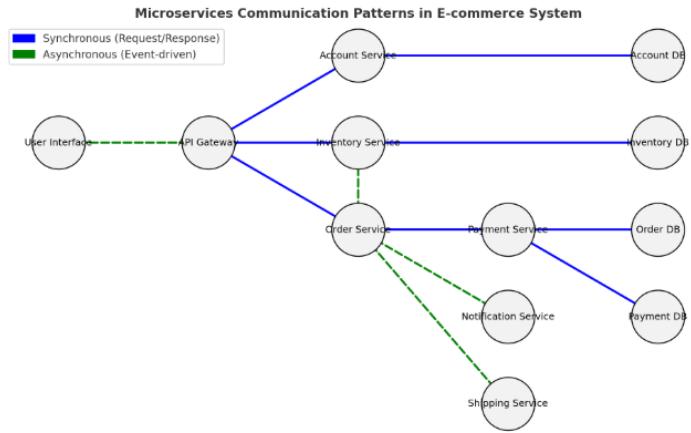


Figure no. 4 Communication Pattern for Microservices

Here's the **communication pattern diagram** for an e-commerce microservices system:

- ● **Blue solid lines → Synchronous (Request/Response)**
calls (e.g., login, product search, payment validation).
- ● **Green dashed lines → Asynchronous (Event-driven)**
interactions (e.g., order triggers stock updates, shipping, notifications).

Dfd level 1

Level 1 DFD (Context Diagram)

This shows the **entire e-commerce system as one process** and how external entities interact with it.

- **External Entity:** Customer
- **System (Process):** E-commerce Microservices System
- **Data Stores:** Account DB, Inventory DB, Order DB, Payment DB
- **Data Flows:** Login, Browse Products, Place Order, Make Payment, Receive Notification, Shipping Info

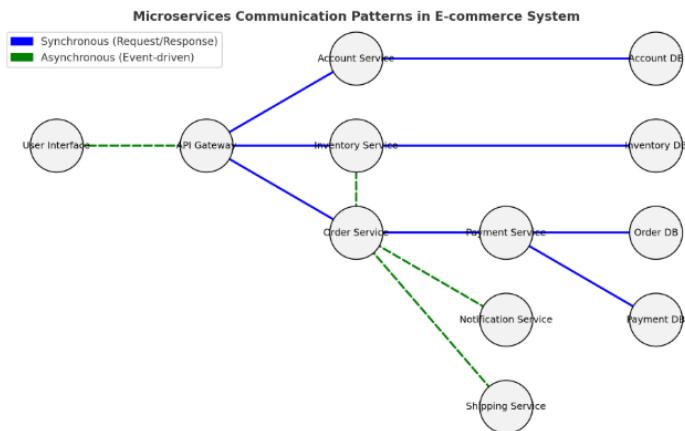


Figure no. 5 Data Flow Diagram for Microservices

3.6 DevOps Implementation

DevOps combines IT operations (Ops) with software development (Dev) to improve collaboration, expedite delivery, and increase the dependability of public consultation platforms. It uses techniques like infrastructure as code (IaC), continuous integration/continuous deployment (CI/CD), and automated monitoring to meet the particular requirements of government-led engagement tools, such as scalability, security, transparency, and adherence to public sector rules.

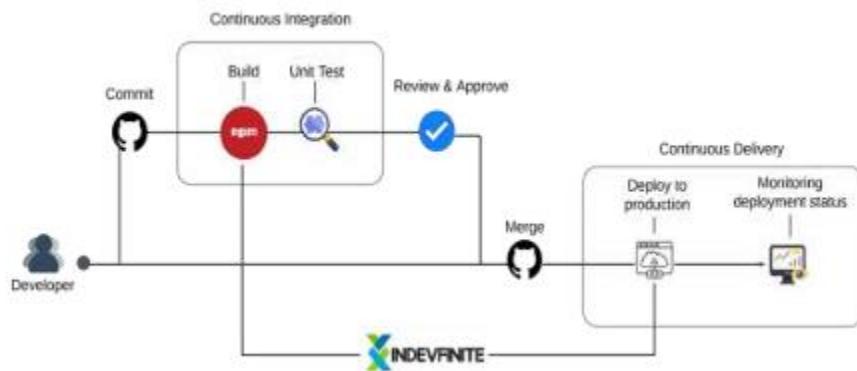


Figure no. 6 CI/CD Pipeline

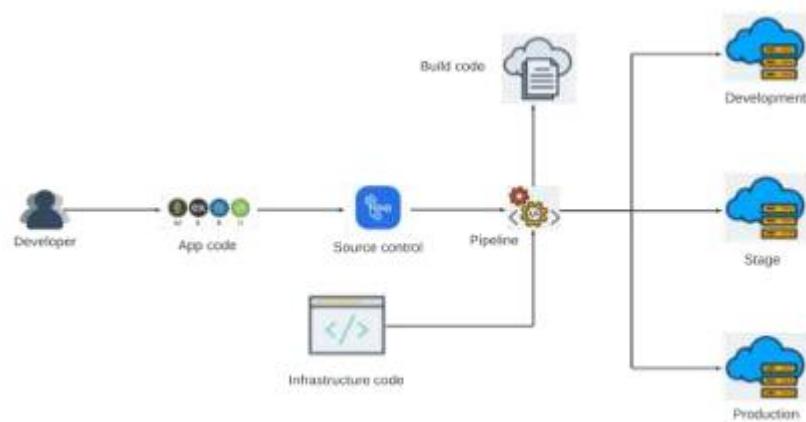


Figure no. 7 Infrastructure as a Code (IaC)

Public consultation focuses on tangible infrastructure outcomes, but **IaC** initiatives require addressing technical design choices that impact accessibility, security, transparency, and community trust. This research examines how to integrate public input into IaC-driven projects, ensuring technical decisions align with public needs while maintaining IaC's efficiency benefits..

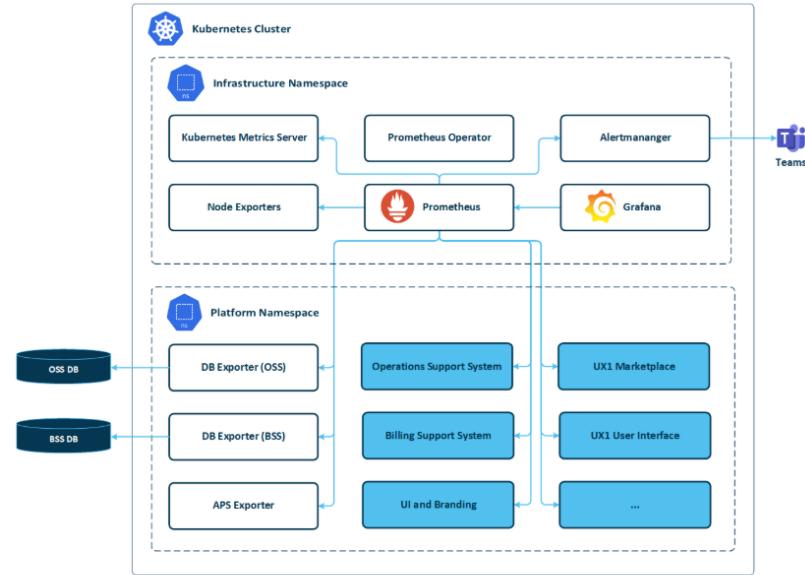


Figure no. 8 Monitoring and Alerting

M&A focuses on technical metrics, but public consultation ensures these systems prioritize community-relevant outcomes—such as service accessibility during peak engagement, data privacy protections, or timely alerts for issues affecting marginalized groups. This research examines how integrating public input into M&A design, implementation, and operation enhances transparency, accountability, and alignment with public needs.

3.7 Integration Approach for Information Systems

The Integration approaches for public consultation information systems aim to connect disparate tools, data sources, and stakeholder platforms into a cohesive ecosystem. This ensures seamless flow of information, consistent user experiences, and unified analysis of public input critical for effective decision-making in government and public sector organizations.

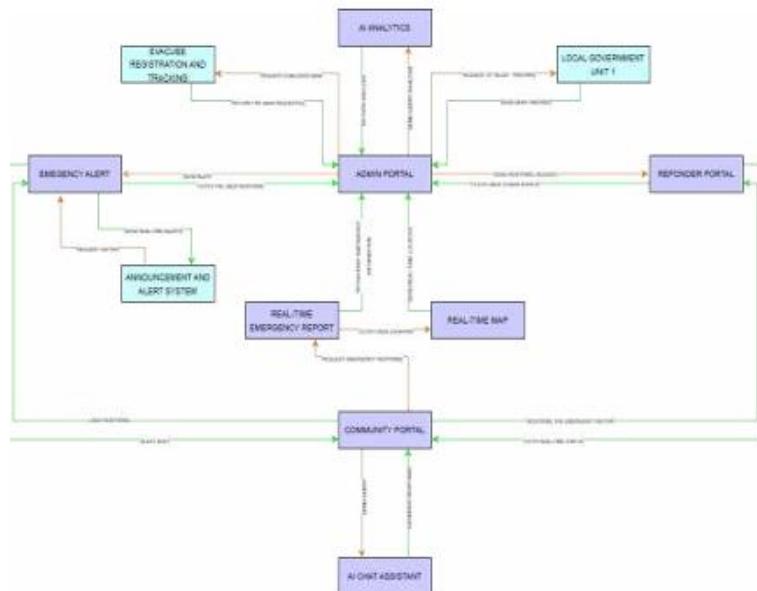


Figure no. 9 Business Process Architecture

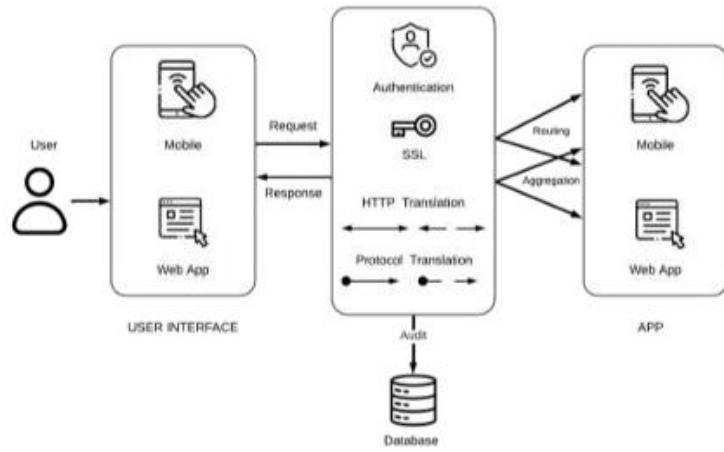


Figure no. 10 API Gateway

API gateways are traditionally designed for technical efficiency and security, public consultation ensures these systems prioritize community needs such as accessibility, transparency, equitable data access, and trust. This research examines how integrating public input into API gateway design, deployment, and governance enhances usability, accountability, and alignment with public priorities.

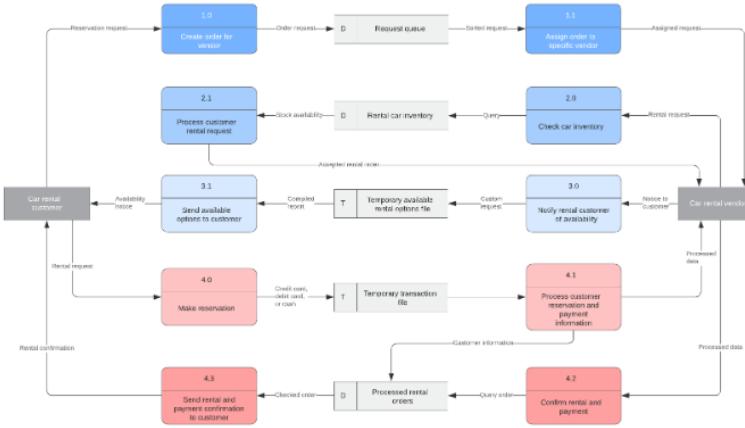


Figure no. 11 Data Flow Diagram

DFDs are traditionally designed for technical and compliance purposes, public consultation ensures these diagrams reflect community concerns about data privacy, transparency, equity, and accountability. This research examines how integrating public input into DFD design, validation, and communication enhances trust in data handling processes and ensures alignment with public values.



Figure no. 12 Use Case Diagram

Use case diagrams are traditionally designed for technical and functional planning, public consultation ensures these diagrams prioritize community needs such as accessibility, equity, transparency, and user-centricity. This research examines how integrating public input into use case diagram design, validation, and communication enhances system usability, ensures inclusive engagement, and builds trust in public services.

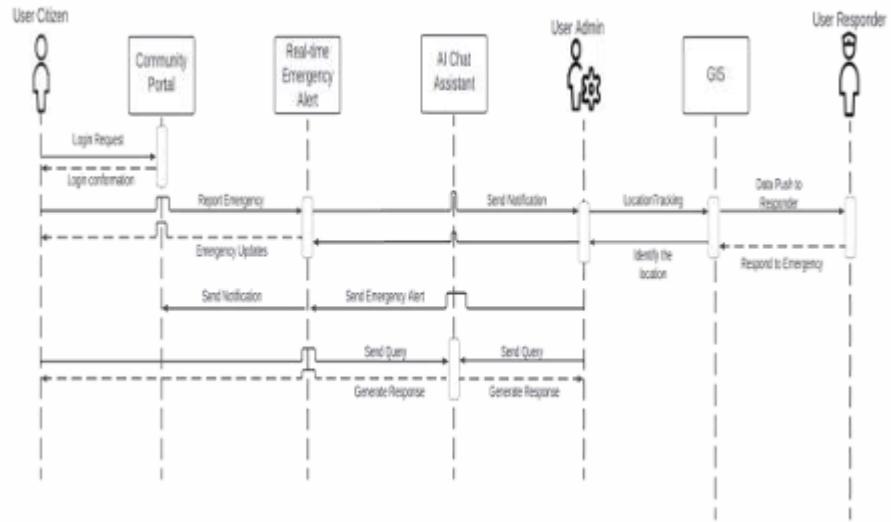


Figure no. 13 Sequence Diagram

Sequence diagrams are traditionally used for technical process planning and troubleshooting, public consultation ensures these diagrams prioritize community needs such as transparency, timeliness, equity, and clarity of communication. This research examines how integrating public input into sequence diagram design, validation, and communication enhances process accountability, ensures inclusive engagement, and builds trust in how public consultation activities are executed.

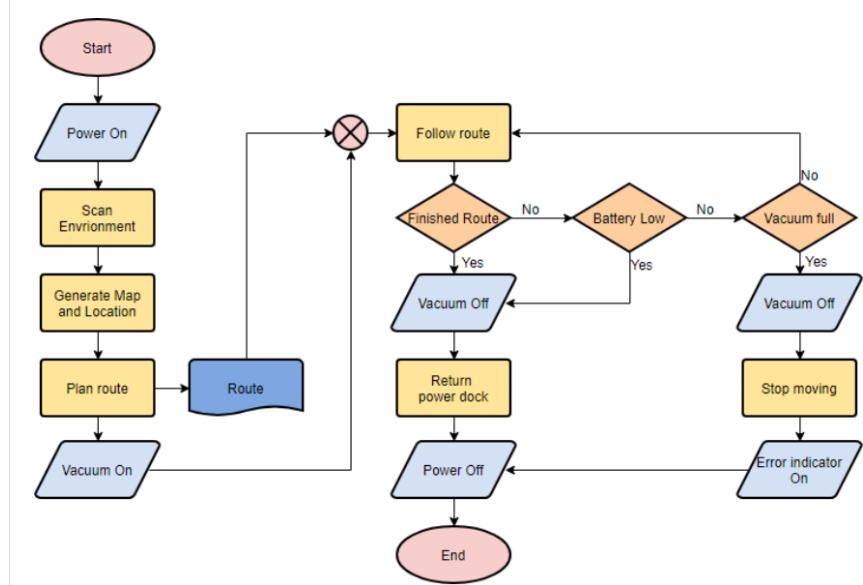


Figure no. 14 Flowchart

Flow charts are traditionally designed for operational efficiency and compliance, public consultation ensures these diagrams prioritize community needs such as clarity, equity, accessibility, and transparency. This research examines how integrating public input into flow chart design, validation, and communication enhances process understanding, ensures inclusive participation, and builds trust in how public institutions operate.

3.8 Introduction to TOGAF and the Four Architectural Domains

The Open Group Architecture Framework (TOGAF) is a vendor-neutral, flexible framework for designing and governing enterprise architectures. When applied to public consultation initiatives—whether for government policies, infrastructure projects, or digital services—TOGAF provides a structured approach to align consultation processes with organizational goals, community needs, and regulatory requirements. It ensures public engagement is holistic, scalable, and adaptable to diverse stakeholder groups, while maintaining transparency and accountability.

1. Business Architecture

Defines the purpose, governance, and processes of public consultation, aligning them with organizational and community objectives.

2. Data Architecture

Defines how feedback data and stakeholder information is collected, stored, managed, and shared.

3. Application Architecture

Defines the tools and systems used to support public consultation activities and integrate feedback into organizational workflows.

4. Technology Architecture

Defines the technical infrastructure that supports consultation applications and data systems.delivery of engagement services while aligning with business, data, and application architecture goal.