Purple Pixel Inc – Condo BMS

Software Requirements Specification

1.0

November 6, 2022

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<Role>
Lead Software Engineer

Contents

1.0 Revision History

Date	Description	Author	Comments
<date>	<Version 1>	<Your Name>	<First Revision>

2.0 Document Approval

The following Software Requirements Specification has been accepted and approved by the following:

Signature	Printed Name	Title	Date

3.0 Introduction

3.1 Purpose

This document describes the high-level software requirements for the system. It describes what, not how, the capabilities of the system for the intended audiences.

3.2 Scope

In-scope

1. Package/Mail Delivery Automation
2. Tenant Management
3. Amenity Booking Solution
4. Notification Automation using Mail, Voice Telephony, and SMS
5. Service and Maintenance Automation
6. Cyber Security for Solution
7. Surveillance and Monitoring Integration with BMS
8. All Integrations required to implement the above modules

Out of Scope

1. Existing processes that are not in the purview of this document
2. HVAC Integration.
3. Any other not explicitly listed in this document

4.0 System Overview

4.1 Project Perspective

The main goal of this project is to build a web application that makes managing a condominium building easier, with functions such as managing received packages, tenants' profiles, service and maintenance requests, amenities reservations, and building-related news announcements. The Project involves creating a hosted application for BMS which will help with Tenant management, Package, and mail Delivery Management, Amenity Booking solution, and Notification System. The Solution will have modularity so that it can be used as a demand-based service and will be scalable for multiple different types of properties. The current solution will be plug-and-play for condominiums.

4.2 System Context

Under the Smart Solutions Business Unit, this initiative will cater to the Business Objective of Creating smart Solutions which are scalable, modular, easy to deploy, and used by the end users. The Plug and Play BMS solution is specially designed for Condominium Communities in and around Toronto, Ontario.

4.3 General Constraints

- Though the system is to be developed by Purple Pixel Inc., its implementation will require client support in terms of time and money to make sure that the client premise is ready for actual system implementation.

- Beta Testing will also require client commitment to the availability of premises and people without any expectations as it would be part of Beta testing

- The System readiness is not related to success of Beta Testing effort.

- All subscriptions and implementations will require check of client premises readiness for a successful partnership.

4.4 Assumptions and Dependencies

Assumptions

- This project makes the following assumptions.
- The BMS product is acquired as a complete system including IT hardware, Software, and professional services of Purple Pixel
- Purchaser agrees to requirements shared, which will be implemented as a solution
- Any additional requirements will be taken up via a change order if required.
- All the implementations will be in accordance with the standard operating procedure for implementing BAS.
- Any upgrades beyond a limited warranty will be paid for by the purchaser.

Dependencies

The following are the internal and external dependencies that will have to be acknowledged and addressed.

- Enhancing coverage for more square feet of property area involves enhancing the solution infrastructure. Therefore, it is important to scope the asks accordingly.
- Upgrade costs can be huge or reduced based on technology price. This may have an impact on ROI and cost-benefit analysis

- System downtime for maintenance is unavoidable. This maintenance will happen through hosted network via prior notification.
- Infrastructure and other cross-functional Team Dependency – As This is a high-priority project other teams will have to identify and allocate resources and adjust their respective project roadmaps.

5.0 Functional Requirements

This section describes specific features of the software project

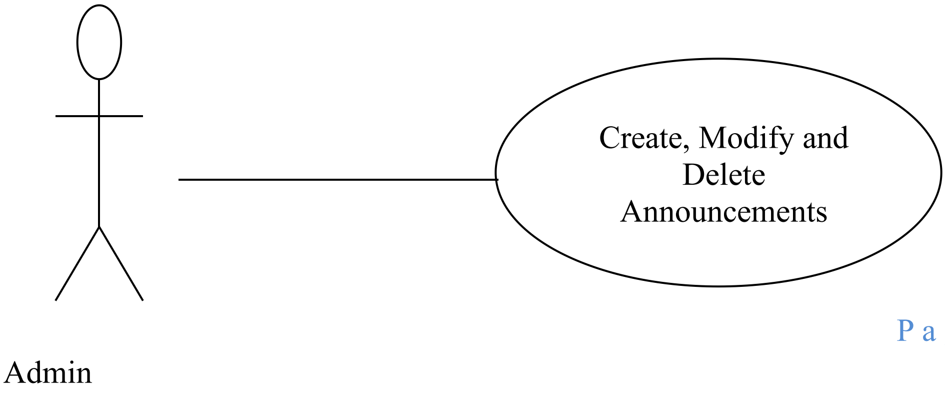
5.1 Requirement list

Introduction	Inputs	Processing	Outputs
Web-based system based on Tenancy	Hosting and domain with subdomain for beta clients	MERN Stack front end with cloud or on-premises relational Oracle db relational backend microservices API supported by JSON	Web portal with Login and many other in session features
Staff Management - Biometrics based Staff roaster	Biometrics	APIs to fetch and place bio metrics in DB	Staff bio metric listing
Ability for the Staff to create delivery approval for packages	Package details	DB table for updating package details triggers for notifications of different types	Package delivery notifications and reminder email notifications
Ability for the tenants to Approve Delivery of Packages	Notification for confirming receipt on behalf of the tenant	APIs and Triggers for initiating confirmation and recording affirmatives and negatives	Package received or receipt denied notification to tenant

5.2 Use Cases

5.2.1 Use Case #1 ... Announcement Board

Diagram:



Brief Description
The admin should be able to Create, View, modify and delete announcements.

Initial Step-By-Step Description
Before this use case can be initiated, the admin user is already connected to the Online BMS

1. Admin navigates to the Announcement tab

2. Admin gets the options listed in the top right corner to Create, Modify, and delete announcements.

3. System invokes the appropriate interface whenever the admin clicks on create, modify, and delete buttons appropriately

4. The admin user can create and save announcements.

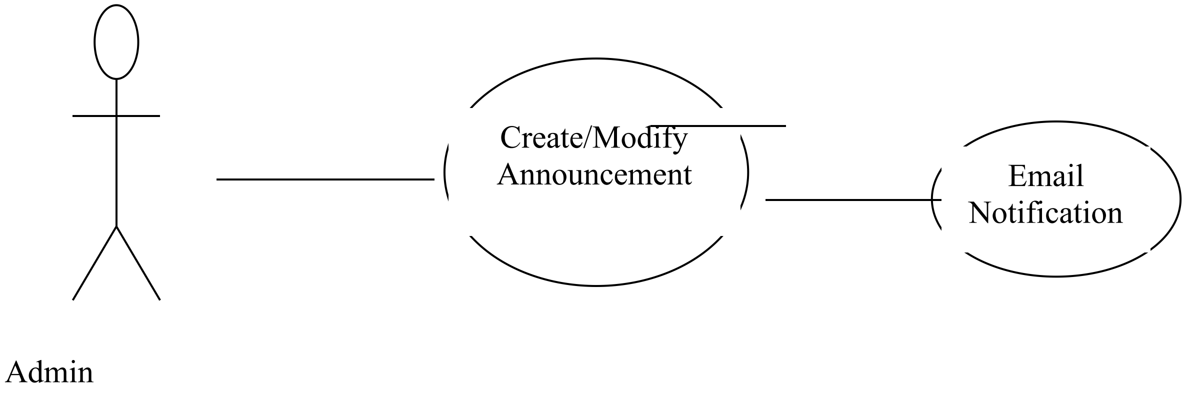
5. The admin user can preview announcements as they would appear in email and SMS along with the web-interface.

6. The admin user can modify existing announcements

7. The admin can delete the previously created announcement

5.2.2 Use Case #2 ... Announcement Notification via SMS and email

Diagram:



Brief Description
Notifications are triggered Whenever Announcements are created or modified

Initial Step-By-Step Description

Before this use case can be initiated, the admin has already connected to the Online BMS

1. The admin navigates to the announcement board

2. Admin creates a new listing.

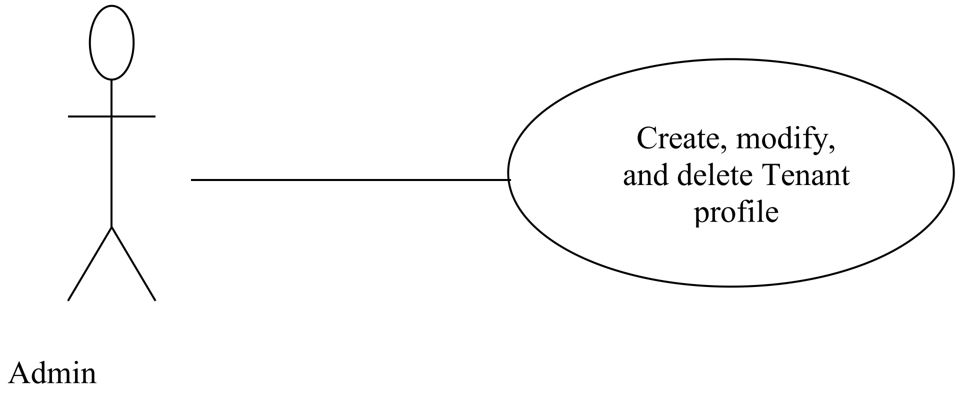
3. All registered tenant users are notified via email and SMS on new announcement creation

4. Admin edits the existing listing.

5. All registered tenants are notified of the modified announcements via SMS and email.

5.2.3 Use Case #3 Tenant Management – Create, modify, and delete Tenant Profile

Diagram:



The admin should be able to Create, View, modify and delete tenant.

Initial Step-By-Step Description

Before this use case can be initiated, the admin user is already connected to the Online BMS

1. Admin navigates to tenant's tab

2. Admin gets the options listed on the top right corner to Create, Modify, and delete the tenant profile

3. System invokes the appropriate interface whenever the admin clicks on create, modify, and delete buttons appropriately

4. The admin user can create and save tenant profiles.

5. The admin user can preview tenant profiles as they would appear in the web interface for tenants

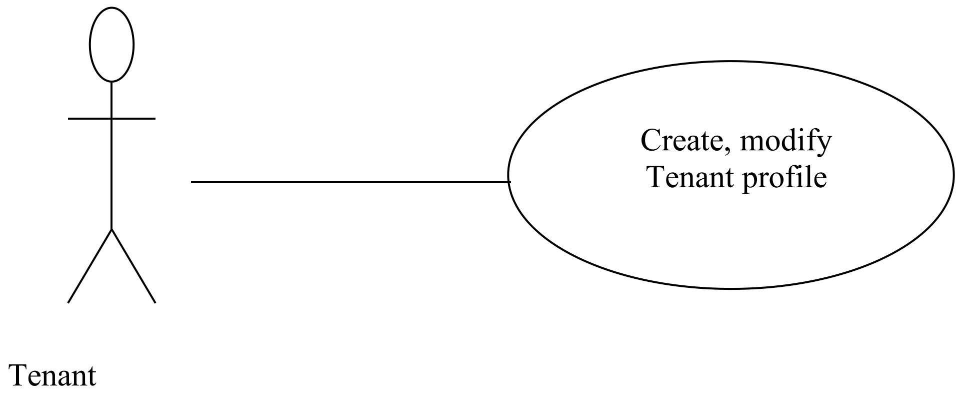
6. The admin user can modify existing tenant profiles

7. The admin can delete the previously created tenant profiles

8. A record of deleted profiles is maintained for past tenants whose profiles are deleted by the admin.

5.2.4 Use Case #4 Tenant Management – Tenant can Create and Modify self profile

Diagram:



The tenant should be able to Create, View, and modify self-profile

Initial Step-By-Step Description

Before this use case can be initiated, the tenant is already connected to the Online BMS

1. Tenant navigates to the profile tab

2. Tenant gets the options listed in the top right corner to Create, Modify profile

3. System invokes an appropriate interface whenever the tenant clicks on create, modify, and delete buttons appropriately

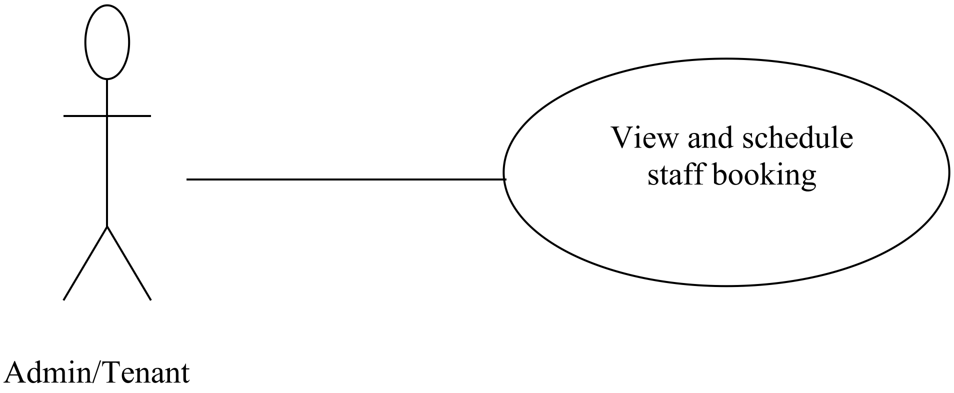
4. The tenant can create and save the tenant's (self)profile.

5. The tenant can modify the existing self-profile

6. A record of profile changes is maintained for tenant updates in the backend for future reference or any use as required for example analytics.

5.2.5 Use Case #5 Staff Management – Staff visit scheduling and display

Diagram:



Brief Description

The admin and or tenant should be able to view, book staff availability, and visit

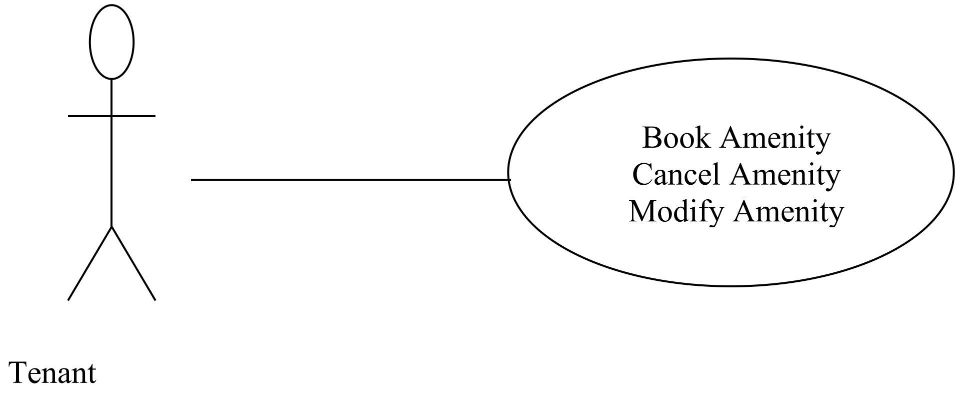
Initial Step-By-Step Description

Before this use case can be initiated, the tenant/Admin has already connected to the Online BMS

1. The tenant/Admin navigates to the staff listing
2. The System uses API integration to retrieve the availability status of staff and lists on front end.
3. The Tenant/admin can invoke book and modify staff visit on the listing page
4. The Tenant/admin clicks on Book button and is navigated to staff visit booking interface.
5. The tenant/admin enters all the details of date and time for booking visit and clearly explains the problem and clicks on submit.
6. Tenant/admin is navigated back to the listing. Staff availability/booking status is updated appropriately on listing page.
7. The tenant/admin clicks on modify button and is navigated to Modify interface on page.
8. The tenant/admin can Modify date and time of booked visit.
9. The saved changes get reflected in backend through API and user is prompted with a confirmation message.
10. On the Modify page – tenant/admin are also able to cancel the previously booked visit
11. User gets a cancellation confirmation after canceling the booked visit
12. Admin users can reroute/reschedule the booked visit through the modified interface exposed on the listing page.

5.2.6 Use Case #6 Amenity Management – Amenity listing and Booking

Diagram:



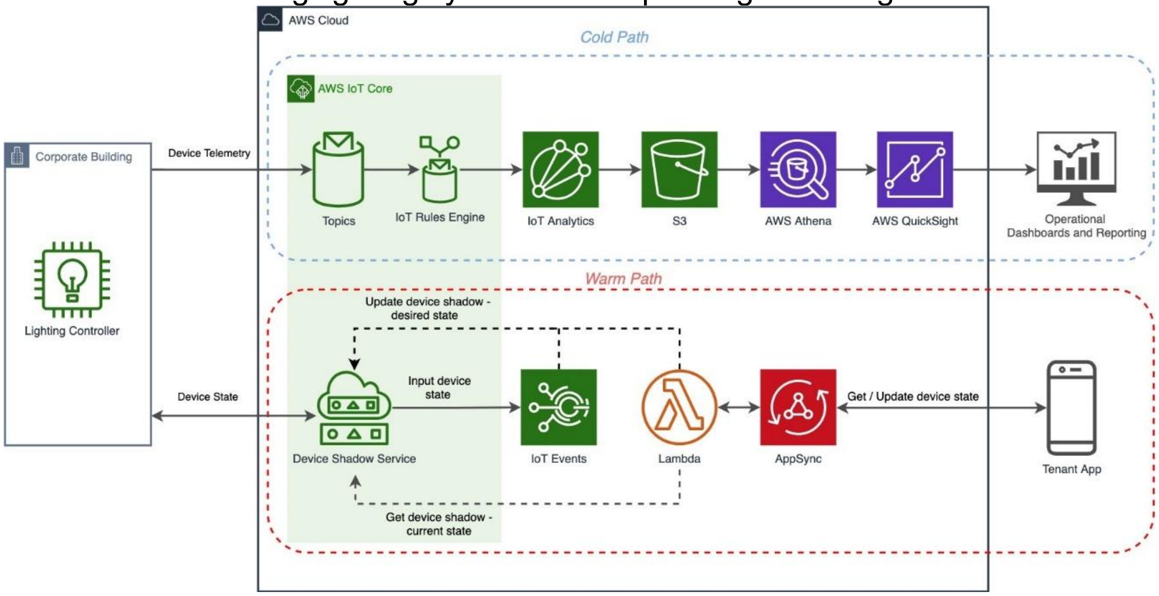
Brief Description
The tenant should be able to view, book, and modify amenities.

Initial Step-By-Step Description
Before this use case can be initiated, the tenant has already connected to the Online BMS

1. The tenant navigates to the amenities listing
2. The System uses the API integration to retrieve the availability status of amenities and lists the amenities on frontend.
3. The Tenant can invoke book and modify interfaces on the listing page
4. The Tenant clicks on Book button and is navigated to the amenities booking interface.
5. The tenant enters all the details of date and time for booking amenities and clicks on submit.
6. Tenant is navigated back to the listing. The amenity booking status is updated appropriately on listing page.
7. The tenant clicks on modify button and is navigated to Modify interface on page.
8. The tenant can Modify date and time of booked amenities.
9. The saved changes get reflected in backend through API and the user is prompted with a confirmation message.
10. On the Modify page – tenant is also able to cancel the previously booked amenity
11. User gets a cancellation confirmation after cancelling the booked amenity

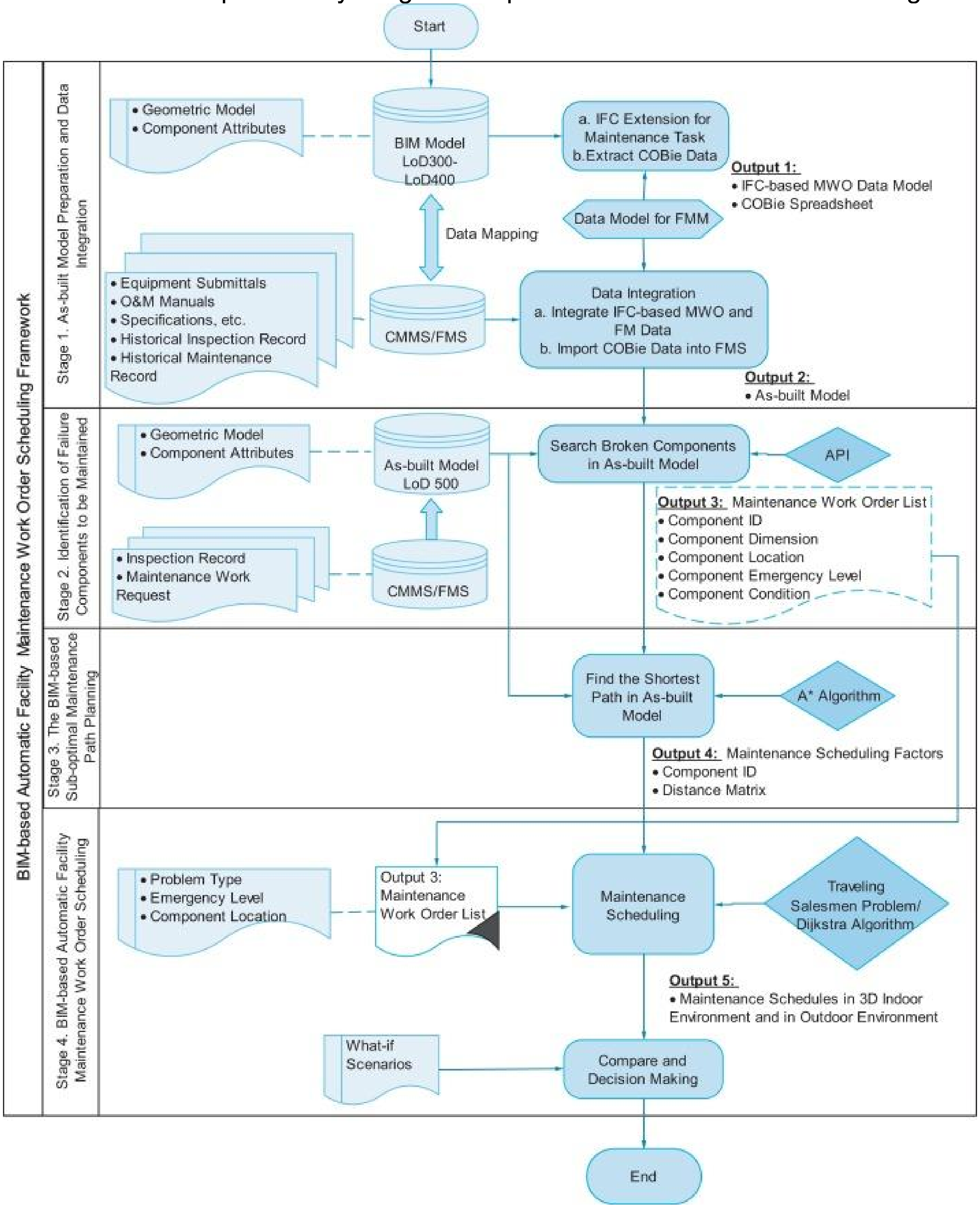
5.3 Data Modelling and Analysis

- Building lighting systems – sample diagram using AWS



Reference - [*https://aws.amazon.com/blogs/architecture/enhancing-existing-building-systems-with-aws-iot-services/*](https://aws.amazon.com/blogs/architecture/enhancing-existing-building-systems-with-aws-iot-services/)

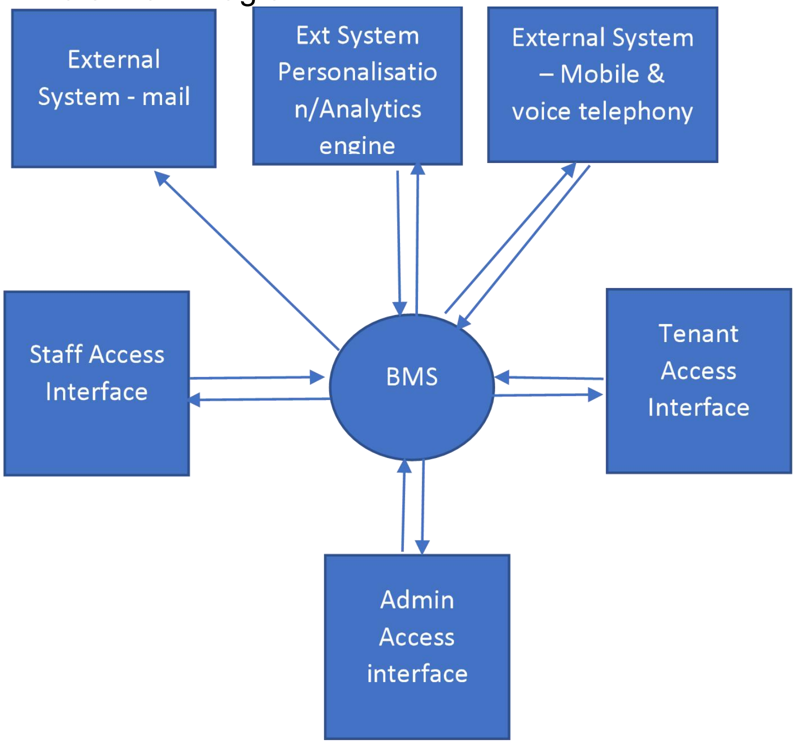
- Sample Activity Diagram for predictive maintenance scheduling:


Start
BIM-based Automatic Facility Maintenance Work Order Scheduling Framework
Stage 1. As-built Model Preparation and Data Integration
• Geometric Model
• Component Attributes
BIM Model LoD300-LoD400
a. IFC Extension for Maintenance Task
b.Extract COBie Data
Output 1:
• IFC-based MWO Data Model
• COBie Spreadsheet
Data Mapping
Data Model for FMM
• Equipment Submittals
• O&M Manuals
• Specifications, etc.
• Historical Inspection Record
• Historical Maintenance Record
CMMS/FMS
Data Integration
a. Integrate IFC-based MWO and FM Data
b. Import COBie Data into FMS
Output 2:
• As-built Model
Stage 2. Identification of Failure Components to be Maintained
• Geometric Model
• Component Attributes
As-built Model LoD 500
Search Broken Components in As-built Model
API
Output 3: Maintenance Work Order List
• Component ID
• Component Dimension
• Component Location
• Component Emergency Level
• Component Condition
• Inspection Record
• Maintenance Work Request
CMMS/FMS
Stage 3. The BIM-based Sub-optimal Maintenance Path Planning
Find the Shortest Path in As-built Model
A* Algorithm
Output 4: Maintenance Scheduling Factors
• Component ID
• Distance Matrix
Stage 4. BIM-based Automatic Facility Maintenance Work Order Scheduling
• Problem Type
• Emergency Level
• Component Location
Output 3: Maintenance Work Order List
Maintenance Scheduling
Traveling Salesmen Problem/ Dijkstra Algorithm
Output 5:
• Maintenance Schedules in 3D Indoor Environment and in Outdoor Environment
What-if Scenarios
Compare and Decision Making
End

Ref- https://www.sciencedirect.com/science/article/abs/pii/S0926580517307173

5.4 Process Modelling

- Data Flow Diagram



Information Flows	Description
Admin flow – Tenant Creation, Edit and Delete	Admin will be able to create Tenant, update tenant Details and Delete Tenant once they leave the property
Admin flow – Create, update, Delete Announcements	Admin will be able to create, update. delete Announcements and notices in BMS
Admin Flow – Initiate voice, mail and SMS notification and alerts	Admin will be able to intimate the tenants and/or appropriate audience via voice, SMS, and email
Admin Flow – Housekeeping flow	Admin will be able to assign routine housekeeping tasks and create a schedule.
Admin Flow – Amenities booking – reserve dates	Admin will be able to reserve dates for amenities availability exclusively for MC
Admin Flow – Amenities booking	Admin will be able to book available amenities on behalf of Tenants if required
Staff Flow – housekeeping Schedule update	Staff will update the status once assign task is completed

Information Flows	Description
Tenant Flow – Create and update	Tenant will be able to create and update their profile and preferences all the time.
Tenant Flow – Book amenities	Tenant will be able to book available amenities by providing date timings and duration
Tenant Flow – Cancel Amenities	Tenant will be able to Cancel the Amenities booking anytime.
Staff Flow – package management	Staff will intimate the notification for package delivery and based on approval or denial will allow or disallow packages.
Staff Flow – Package to Storage Bay	In case if parcel is approved but not delivered staff will update the system to indicate parcel storage bay so that concerned owner can pick up from the bay.

6.0 Non-Functional Requirements

1. The system must be scalable supporting 1500 visits at the same time while maintaining optimal performance.

2. The Software should be able to recognize and adapt to different device drivers seamlessly.

3. All current browsers on latest versions and last two versions prior to latest version should support all functionalities and features provided by the solution

4. The System must perform 100% of use cases without failure during the year

5. Mean Time to Restore the system after system failure should not be more than 90 mins

6. The System should be up and running and ready for usage 99.99% of the time for registered users in Ontario, CA.

7. Critical and confidential data received either from tenants or any other source should be passed and stored encrypted.

8. SSO will be disabled for admins.

7.0 Logical Database Requirements

NA

8.0 Other Requirements

NA

9.0 Approval

The signatures below indicate their approval of the contents of this document.

Project Role	Name	Signature	Date