

**Functional Requirements Document**

**(Guide S50 Version 1.0)**

*for*

**MAKO: REAL ESTATE MANAGEMENT SYSTEM**

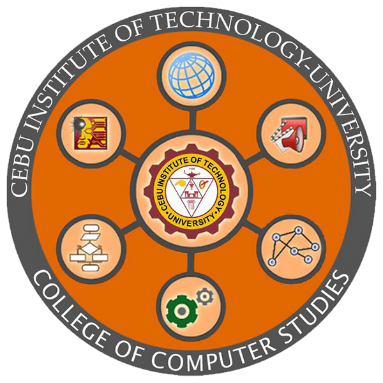
**<Version 1.0>**

*Prepared for*

**CSIT 327 – INFORMATION MANAGEMENT 2**

## Submitted to

**FREDERICK REVILLEZA**



August 28, 2024

*Prepared by*

Mike Francis Alon, Cg Fernandez, Rendolf Baluntang

*<This page is intentionally left blank.>*

Table of Contents

[1. DOCUMENT REVISION LOG 1](#_Toc254091316)

[2. DOCUMENT REVIEWERS 1](#_Toc254091317)

[3. APPROVER & SIGNOFF 1](#_Toc254091318)

[4. INTRODUCTION (Analysis Description) 3](#_Toc254091319)

[4.1 DOCUMENT PURPOSE 3](#_Toc254091320)

[4.2 DOCUMENT SCOPE 3](#_Toc254091321)

[4.3 DOCUMENT INTENDED AUDIENCE 4](#_Toc254091322)

[4.4 BUSINESS ANALYSIS APPROACH 4](#_Toc254091323)

[4.5 REQUIREMENTS QUALITY ASSURANCE 5](#_Toc254091324)

[4.6 INFORMATION REFERENCES 5](#_Toc254091325)

[4.7 DEFINITIONS, ABBREVIATIONS & ACRONYMS 6](#_Toc254091326)

[5. BUSINESS REQUIREMENTS (Opportunity) 7](#_Toc254091327)

[5.1 PROJECT BACKGROUND 7](#_Toc254091328)

[5.2 SCOPE STATEMENT 7](#_Toc254091329)

[5.3 BUSINESS REQUIREMENTS PURPOSE 7](#_Toc254091330)

[5.4 BUSINESS CONTEXT DIAGRAM 7](#_Toc254091331)

[5.5 BUSINESS OBJECTIVES & BENEFITS SUMMARY 9](#_Toc254091332)

[5.6 BUSINESS DRIVERS/ISSUES 9](#_Toc254091333)

[5.7 DEPENDENCIES 9](#_Toc254091334)

[5.8 ASSUMPTIONS 9](#_Toc254091335)

[5.9 CONSTRAINTS/RESTRICTIONS 10](#_Toc254091336)

[5.10 BUSINESS TRANSACTION VOLUMES 10](#_Toc254091337)

[5.11 REGULATORY CONSIDERATIONS 10](#_Toc254091338)

[5.12 PRIVACY IMPACT ASSESSMENT – Refer to Completed PIA 10](#_Toc254091339)

[5.13 RECORDS IMPACT ASSESSMENT – Refer to completed RIA 11](#_Toc254091340)

[5.14 OPEN ISSUES 11](#_Toc254091341)

[6. USER REQUIREMENTS (Needs) 12](#_Toc254091342)

[6.1 USE CASE OVERVIEW 12](#_Toc254091343)

[6.2 BUSINESS PROCESS MODEL 13](#_Toc254091344)

[6.3 ACTOR PROFILES & LOCATIONS 14](#_Toc254091345)

[6.4 INPUTS 14](#_Toc254091346)

[6.5 OUTPUTS 14](#_Toc254091347)

[6.6 USER INTERFACE 15](#_Toc254091348)

[6.7 TRIGGERS 15](#_Toc254091349)

[6.8 BUSINESS RULES 15](#_Toc254091350)

[6.9 FUNCTION HIERARCHY DIAGRAM & REPORT 16](#_Toc254091351)

[6.10 DATA FLOW DIAGRAM 17](#_Toc254091352)

[7. FUNCTIONAL REQUIREMENTS (Product Capabilities & Behaviour) 18](#_Toc254091353)

[7.1 OPERATIONAL ENVIRONMENT 18](#_Toc254091354)

[7.2 SYSTEM INTERFACE 18](#_Toc254091355)

[7.3 COMMUNICATIONS INTERFACE 18](#_Toc254091356)

[7.4 SOFTWARE INTERFACE 18](#_Toc254091357)

[7.5 HARDWARE INTERFACE 18](#_Toc254091358)

[7.6 FUNCTION/USER SECURITY MATRIX 19](#_Toc254091359)

[7.7 USER GROUP & SYSTEM ACCESS SUMMARY 20](#_Toc254091360)

[8. NON-FUNCTIONAL REQUIREMENTS (Success Factors) 21](#_Toc254091361)

[8.1 RESPONSE/ PERFORMANCE 21](#_Toc254091362)

[8.2 CAPACITY 21](#_Toc254091363)

[8.3 RELIABILITY 21](#_Toc254091364)

[8.4 OPERABILITY 21](#_Toc254091365)

[8.5 MAINTAINABILITY 21](#_Toc254091366)

[8.6 SCALABILITY 21](#_Toc254091367)

[8.7 AVAILABILITY 22](#_Toc254091368)

[8.8 DELIVERY 22](#_Toc254091369)

[8.9 RECOVERY 22](#_Toc254091370)

[8.10 TRANSITION REQUIREMENTS 22](#_Toc254091371)

[9. DATA REQUIREMENTS (Structure) 23](#_Toc254091372)

[9.1 LOGICAL DATA MODEL 23](#_Toc254091373)

[9.2 DATA CONVERSION REQUIREMENTS 23](#_Toc254091374)

[9.3 WAREHOUSING 23](#_Toc254091375)

[9.4 DATA VOLUMES & SIZE 23](#_Toc254091376)

[9.5 DATA RETENTION/ARCHIVE/PURGE 23](#_Toc254091377)

[10. ALL REQUIREMENTS LIST/TRACEABILITY MATRIX (Requirements Baseline) 24](#_Toc254091378)

[11. CONSIDERATIONS (Planning Effort) 26](#_Toc254091379)

[11.1 PRELIMINARY DESIGN 26](#_Toc254091380)

[11.2 WORK PLAN 26](#_Toc254091381)

[11.3 RESOURCING 26](#_Toc254091382)

[11.4 COSTS 26](#_Toc254091383)

[11.5 DELIVERY REQUIREMENTS 26](#_Toc254091384)

[11.6 TEST STRATEGY 26](#_Toc254091385)

[11.7 IMPLEMENTATION PLAN 26](#_Toc254091386)

[11.8 USER TRAINING 26](#_Toc254091387)

[11.9 SUPPORT 27](#_Toc254091388)

[11.10 SYSTEM MAINTENANCE AND OPERATIONS 27](#_Toc254091389)

[11.11 APPLICATION DEACTIVATION 27](#_Toc254091390)

[12. APPENDICES (Supporting Documentation) 28](#_Toc254091391)

List of Tables

Table 1 Document Revision Log

Table 2 Document Reviewers

Table 3 Client Acceptor (Project Sponsor)

Table 4 Document Audience

Table 5 Information References

Table 6 Terms, Acronyms & Abbreviations

Table 7 Dependencies

Table 8 Assumptions

Table 9 Constraints/Restrictions

Table 10 Open Issues

Table 11 Actor Profiles & Locations

Table 12 Business Rules

Table 13 Function/User Security Matrix

Table 14 User Group & System Access Summary

List of Appendices

[Appendix A: Business Context Diagram](#_Toc229372630)

Appendix B: Use Case Diagram

Appendix C: Business Process Map

[Appendix D: Function Hierarchy Diagram](#_Toc229372632)

[Appendix E:](#_Toc229372633) Data Flow Diagram

Appendix F: Logical Data Model

Appendix G: All Requirements List & Traceability Matrix

# DOCUMENT REVISION LOG

<Suggested numbering convention:

*0 to 0.9 are for pre-Peer Review drafts; 1.0 is for an approved document from the Peer Review (review can be from either MFR or Vendor community)*

*1.0 – 1.9 is for the IT oversight; 2.0 is for an IT Oversight approved document*

*2.1 – 2.9 is for Client reviews; 3.0 is for a Client-approved document*

*3.1 – 3.9 is an IMB approved document.*

*A BRD with a version number of 4.0 has been thoroughly reviewed and is ready for a Statement of Work and/or Design Specification.>*

**Table 1 Document Revision Log**

| Date | Author | Version | Reason for Change |
| --- | --- | --- | --- |
|  |  |  |  |

# DOCUMENT REVIEWERS

*<The Document Reviewers provide comment and validate the structure and content of the document for the purpose ensuring that key points of contact for the initiative have input or review. The review may not necessarily be specific to the detail but may view from context or presentation perspectives.>*

**Table 2 Document Reviewers**

| Name & Title | Role | Approval Date | Version |
| --- | --- | --- | --- |
|  |  |  |  |

# APPROVER & SIGNOFF

*<In some cases, projects will have a number of key stakeholders who must discuss and provide interim approval for all, or specific sections of the BRD. However, there must always be at least one Client Acceptor who will ultimately approve the document, representing the requirements viewpoint of the business area addressed by the project.*

*Within project management and business analysis, the identification of the Client Acceptor is the key delegation. The delegation of Client Acceptor may be awarded to the same individual who serves as Business Area Project Sponsor.>*

**Table 3 Client Acceptor (Project Sponsor)**

| Name & Title | Role | Approval Date | Version |
| --- | --- | --- | --- |
|  |  |  |  |
| Signature: |  | | |

# [INTRODUCTION](#_Toc229372572) (Analysis Description)

## DOCUMENT PURPOSE

*<This section describes the reasons and purpose of the BRD.>*

<The purpose of the Business Requirements Document (BRD) is to present the stakeholder requirements needs for <an application> completely, accurately and unambiguously in a technology-independent manner. This information is captured and written by the Business Analysis team during the project Analysis phase. Business language is used to describe the requirements authored in this document and is the definitive specification of the user requirements. The BRD is the primary input to the design and development phases, and is the primary specification for User Acceptance. This document is intended to be read by all responsible for the management of the project development initiative including business users, user representatives and sponsors, and other interested parties.>

## DOCUMENT SCOPE

*<This section describes the scope of the BRD.>*

<As determined during the Analysis phase of the project, the scope of this document is limited to describing the <Project> stakeholder business needs including stakeholder categories (*who*, e.g. primary and secondary users), the business data relationship map (*what*, e.g. data model), the event-response table (*when*, e.g. state diagrams), business policies (*why*, e.g. business rules), and the process map (*how*, e.g. use cases). The approved and signed version of this document will serve as the basis for subsequent phases of the project.

This document intends to define and describe the:

* Business requirements,
* User requirements,
* Use cases that support the business processes,
* User profiles and locations,
* Business processes and rules,
* Functional requirements,
* Non-functional requirements,
* Data requirements,
* Requirements baseline and traceability,
* Future considerations,

This document does not include:

* Technical and design specifications – these will be provided in the next phase of the project as part of the system design documentation
* Descriptions of functionality, interfaces or requirements of processes outside of the business area
* Detailed analysis of requirements related to other applications, and
* Out of scope requirements>

## DOCUMENT AUDIENCE

**Table 4 Document Audience**

| Document Audience | Location |
| --- | --- |
|  |  |

*<The main intended audience for this document are the business owners of the proposed system or other change initiative. They must be able to verify that their business requirements have been documented completely, accurately and unambiguously. Data Architects, Application Architects and Technical Architects would also find the information in this document useful for designing a solution that will address these business requirements. Since the requirements are documented here in technology-independent manner, the end-users of the system should be able to comprehend the requirements fairly easily from this document.>*

## BUSINESS ANALYSIS APPROACH

*<This section describes the output from tasks and activities that was used to perform business analysis for this project. This may include, but is not limited to, conceptual requirements and input from the SDLC Planning phase, consultation preparation, working group meetings, decision request documents, interviews, JAD sessions, surveys and questionnaires.>*

< The objective of the Analysis phase of the project was to document the list of requirements of interest to the business and to provide supporting documentation for the solution in sufficient detail for next phase work. The Analysis phase included <both a review of existing information and> identification of new or modified requirements.

The approach included:

* Business analysis planning and monitoring
* Elicitation
* Requirements management and communication
* Requirements analysis
* Solution assessment and validation

The inputs to this phase included:

* Business Case
* Master Project Plan
* Project Charter
* Business Analysis Work Plan

## REQUIREMENTS QUALITY ASSURANCE

*<Quality assurance for requirements planning and management focuses on ensuring that the processes and activities will deliver outputs that meet an appropriate level of quality. The processes and activities may include techniques such as BRD peer review, contractor status reporting and metrics, requirements change management process, requirements completeness checklist, client participation in requirements acceptance and signoff, and vendor project quality assurance plans. State if structured walkthrough of finalized set of requirements will be conducted for ensuring the quality of the requirements.>*

*<There are a number of levels at which this document should be reviewed including;*

* *Business Case Synchronicity Check (the Sponsor has identified the means for validating the project success)*
* *Requirements Document Check (the document is worth reading at the business context level)*
* *Requirements Statements Content Check (the individual and related requirement statements are unambiguous, clear, valid and traceable)>*

## INFORMATION REFERENCES

<This section should provide a complete list of all the applicable and reference documents, identified by title, author, date and version. Alternatively, the list of documents may be put into an appendix. However, even in that case, a clear indication of the existence of applicable documents, and a pointer to where the list of them may be found, must as a minimum be included in the section. e.g., Business Case, Master Project Plan, PIA, RIA, STRA. >

**Table 5 Information References**

|  |  |  |  |
| --- | --- | --- | --- |
| **Document Name** | **Author** | **Date** | **Version** |
|  |  |  |  |

## DEFINITIONS, ABBREVIATIONS & ACRONYMS

*<This section should provide the definitions of all terms, acronyms, and abbreviations, or refer to other documents where the definitions can be found.>*

<The following terms, acronyms, and abbreviations are used throughout this document.>

**Table 6 Terms, Acronyms & Abbreviations**

|  |  |
| --- | --- |
| **Name** | **Definition** |
|  |  |

# BUSINESS REQUIREMENTS (Opportunity)

## PROJECT BACKGROUND

<Provide a short description of the proposed solution being specified and its purpose in relation to the recommendation of corporate goals or business strategies. At the high-level articulate the “as is” in terms of what the Customer has now (business functions, processes, and infrastructure). State why the current situation needs improvement, then articulate what the Customer expects to be able to do in the “to be” state.>

## SCOPE STATEMENT

### IN SCOPE

<Use the In Scope section to describe at a high-level “what the customer expects this project to deliver”.>

### OUT OF SCOPE

<Is there anything that has been discussed as a possible activity of the project that needs to be identified as explicitly out of scope? If nothing is identified as out of scope, will everyone’s expectations be met?>

## BUSINESS REQUIREMENTS PURPOSE

<This section describes the purpose of the Business Requirements Document. Tick one or more of the appropriate check boxes and describe the purpose of the Business requirements briefly underneath.>

Major enhancements to an existing system

New application development

Replacement application development

Maintenance to an existing system

Policy and legislation changes

Health and safety

## BUSINESS CONTEXT DIAGRAM

*<Describe the system context that defines the relationships of this system with users and external systems. The system context draws the boundary that distinguishes what's in the system and what's outside of it. The context also represents the relationships between the system and the external entities with which the system interacts.*

*If many user roles and external systems exist, simplify with abstractions. The detailed requirements for the relationships of the system with the external world are better expressed in the User Requirements than in the Business Requirements section.>*

### 5.4.1“As Is” – CURRENT STATE

* *<’As Is’ State: Provide a high level business context description of the current business state.>*

### 5.4.2“To Be” – FUTURE STATE

* *<’As Is’ State: Provide a high level business context description of the current business state.>*

**Appendix A: Business Context Diagram(s)**

<INSERT DIAGRAM HERE>

## BUSINESS OBJECTIVES & BENEFITS SUMMARY

< This section describes the primary business objectives and benefits to be achieved with the implementation of the Business Requirements as prescribed in the Business Case. Describe at a strategic enterprise level “what the client expects this product to provide” and “what the client agrees to defer”.>

## BUSINESS DRIVERS/ISSUES

<Define the critical business factors that are to be addressed or satisfied by this system. Consider any business issues that may impact or impede the success of the system.>

## DEPENDENCIES

<This section lists the dependencies between and within the system for which these requirements are written and the subsequent project phases or other systems. Describe which factors may influence the quality and the success of the product, such as the availability of an external component in a certain date. Dependencies are a form of constraint in that they can influence the timing, content, risk, etc. for a project. If there are none, delete the table and add the text,

<There are no project requests active projects related to this BRD.>

<The following projects are related to this project request.>

**Table 7 Dependencies**

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Project/System Name | Active? (Y/N) | Nature of Dependency |
|  |  |  |  |

## ASSUMPTIONS

<This section lists the assumptions for which these requirements are written and the subsequent project phases. If the limitation is due to a business rule or an IT policy, identify the rule or policy in simple terms or provide a reference. List any assumed factors (as opposed to known facts) that could affect the requirements stated in the BRD. These could include third-party or commercial components, development or operating environment issues, or constraints. The project could be affected if these assumptions are incorrect, are not shared, or changed.>

<The following are assumptions that the project depends on but which are beyond the control of the project team. These assumptions will be managed as risks in the project plan.>

|  |  |
| --- | --- |
| Table 8 Assumptions | |
| |  |  | | --- | --- | | ID | Assumptions | |  |  | |  | |
|  |  | |

## CONSTRAINTS/RESTRICTIONS

< This section lists the constraints and restrictions for which these requirements are written and the subsequent project phases. They often impact and/or provide direction on how the system must ultimately be developed. Use the following table to detail and uniquely identify any conditions that restrict the requirements and/or technology to specifying a system.>

Table 9 Constraints/Restrictions

|  |  |
| --- | --- |
| ID | Constraints/Restrictions |
|  |  |

## BUSINESS TRANSACTION VOLUMES

*<Define the expected volumes associated with the input and output requirements showing different types of data as well as the internal storage and processing volumes. Define the nature of processing (timing), and the volume (size) of transactions that typically are processed per 'cycle.' Are transactions processed on a monthly cycle, such as preparing a billing statement? Other transactions are processed the same day they are entered into the system, such as items received in an inventory system or a customer payment received in a billing system. Still other transactions are entered into the system and held for processing on a particular date or awaiting an event trigger.>*

## REGULATORY CONSIDERATIONS

### External Regulations

*<Describe external regulations governing the sponsoring organization that will or may impact the project, timeline and deliverables.>*

### Internal Regulations

*<Describe internal regulations governing the sponsoring organization that will or may impact the project, timeline and deliverables.>*

## PRIVACY IMPACT ASSESSMENT – Refer to Completed PIA

## RECORDS IMPACT ASSESSMENT – Refer to completed RIA

## OPEN ISSUES

<Use this section to track unresolved issues needing to be resolved for requirements to be complete. Maintain this list during the development of this document. In the description of the issue, include an assessment of the complexity of the issue and its potential impact if not resolved e.g. standing issues for next stage. >

**Table 10 Open Issues**

| ID | Issue/Priority/Impact | Target Resolution Date | Responsibility |
| --- | --- | --- | --- |
|  |  |  |  |

# USER REQUIREMENTS (Needs)

## USE CASE OVERVIEW

*<Where a business process already exists, provide high-level business use cases that describe what the users are expecting. These use cases will provide the basis for planning user acceptance testing. If a new business process will be created ensure to map out the new business process so that there will be a basis for user acceptance testing and requirements traceability. Use Cases are used in system analysis to identify, clarify, and organize system requirements, and consists of a set of possible sequences of interactions between systems and users in a particular environment and related to a particular goal through primary and alternate flows.>*

**Appendix B Use Case**

|  |  |
| --- | --- |
| Use Case Number | *<the number assigned to the Use Case>* |
| Name | *<goal or event described by verb and noun>* |
| Description | *<brief description of the business activity accomplished by this use case>* |
| Actor(s) | *<who performs this activity?>* |
| Pre-conditions | *<this case processes the following inputs…>* |
| Flow of Events | *<Standard path, Alternate path, Exception path>* |
| Post-conditions | *<this case generated the following post conditions …>* |
| Exit Criteria | *<this case is complete when…>* |
| User Requirement # | *<identify user requirement number associated to this case>* |
| Notes & Issues | *<identify user requirement number associated to this case>* |

## BUSINESS PROCESS MODEL

*<A business process model diagram should be created in each of the following cases: for each function one level above the elementary function level; and where more than one system process is used to implement the elementary function level, one process model diagram should be created for each elementary business function.*

*In the former case, the diagram will include a number of elementary business functions, and the business event(s) and outcome(s) associated with each. The diagram should be given the same name as the higher level function on which it is based. In the latter case, each diagram will show all of the system processes used to implement the elementary business function being depicted, the system trigger(s) used to implement the business event(s), the outcome(s) of the elementary business function, and the flow lines that indicate the processing order.>*

### “As Is” – CURRENT STATE

* *<’As Is’ State: Provide a high level description of the business area in terms of the business functions being accomplished. Also identify the systems being used to address the business functions.>*

### “To Be” – FUTURE STATE

* *<’To Be’ State: Summarize the findings from the review of the systems. Identify any redundancies on process or data, data sinks (data coming in not being used by any other processes) and data gaps (data being used but not coming in from another source). If this review covers multiple business areas or sub-systems, you may want to create a general findings section and a Program Area specific section to ensure all topics are covered.>*

**Appendix C Business Process Model Diagram**

INSERT DIAGRAM HERE

## ACTOR PROFILES & LOCATIONS

*<Identify the various user classes that you anticipate will use this product e.g. Sponsor, Primary User, Secondary User. User classes may be differentiated based on frequency of use, subset of business functions performed, technical expertise, security or privilege levels, educational level, or experience. Describe the pertinent characteristics of each user class. Certain requirements may pertain only to certain user classes.>*

**Table 11 Actor Profiles & Locations**

| Organizational Job Function | Nature of the Interaction | Organizational Relationship | Job Title |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |

## INPUTS

< *Describe the input media at a conceptual context that can be used by the operator for providing information to the system. Where appropriate provide the layout of all input data screens or graphical user interfaces (GUIs) (for example updates to existing screens, prototype etc.). Provide a graphic representation of each interface.*

*This section should contain a list of the data entities. Specific values, range of values, mandatory/optional, alphanumeric values, and length are defined and identified in the Data Requirements Section 6.*

*Where applicable discuss the miscellaneous messages associated with operator inputs, including the following:*

* *Copies of form(s) if the input data are keyed or scanned for data entry from printed forms*
* *Description of any access restrictions or security considerations*
* *Each transaction name, code, and definition, if the system is a transaction-based processing system.>*

## OUTPUTS

*<This section describes of the system output requirement relative to the user/operator; show a mapping to the high-level data flows. System outputs include reports, data display screens and GUIs, query results, etc. The output files are described in Section 3 and may be referenced in this section. The following should be provided, if appropriate:*

* *Description of the purpose of the output, including identification of the primary users*
* *Description of the output which may be represented by report and screen contents (provide a graphic representation of each layout and define all data elements associated with the layout or reference the data dictionary)*
* *Report distribution requirements, if any (include frequency for periodic reports)*
* *Description of any access restrictions or security considerations>*

## USER INTERFACE

*<Describe the logical characteristics of each interface between the software product and the users. This may include sample screen images, any GUI standards or product family style guides that are to be followed, screen layout constraints, standard buttons and functions (e.g., help) that will appear on every screen, keyboard shortcuts, error message display standards, and so on. Define the software components for which a user interface is needed. Details of the user interface design should be documented in a separate user interface specification.>*

## TRIGGERS

*<Define the relationships between the functions and the business processes that drive or initiate the function(s) e.g. dates, event, state change.>*

## BUSINESS RULES

*<A business rule describes a standard business practice that constrains the design of the solution. Business rules define acceptable corporate behaviour in response to business events. They grant authority to act while imposing limits and conditions on how users interact within their business environment. From an information system perspective, the rules define which processes, data, constraints and performance criteria are acceptable. Properly expressed, they are a set of formal business requirements. OPERATIVE RULES= policy/legislation (e.g. an authorized permit must be in place); STRUCTURAL RULES=true or not true (e.g. every employee must have a 3 digit employee number. An example is:)>*

**Table 12 Business Rules**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Rule ID #** | **Rule Type** | **Statement** | **Source/ Date** | **Priority** | **Linked Requirement #** | **Use Case Source** | **Test Case Source** |
|  |  |  |  |  |  |  |  |

## FUNCTION HIERARCHY DIAGRAM & REPORT

*<If Use Cases are not supplied then include the Function Hierarchy Diagram & Report. The business should be represented on as few diagrams as possible that will meet the objective of clear communication. If the entire function model can be shown on a single page without becoming either illegible or too complex, then only one page should be used.*

*A function definition report should be generated to correspond to each function hierarchy diagram. If no properties have been captured for higher level functions, then the report should include only elementary business functions presented in alphabetic order by function label>.*

**Appendix D Function Hierarchy Diagram**

INSERT DIAGRAM HERE

## DATA FLOW DIAGRAM

*<As distinct from the business process model, defines the understanding of the range of data for the information input, processed, stored, and output between functions. Define the method of ensuring that the function process is adhered to within the system.>*

**Appendix E Data Flow Diagram**

INSERT DIAGRAM HERE

# FUNCTIONAL REQUIREMENTS (Product Capabilities & Behaviour)

## **OPERATIONAL ENVIRONMENT**

*The real estate management system must be designed to manage a diverse range of property-related data, including property listings, tenant information, lease agreements, and maintenance records, ensuring data consistency and integrity across all modules. It must support robust database technologies capable of efficiently handling large volumes of tenant and lease data, with SQL-based queries enabling quick and reliable information retrieval. To meet the varied operational needs of property managers, the system should include customizable reporting tools, allowing the creation of tailored reports and dashboards that provide valuable insights.*

*Additionally, the system must support automated notifications and alerts for key events, such as lease expirations or maintenance due dates, ensuring that property managers are promptly informed. Built on a scalable architecture, the system should be capable of accommodating growth in data volume, user base, and additional features without compromising performance or reliability. A user-friendly interface is essential, enabling users with varying levels of technical expertise to navigate and use the system with ease. Finally, the system must comply with all relevant real estate regulations and standards, ensuring that data handling, reporting, and operational processes meet legal and regulatory requirements.*

*This paragraph format cohesively describes the operational environment, focusing on the key aspects that the real estate management system must address to function effectively within its intended context.*

## **SYSTEM INTERFACE**

*The real estate management system must seamlessly integrate with various external platforms and tools to enhance its functionality and streamline operations. It should interface with property listing platforms to ensure automated synchronization of property details, images, and availability status, providing up-to-date information to potential tenants. Additionally, the system must connect with tenant screening services, enabling the direct import of tenant background checks and credit reports into the tenant management module for efficient tenant evaluation. Integration with financial accounting software is essential to automatically track and manage rent payments, security deposits, and other financial transactions, ensuring accurate and transparent financial management.*

*To optimize maintenance operations, the system should interface with third-party maintenance management systems, allowing property managers to assign, track, and manage maintenance tasks effortlessly. Document management integration is also crucial, enabling the secure storage and retrieval of lease agreements, contracts, and other critical documents. Furthermore, the system must support integration with SMS and email service providers to send automated notifications and updates to tenants and property managers regarding lease renewals, maintenance schedules, and payment reminders. Finally, to provide comprehensive property information, the system should integrate with Geographic Information System (GIS) mapping tools, offering visual representations of property locations, nearby amenities, and zoning information.*

## **COMMUNICATIONS INTERFACE**

*The real estate management system must support robust communication functions to ensure seamless interactions between users and the system. E-mail functionality is required for sending automated notifications and updates, such as lease renewal reminders and maintenance alerts, to both tenants and property managers. The system must be accessible via major web browsers, ensuring a consistent user experience across different platforms. Additionally, the system should support electronic forms for tasks such as submitting maintenance requests or signing lease agreements, providing a user-friendly and efficient way for users to interact with the system.*

*The system must use standard network server communication protocols, specifically HTTP/HTTPS, to facilitate secure data transmission between clients and servers. FTP may be used for bulk data transfers when necessary. Message formatting within the system should primarily use JSON for internal API communications and XML for any necessary data exchange with external systems. Communication security is paramount, so the system must implement TLS/SSL encryption to protect all data transmitted over the network, ensuring that sensitive information remains confidential.*

*To handle real-time updates and ensure data consistency across the system, synchronization mechanisms must be in place, particularly for scenarios involving handheld devices or remote access. The system should support data transfer rates that allow for efficient processing and timely updates, preventing delays in critical operations like financial transactions or maintenance scheduling.*

## **SOFTWARE INTERFACE**

*The real estate management system must integrate with a central SQL Server database (version 2019 or later) to manage and store all essential data, including property listings, tenant details, lease agreements, and financial transactions. The system will be compatible with operating systems such as Windows Server 2019 and Ubuntu 20.04 LTS, and it will utilize key tools like the .NET Framework (version 4.8 or later) for backend development and React.js (version 17.0 or later) for the user interface.*

*Data flowing into the system will include critical property and tenant information, while outgoing data will involve reports, notifications, and integrations with external platforms, such as financial accounting software and tenant screening services. The system will provide RESTful API services to enable secure communication and data exchange between components and third-party services, with detailed API protocols outlining integration methods.*

*Data shared across software components, such as between tenant management and financial modules, must adhere to strict data integrity and security standards. Where necessary, a global data area will be used in a multitasking operating system to manage shared data efficiently, ensuring consistency and preventing conflicts across the system.*

## **HARDWARE INTERFACE**

#### *1. Server Interface*

* ***Logical Characteristics:***
  + ***Device:*** *Centralized server (on-premises or cloud).*
  + ***Data/Control:*** *Handles core data processing, user authentication, and business logic.*
  + ***Protocols:*** *TCP/IP, HTTPS for secure communication; SQL/NoSQL for database interaction.*
* ***Physical Characteristics:***
  + ***Type:*** *High-performance server.*
  + ***Specs:*** *Multi-core processors, extensive RAM, RAID storage.*
  + ***Connectivity:*** *Ethernet ports, USB, redundant power.*

#### *2. Client Workstations Interface*

* ***Logical Characteristics:***
  + ***Device:*** *Desktops, laptops, tablets.*
  + ***Data/Control:*** *User access to web/client application for tasks like property management.*
  + ***Protocols:*** *HTTP/HTTPS for secure interaction.*
* ***Physical Characteristics:***
  + ***Type:*** *Standard workstations.*
  + ***Specs:*** *Minimum 8GB RAM, dual-core processors.*
  + ***Connectivity:*** *Ethernet/Wi-Fi, USB ports.*

#### *3. Mobile Devices Interface*

* ***Logical Characteristics:***
  + ***Device:*** *Smartphones, tablets.*
  + ***Data/Control:*** *Mobile access to MAKO via app or web interface.*
  + ***Protocols:*** *RESTful APIs, SSL/TLS for security.*
* ***Physical Characteristics:***
  + ***Type:*** *iOS/Android devices.*
  + ***Specs:*** *Modern OS, multi-core processors.*
  + ***Connectivity:*** *Wi-Fi, cellular.*

#### *4. Printer Interface*

* ***Logical Characteristics:***
  + ***Device:*** *Network/local printers.*
  + ***Data/Control:*** *Printing of documents like leases and reports.*
  + ***Protocols:*** *IPP, PCL/PostScript for printing.*
* ***Physical Characteristics:***
  + ***Type:*** *Office printers (laser/inkjet).*
  + ***Connectivity:*** *Ethernet, USB, Wi-Fi.*

#### *5. Security Cameras Interface*

* ***Logical Characteristics:***
  + ***Device:*** *IP cameras.*
  + ***Data/Control:*** *Video streaming and camera control.*
  + ***Protocols:*** *RTSP, HTTPS for secure transmission.*
* ***Physical Characteristics:***
  + ***Type:*** *Fixed/PTZ cameras.*
  + ***Specs:*** *HD resolution, night vision.*
  + ***Connectivity:*** *Ethernet/Wi-Fi, PoE.*

*This streamlined description provides an overview of the hardware interfaces in MAKO, covering key details for system design and implementation.*

## **FUNCTION/USER SECURITY MATRIX**

The system must define user roles (e.g., Admin, Property Manager, Tenant) with specific permissions for accessing different functions.

• CRUD Matrix:

o Create: Property Managers must be able to create new property listings, tenant records, and maintenance requests.

o Read: All users must have read access to relevant data (e.g., tenants can view their lease agreements, property managers can view maintenance requests).

o Update: Property Managers and Admins must have the ability to update property details, tenant information, and maintenance statuses.

o Delete: Only Admins must have the permission to delete records, with an audit trail maintained for all deletions.

• Security Compliance: The system must ensure all user actions are logged and auditable, with access restricted based on user roles and responsibilities.

<The following symbols represent the level of access by each of the user groups:>

|  |  |
| --- | --- |
| **C** | Create |
| **R** | Read |
| **U** | Update |
| **D** | Delete |

**Table 13 Function/User Security Matrix**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Actor:** |  |  |  |  |  |  |  |
| **Function (or Use Case):** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

## USER GROUP & SYSTEM ACCESS SUMMARY

*<Define any special user access security that relates to entities within the data. >*

**Table 14 User Group & System Access Summary**

|  |  |
| --- | --- |
| **User Group** | **System Access** |
|  |  |

# 

# NON-FUNCTIONAL REQUIREMENTS (Success Factors)

## RESPONSE/ PERFORMANCE

*< State the performance requirements for functions or features given the proposed resources and explain their rationale to enable suitable design choices including*

* *speed*
* *precision>*

## CAPACITY

<State the expected averages and levels of system growth for

* *volumes of transaction,*
* *users, and*
* *peak times usage>*

## RELIABILITY

<State the reliability requirements for the system including ability to recover from

* *errors, and*
* *failures in the interfaces>*

## OPERABILITY

<State the operability requirements including

* *the ease of learning the application*
* *error handling & messaging*

## MAINTAINABILITY

<State the maintainability requirements for the application post implementation including

* *the ability to implement changes without causing unexpected failures*
* *the ease of making changes*
* *the ability to make changes to components without affecting others*

## SCALABILITY

<State the expected scalability for

* *users,*
* *uptake,*
* *storage,*
* *infrastructure support,*
* *modules,*
* *licensing needs>*

## AVAILABILITY

*<State the availability requirements for the system including*

* *time of day, days of year*
* *what loss of availability during those times is tolerable*
* *how will the users learn of non-availability*
* *fallback facilities needed in the event of non availability*
* *special provision needed for bringing the system back into safe, productive operation after a period of non availability>*

## DELIVERY

*<State the core types of deliverable components expected for each application release including*

* *executable software*
* *source code*
* *build scripts*
* *development tools*
* *documentation>*

## RECOVERY

*<Define specific and critical requirements for system planning that need to be considered during the detailed technical design stage of the system. What are the needs for timing of backups? >*

## TRANSITION REQUIREMENTS

*<Identify any transition requirements for the system solution or user skill set needed to operate the system.>*

# DATA REQUIREMENTS (Structure)

## LOGICAL DATA MODEL

*<Details are covered in the Data Administration standards. Please refer to these documents in conjunction with this analysis standard when preparing system requirements. Specify any special requirements for accessing other systems data. Show validation requirements and edit rules. Include the following components. Additional information can be found at:* <http://www.for.gov.bc.ca/his/datadmin/s7.pdf>>

**Appendix F Logical Data Model**

* Entity Relationship Diagram- include diagram or reference to diagram
  + Include relationship descriptions
* Entity & definitions- include or reference
* Entity Attributes and Definitions- include reference
* Code Lists

## DATA CONVERSION REQUIREMENTS

*<This section describes the high-level Data Conversion Requirements which identifies and defines the source data (data sets) which must be converted into the new database tables (or existing tables) as a result of this project. It will show the list of major entity (source) to entity (target) mappings. (More details e.g. column mappings, will be added in the design phase.)>*

## WAREHOUSING

*<This section defines the high level warehousing requirements for the project. The data warehousing is to be treated as a separate “system” in parallel to the main business system. There are separate and different requirements for data, processing and reporting associated with the data warehouse.>*

## DATA VOLUMES & SIZE

*<This section describes the expected approximate Data volumes (initial volume and annual growth percentage for each conceptual Entity.>*

## DATA RETENTION/ARCHIVE/PURGE

*<This section describes the Data retention (time frames for online Data retention before archiving) and also the archiving requirements. Refer to records management policy.>*

# ALL REQUIREMENTS LIST/TRACEABILITY MATRIX (Requirements Baseline)

*<This section shall be divided into statements to specify the requirements, that is, those characteristics of the requirements that are conditions for its acceptance. Each requirement shall be assigned a project-unique identifier to support testing and traceability, and shall be stated in such a way that an objective test can be defined for it. The final product must be tested and validated against the design and original requirements. A "strong" requirement is tightly, unambiguously, and precisely defined in such a way that leaves no other interpretation or meaning to any individual requirement.*

*Requirements tracing is the process of documenting the links between the user requirements for the system and the work products developed to implement and verify those requirements in a bi-directional manner e.g. source of requirements, requirements and work products that implement the requirement. These work products include software requirements, design specifications, software code, test plans and other artifacts of the systems development process. Requirements tracing helps the project team to understand which parts of the design and code implement the user’s requirements, and which tests are necessary to verify that the user’s requirements have been implemented correctly.*

*The format for requirement presentation can be as follows:*

* *Requirement Identification Number*

*<Provide an identification number for the requirement.>*

* *Requirement Type*

*<Provide a definition of the requirement type.>*

* *Statement*

*<Provide a definitive statement of the business condition or capability in clear, consistent and unambiguous language. Avoid specifying the design.>*

* *Source/Date*

*<The source of and date of the requirements statement.>*

* *Priority*

*<Use “Priority” to sort the requirements so that the most important are distinguished from the rest. The choices are Mandatory, Value Added, Optional, and Excluded.>*

* *Business Rule Number*

*< State the business rule that is related to this requirement.>*

* *Backward Traceability*

*<Show the origin of an item. This can be used to determine if unnecessary items are being created (gold plating) that are not warranted by the requirements or to discover the reason for an item. Tie back to hi-level business requirements statement.>*

* *Use Case Source*

*<State the detail use case that is related to this requirement.>*

* *Test Case Source*

*<**State the high level test case that is related to this requirement.>*

**Appendix G All Requirements List & Traceability Matrix**

|  |  |
| --- | --- |
| **ID #** |  |
| **Requirement Type** |  |
| **Statement** |  |
| **Source/Date** |  |
| **Priority** |  |
| **Business Rule #** |  |
| **Backward** |  |
| **Use Case Source** |  |
| **Test Case Source** |  |

# CONSIDERATIONS (Planning Effort)

*<Most of these headings are covered under other SDLC phases and are optional to complete. Provide high level statements for consideration in future work.>*

## PRELIMINARY DESIGN

*<Provide preliminary design information to enable framing of the design phase deliverables and preferred contract type. Where there is an agreement that the contractor performing the analysis phase will be proceeding with the design phase, these details should be specific and accurate.*

*If there is no agreement that the contractor performing the analysis phase will be proceeding with the design phase, these details may be more general and high level or not present.>*

## WORK PLAN

*<Provide a high-level work plan for the design phase identifying all major milestones including the proposed delivery schedule.>*

## RESOURCING

*<Identify the ministry branches and/or other ministries and contracted resources required and responsible for the detail planning and estimating of the design phase.>*

## COSTS

*<Estimate the costs and preferred contract type for the design phase based on the scope definition. It is preferred that the scope be defined to such a degree so as to enable the* *estimates to be fixed priced.>*

## DELIVERY REQUIREMENTS

*<Identify the business and technical units a general definition of the new solution by policies, procedures, business rules, training, manuals retooling, staffing and facilities needed.>*

## TEST STRATEGY

*<Identify the high level test strategy that would cover off the requirements scope.>*

## IMPLEMENTATION PLAN

*<Identify the system implementation strategy that addresses the general timing and activities required for implementation and post implementation support.>*

## USER TRAINING

*<Identify a high level system training and support strategy that addresses productivity gains around assembly, maintenance, publishing and delivery of learning content for primary and secondary users.>*

## SUPPORT

<*Identify at a high level the expected support for the system once in production.>*

## SYSTEM MAINTENANCE AND OPERATIONS

*<Identify the collaborative technical and business strategy to fix problems and implement enhancements that add value to the system and ultimately the organization.>*

## APPLICATION DEACTIVATION

*<Identify the future high-level business, technical and regulatory strategies that would address the deactivation of the business solution should it be replaced or retired.>*

# APPENDICES (Supporting Documentation)

[Appendix A: Business Context Diagram](#_Toc229372630)

Appendix B: Use Case Diagram

Appendix C: Business Process Map

[Appendix D: Function Hierarchy Diagram](#_Toc229372632)

[Appendix E:](#_Toc229372633) Data Flow Diagram

Appendix F: Logical Data Model

Appendix G: All Requirements List & Traceability Matrix