

UNIVERSITY OF BUEA

**Faculty of Engineering and Technology**

CEF440

**INTERNET PROGRAMMING AND MOBILE PROGRAMMING**

**Design and Implementation of a Mobile-Based Archival and Retrieval of Missing Objects Application using Image Matching**

*Submitted to:*

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**TABLE OF CONTENTS**

[1. Introduction 1](#_Toc166524374)

[1.1 Overview 1](#_Toc166524375)

[1.2 Objectives 1](#_Toc166524376)

[1.3 Summary 1](#_Toc166524377)

[2. Stakeholder Needs Refinement 2](#_Toc166524378)

[2.1 Prioritized Requirements Review 2](#_Toc166524379)

[Prioritized Requirements: 2](#_Toc166524380)

[2.2 Detailed Functional and Non-functional Requirements Specification 3](#_Toc166524381)

[ Functional Requirements: 3](#_Toc166524382)

[ Non-functional Requirements: 5](#_Toc166524383)

[3. System Constraints and Risks Assessment 6](#_Toc166524384)

[3.1 Technical Feasibility Analysis 6](#_Toc166524385)

[3.2 Risk Mitigation Strategies 6](#_Toc166524386)

[a) Risk Avoidance: 6](#_Toc166524387)

[b) Risk Transfer: 6](#_Toc166524388)

[c) Risk Acceptance: 7](#_Toc166524389)

[4. Conclusion 7](#_Toc166524390)

[5. References 8](#_Toc166524391)

TASK 4: REQUIREMENT ANALYSIS

# Introduction

## Overview

The requirement analysis phase builds upon the insights gathered during the requirement gathering phase to refine and prioritize the identified needs of stakeholders. This phase focuses on translating high-level requirements into detailed specifications that will guide the design and development of the Mobile-Based Archival and Retrieval of Missing Objects Application using Image Matching.

## Objectives

The primary objective of requirement analysis is to analyse, validate, and prioritize the gathered requirements to ensure alignment with stakeholder needs, technical feasibility, and project constraints. By refining requirements, this phase aims to establish a clear understanding of the system's functionalities and performance expectations.

## Summary

Requirement analysis serves as a critical step in the project lifecycle, laying the groundwork for subsequent system modelling, design, and implementation. Through comprehensive analysis and prioritization, this phase aims to facilitate the development of a robust and user-centric application for archival and retrieval of missing objects.

# Stakeholder Needs Refinement

## Prioritized Requirements Review

Upon reviewing the prioritized requirements from the requirement gathering phase, it's imperative to ensure that they are comprehensive, clear, and aligned with stakeholders' needs. Stakeholders' feedback on the prioritized requirements should be solicited to confirm their understanding and acceptance. This iterative process ensures that the refined requirements accurately represent stakeholders' expectations and project objectives.

### Prioritized Requirements:

1. **Lost Item Reporting**: Users should be able to report lost items by providing detailed information such as item description, images, location, date, and time of loss. The reporting process should be intuitive and user-friendly to encourage active participation.
2. **Image Matching**: The application should employ advanced image matching algorithms to compare reported lost item images with found objects. Accurate matching results should be provided to users, facilitating quick identification and retrieval of lost items.
3. **Security Measures**: Robust security measures should be implemented to safeguard users' credentials and sensitive information. This includes encryption of data transmission, secure storage of user data, and authentication mechanisms to prevent unauthorized access.
4. **User Feedback Mechanisms**: Users should have the ability to provide feedback on their experience with the application, report issues or suggestions for improvement, and receive timely responses from the support team. Feedback mechanisms should be easily accessible and integrated within the application interface.
5. **User Registration and Authentication**:

Users should be able to create accounts, log in securely, and manage their authentication credentials (e.g., password reset, account recovery).

1. **Search and Retrieval Functionality**:

Users should be able to search for missing objects based on various criteria such as description, category, location, and date of loss. The system should facilitate the retrieval of relevant search results efficiently.

## Detailed Functional and Non-functional Requirements Specification

Based on the insights gathered during requirement gathering, the detailed specification of functional and non-functional requirements is crucial for guiding the development process. Functional requirements such as lost item reporting, image matching, security measures, and user feedback mechanisms need to be defined with clarity and specificity. Additionally, non-functional requirements addressing performance optimization, usability, security, and localization support should be articulated to ensure the overall effectiveness and quality of the application.

### Functional Requirements:

* 1. **Lost Item Reporting**

Users should be able to report lost items by providing detailed information such as item description, images, location, date, and time of loss. The reporting process should be intuitive and user-friendly to encourage active participation.

* 1. **Image Matching**:

The application should employ advanced image matching algorithms to compare reported lost item images with found objects. Accurate matching results should be provided to users, facilitating quick identification and retrieval of lost items.

* 1. **Security Measures**:

Robust security measures should be implemented to safeguard users' credentials and sensitive information. This includes encryption of data transmission, secure storage of user data, and authentication mechanisms to prevent unauthorized access.

* 1. **User Feedback Mechanisms**:

Users should have the ability to provide feedback on their experience with the application, report issues or suggestions for improvement, and receive timely responses from the support team. Feedback mechanisms should be easily accessible and integrated within the application interface.

1. **User Registration and Authentication**:

Users should be able to create accounts, log in securely, and manage their authentication credentials (e.g., password reset, account recovery).

1. **Search and Retrieval Functionality**:

Users should be able to search for missing objects based on various criteria such as description, category, location, and date of loss. The system should facilitate the retrieval of relevant search results efficiently.

1. **Notification System**:

The application should notify users about important events and updates, such as when a lost item is reported, matched, or retrieved. Notification preferences should be customizable by users.

1. **Location Services**

The application shall utilize location services to allow users to specify the location where the item was lost or found. Location information shall be integrated into the reporting and matching processes to enhance accuracy and relevance.

1. **Language Translator**

The application shall feature a language translator tool to facilitate communication between users who speak different languages. Translation capabilities shall be seamlessly integrated into the user interface, enabling users to translate text and messages in real-time.

1. **Simple Design**

The user interface shall be designed with simplicity and minimalism in mind, prioritizing ease of use and intuitive navigation. Complex features and unnecessary clutter shall be avoided to create a streamlined and user-friendly experience.

1. **Admin Dashboard**:

Administrators should have access to a dashboard where they can monitor system activities, manage user accounts, and perform administrative tasks (e.g., data management, user permissions).

1. **Reporting and Analytics**:

The system should provide reporting and analytics capabilities for administrators to track usage metrics, identify trends, and generate insights for continuous improvement.

1. **Integration with External Systems**:

The application may need to integrate with external systems or APIs for additional functionality, such as mapping services for location-based features or payment gateways for premium services.

### Non-functional Requirements:

* 1. **Performance Optimization**:

The application should be optimized for performance to ensure smooth user experience, with minimal latency in image upload, search time, and interaction responsiveness. Performance testing should be conducted to identify and address any bottlenecks.

* 1. **Usability**:

The user interface should be designed with simplicity and intuitiveness in mind, catering to users of varying technical proficiency. Clear navigation, concise instructions, and visual cues should enhance usability and facilitate efficient task completion.

* 1. **Security**:

Comprehensive security measures should be implemented to protect user data and privacy. This includes encryption of stored data, secure authentication mechanisms, and regular security audits to detect and mitigate vulnerabilities.

* 1. **Localization Support**:

The application should support multiple languages and regional preferences to accommodate users from diverse backgrounds. Localization features such as language selection, date formats, and cultural considerations should be incorporated to enhance user accessibility and inclusivity.

# System Constraints and Risks Assessment

## Technical Feasibility Analysis

Technical feasibility studies help identify potential limitations and inform decision-making regarding system architecture and implementation strategies. Several factors include:

* **Technology Stack**: The project will utilize modern mobile development frameworks and image matching APIs to implement the required features.
* **Intended platform**: The project will be developed for the Android mobile platform first and ported to the iOS platform at a later time.
* **Development Resources**: The availability of skilled developers and access to necessary development tools and resources are essential for the project's success.
* **Integration Challenges**: Integrating image matching algorithms, location services, and language translator APIs into the application may pose integration challenges that need to be addressed.
* **Compliance with Regulations**: Ensuring compliance with data protection regulations and privacy laws is critical for the project's success and acceptance by users.

## Risk Mitigation Strategies

### Risk Avoidance:

Risk avoidance involves taking proactive measures to eliminate or minimize the likelihood of encountering identified risks. This may include altering project scope, adjusting timelines, or reallocating resources to mitigate potential threats before they materialize. By avoiding known risks, the project team can reduce the probability of negative impacts on project outcomes.

### Risk Transfer:

Risk transfer involves shifting the responsibility for managing identified risks to external parties or stakeholders better equipped to handle them. This may involve purchasing insurance policies, outsourcing specific project tasks, or entering into contractual agreements with third-party vendors. By transferring risks to external entities, the project team can mitigate the financial or operational consequences of potential risks.

### Risk Acceptance:

Risk acceptance entails acknowledging the existence of identified risks without implementing specific mitigation measures. This approach is typically adopted when the perceived impact or likelihood of a risk is deemed acceptable within the context of the project. While not actively mitigating risks, risk acceptance allows the project team to focus resources on higher-priority activities and allocate contingency reserves to address unforeseen challenges as they arise.

The above-mentioned mitigation strategies should be developed to minimize the impact of identified risks on project deliverables and timelines.

# Conclusion

The requirement analysis phase plays a pivotal role in shaping the direction and scope of the project, ensuring that the final solution meets the needs of stakeholders and aligns with project objectives. By refining and prioritizing requirements, addressing system constraints, and mitigating risks, this phase lays a solid foundation for successful system modelling, design, and implementation.

# References

* Brown, A., & Smith, B. (2019). "Requirements Engineering Fundamentals: A Study Guide for the Certified Professional for Requirements Engineering Exam - Foundation Level - IREB compliant." Springer.
* Sommerville, I. (2016). "Software Engineering." Pearson Education Limited.
* Pressman, R. S., & Maxim, B. R. (2014). "Software Engineering: A Practitioner's Approach." McGraw-Hill Education.
* Wiegers, K. E., & Beatty, J. (2013). "Software Requirements, 3rd Edition." Microsoft Press.
* Robertson, S., & Robertson, J. (2012). "Mastering the Requirements Process: Getting Requirements Right." Addison-Wesley Professional.
* Hull, E., Jackson, K., & Dick, J. (2010). "Requirements Engineering." Springer Science & Business Media.
* Gottesdiener, E., & Gorman, M. (2012). "Discover to Deliver: Agile Product Planning and Analysis." EBG Consulting, Inc.
* Kotonya, G., & Sommerville, I. (1998). "Requirements Engineering: Processes and Techniques." John Wiley & Sons.
* Davis, A. M. (1993). "Software Requirements: Objects, Functions, and States." Prentice Hall.
* Wiegers, K. E. (2003). "More About Software Requirements: Thorny Issues and Practical Advice." Microsoft Press.
* Lamsweerde, A. van. (2009). "Requirements Engineering: From System Goals to UML Models to Software Specifications." John Wiley & Sons.
* IEEE Computer Society. (n.d.). "Requirements Engineering." Retrieved from <https://www.computer.org/csdl/mags/re/index.html>
* International Requirements Engineering Board (IREB). (n.d.). "Certification." Retrieved from <https://www.ireb.org/en/certification/>
* International Institute of Business Analysis (IIBA). (n.d.). "Certification." Retrieved from <https://www.iiba.org/certification/>