**Software Requirement Specification**

**For**

**Mobile App for Farmers**

**Prepared by:**

**Ahmed Hamza Khaliq**

**Muhammad Umer**

**Saad Khan**

**AgriKare Inc.**

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# **Introduction**

## **Project Purpose:**

The purpose of this project is to develop a mobile application that serves as a comprehensive and user-friendly tool for farmers and agricultural workers. This app is designed to facilitate crop identification, disease detection, and pesticide recommendations using image recognition and AI-driven technologies. Additionally, the app aims to foster a sense of community among users, providing a platform for knowledge sharing and interaction. By addressing the specific needs and challenges of the agricultural industry, this project seeks to enhance crop management, disease prevention, and overall agricultural practices.

## **Intended Audience and Reading Suggestions:**

This Software Requirements Specification (SRS) document will be read by developers, project managers, quality assurance teams, and all stakeholders involved in the development and implementation of the agricultural mobile application. This SRS serves as a whole reference that outlines the project's goals, functional requirements, and technical specifications. It provides a clear roadmap for developers to follow during the application's development and a basis for quality assurance testing. For project managers and stakeholders, the SRS offers an overview of the project's scope and key features, helping to align expectations and monitor progress. If there are certain changes in the requirements the analyst gather all the requirements and made changes in this document.

## **Project Scope:**

The aim of this project is to develop and deploy of a User-Friendly mobile application for the agricultural sector. The application's primary goal is to provide farmers and agricultural workers with essential tools and resources to enhance crop management, disease detection, and pesticide recommendations. This innovative app will offer features such as crop image recognition, real-time disease identification, community engagement through forums, expert consultation, and access to a wide-ranging agricultural database. It will enable users to make informed decisions about crop health and pest management, ultimately contributing to increased crop yield and sustainable farming practices. The project's scope includes all stages, from initial planning and design to development, testing, deployment, and ongoing support and maintenance. Furthermore, the app aims to adhere to privacy regulations and maintain a high standard of security to ensure the confidentiality of user data. The project's scope also involves continuous improvement and adaptation to meet the evolving needs of the agricultural community.

# **Overall Description:**

## **Product Perspective:**

In the vast landscape of digital agriculture, our app stands as an innovative beacon, bringing modern technology and ancient wisdom together. It's not just an app; it's a green thumb in your pocket, a digital farming companion. While it exists within the digital realm, its roots are firmly planted in the real world, aimed at transforming how farmers, experts, and enthusiasts interact with the age-old craft of farming.

## **Mobile App Functionalities:**

**Crop Identification:**

Users can capture images of crops using the app's camera feature. The app employs image recognition and machine learning algorithms to identify the type of crop in the image. This function helps users quickly recognize crops in their fields.

**Disease Detection:**

The app analyzes crop images to detect signs of diseases or pests. Users can capture images of affected crops, and the app's algorithms provide real-time disease identification. It also offers detailed information about the identified disease and potential treatment options.

**Pesticide Recommendations:**

In case of a disease or pest infestation, the app suggests appropriate pesticide or treatment options. The recommendations are based on the identified crop and disease, ensuring targeted and effective solutions.

**Community Platform:**

The app includes a community page where users can engage with one another. Users can post questions, share experiences, and provide insights related to agriculture. This feature fosters knowledge sharing and peer support.

**Agricultural Information Hub:**

The app serves as a comprehensive source of agricultural information. It provides users with access to up-to-date articles, guides, and blogs covering a wide range of agricultural topics. Users can stay informed about best practices and industry trends.

**Multi-language Support:**

To reach a diverse user base, the app supports multiple languages. Users can select their preferred language for a personalized experience.

**Push Notifications:**

The app sends push notifications to users, delivering updates on crop-related information, disease alerts, or community posts. Notifications keep users informed and engaged.

**Feedback and Rating System:**

Users can provide feedback on the app's usability, functionality, and overall experience. They can also rate the app, helping the development team gather insights for continuous improvement.

**User Profiles:**

Users can create and manage profiles within the app. They can personalize their profiles, add information about their agricultural practices, and participate in the community as recognized members.

**Expert Consultation:**

The app connects users with agricultural experts and advisors. Users can request consultations, and experts provide guidance and insights regarding crop management and pest control.

**In-app Messaging:**

Users can communicate with experts and peers via in-app messaging. This feature allows for private conversations and knowledge sharing.

**Blog Summarization:**

The app includes a blog section with in-depth agricultural articles. Users can access summarized versions of these articles for quick insights into specific topics.

**Social Media Sharing:**

Users can share informative articles, disease alerts, or other content with their social networks. This function promotes knowledge dissemination.

**Purchase Integration:**

For the convenience of users, the app facilitates the purchase of pesticides and fertilizers from partner dealers. Users can browse products, add them to their cart, and make secure online purchases.

**Inventory Management:**

The app offers inventory management for pesticide and fertilizer dealers. It tracks sales, updates product availability, and provides real-time order information to users.

**Return and Refund Handling:**

Users can initiate return and refund requests for purchased products, with a structured process for handling such cases.

## **User Classes & Characteristics**

Farmers have low technical knowledge of Smart phone and education so we have to train them.

## **Operating Environment:**

This mobile App requires Smartphone (Android/IOS) with minimum of 2 GB RAM with android/IOS versiongreater than 6.

## **Design & Implementation Constraint:**

The development technologies and frameworks used, such as React Native, Node.js, and MongoDB, will affect the design and implementation choices. Additionally, the development team must consider factors such as performance optimization, database scalability, and cross-device compatibility.

## **Dependencies:**

The external factors that may have an impact on the project's progress, outcomes, and overall success.

**Internet Connectivity:** The availability and reliability of internet connectivity can affect the app's functionality, especially for features that require real-time data updates, access to the community page, or cloud-based services.

**Mobile Device Platforms:** The app's compatibility with different mobile device platforms (such as iOS and Android) relies on the platform's development guidelines, updates, and changes. Compatibility issues or limitations imposed by the platforms can impact the app's performance and user experience.

**External APIs and Services:** If the app relies on third-party APIs or services, such as weather data, crop databases, or image recognition APIs, the project's success is dependent on the reliability, availability, and compatibility of those external services.

**Market and Industry Trends:** Changes in market trends, agricultural practices, regulations, or consumer preferences can impact the relevance and adoption of the app. Staying updated with industry trends and adapting the app accordingly is crucial for its success.

**Data Availability:** The availability and accessibility of agricultural data, including crop information, disease databases, and pesticide recommendations, from reliable sources can influence the accuracy and effectiveness of the app's functionalities.

**Government Policies and Regulations:** Regulatory changes related to agriculture, data privacy, or pesticide usage can impact the app's compliance requirements and functionality. Adapting to new policies and ensuring compliance is essential for the project's success.

**User Adoption and Feedback:** The success of the app relies on user adoption and engagement. External factors such as user preferences, feedback, and word-of-mouth recommendations can influence the app's acceptance and growth in the target user base.

**Economic Factors:** Economic conditions, market stability, and financial resources available to users or stakeholders may impact their willingness and ability to invest in the app or engage with its features.

## **Constraints:**

Following are the constraints:

1. **Time Constraints:**

* **Limited Development Time:** The project may have a fixed timeline or deadline, requiring efficient use of time to complete the development and deployment of the app within the specified timeframe.
* **Time zone Differences:** If the project involves collaboration with stakeholders or team members from different time zones, effective communication and coordination become crucial to minimize delays and ensure smooth progress.

1. **Resource Constraints:**

* **Limited Development Team:** The project may have a limited number of developers, requiring effective resource allocation and task prioritization to optimize productivity.
* **Limited Hardware Resources:** The availability of physical devices for testing the app on different platforms (iOS, Android) may be limited, which could impact the thoroughness of device testing.

1. **Limited Access to Agricultural Data**: Access to comprehensive and up-to-date agricultural data, such as crop information, disease databases, and pesticide details, may be restricted, requiring careful selection and utilization of available resources.
2. **Financial Constraint:**

* **Budget Limitations:** The project may have a fixed budget, requiring cost-effective decisions regarding resource allocation, software licenses, infrastructure setup, and external service integrations.
* **Cost of Cloud Services:** If the app utilizes cloud services for hosting, storage, or AI/ML processing, there may be financial limitations that influence the selection and utilization of these services.

1. **Business Constraint**

* **Market Competition:** The app may face competition from existing agricultural apps or platforms, requiring a focus on unique features, user experience, and value proposition to differentiate from competitors.
* **Regulatory Compliance:** The project needs to adhere to relevant legal and regulatory requirements related to data privacy, security, and pesticide recommendations in different regions or countries.

1. **Technical Constraint:**

* **Technology Compatibility:** The app should be compatible with a wide range of mobile devices, operating systems, and screen sizes to ensure a broad user reach.
* **Integration Challenges:** Integrating multiple technologies, such as React Native, Node.js, MongoDB, and CNN models, may pose technical challenges that need to be addressed effectively.
* **Scalability and Performance:** The app should be designed and optimized to handle potential user growth, concurrent usage, and large image datasets without compromising performance.

## **Assumptions:**

Following are the assumptions

1. Users have access to smartphones with a camera.
2. Sufficient image quality can be achieved for accurate crop identification and disease detection. accurate identification and detection.
3. Sufficient training data is available for training the image classification model.
4. The app users have basic knowledge and understanding of agricultural practices.
5. The app's pesticide recommendations are based on general guidelines and may not consider specific local regulations or restrictions.
6. The app's disease detection algorithm provides accurate results but does not replace professional diagnosis.
7. Users have access to an internet connection for accessing community features and retrieving up-to-date information.

# **External Interface Requirements:**

Here are the specified External Interface Requirements:

## **User Interfaces:**

**User Registration and Login**: The app should provide user-friendly interfaces for user registration and login. Users should be able to create accounts, log in securely, and recover forgotten passwords if necessary.

**Image Capture and Submission:** Users should have an easy-to-use interface for capturing and submitting images of crops for identification and disease detection. This interface may involve camera integration.

**Community Page:** The community page interface should allow users to post questions, answers, and engage in discussions. Users should be able to search for topics and filter discussions.

**Blogging:** The blog section should provide an interface for experts and users to create, edit, and publish agricultural articles and information. Users should be able to comment on blog posts.

**Language Selection:** The app should feature an interface element for users to select their preferred language.

**Profile Management:** Users must be able to access and edit their profiles, including personal information, privacy settings, and profile pictures.

**Push Notifications:** The app should have a user interface to manage notification preferences, allowing users to enable or disable specific types of notifications.

## **Hardware Interfaces:**

**Camera Integration:** The app may require integration with the device's camera hardware to capture crop images.

**GPS Integration:** If location-based services are part of the app, it may need to interface with the device's GPS hardware.

## **Software Interfaces:**

**Database Management System:** The app needs to interface with a database system to store and retrieve data. This includes crop data, disease information, user profiles, and community interactions.

**External APIs and Services:** The app may need to integrate with external APIs and web services, such as image recognition APIs, weather data services, or e-commerce APIs for product purchasing and delivery.

**Payment Gateway:** Integration with a payment gateway may be required for handling transactions related to pesticide and fertilizer purchases.

## **Communications Interfaces:**

**Internet Connectivity:** The app relies on internet connectivity for real-time data updates, external API interactions, and community engagement. It should be designed to operate effectively over both cellular and Wi-Fi connections.

**Push Notification Services:** The app must interface with push notification services to deliver alerts and updates to users' devices.

**Communication with Experts:** If expert consultation is offered, the app should provide a secure messaging interface for communication between users and agricultural experts.

**Data Exchange:** Communication interfaces with external data sources, including agricultural data providers, are essential for keeping the app's information up to date and reliable.

# **Other Non-Functional Requirements:**

## **Performance Requirements:**

Performance requirements focus on the responsiveness and efficiency of the application under various conditions. For an agricultural mobile app, performance is crucial to ensure users can access real-time data and receive timely assistance:

**Response Time:** The app should respond to user interactions (e.g., image capture, disease detection) promptly, with a maximum response time of 2 seconds to provide a seamless user experience.

**Image Recognition Speed:** The image classification algorithm should identify crops and diseases within 5 seconds for optimal user engagement.

**Scalability:** The application must handle a growing user base and increasing data volume. It should be designed for scalability and maintain optimal performance as the number of users and data entries expands.

**Offline Capability:** The app should have limited offline functionality to accommodate users in areas with poor or no internet connectivity. Offline mode should allow users to capture images and access previously downloaded content.

## **Safety Requirements:**

Safety requirements are essential to protect user data and ensure the application's responsible usage:

**Data Privacy:** The app must comply with data privacy regulations (e.g., GDPR) and safeguard user data. User data should be anonymized and stored securely. Users should have control over their data and consent to data processing.

**Secure Payment Transactions:** All financial transactions, including the purchase of pesticides and fertilizers, must be conducted securely to protect user payment information.

**User Safety Tips:** The app should provide safety tips and guidelines for the appropriate use of pesticides, addressing potential risks and safety measures.

## **Security Requirements:**

Security requirements are critical to prevent data breaches, unauthorized access, and protect sensitive information:

**Data Encryption:** User data, including personal information and payment details, should be encrypted during transmission and storage to prevent unauthorized access.

**Authentication and Authorization:** Secure user authentication and authorization mechanisms should be implemented to control access to user accounts and data.

**API Security:** When interacting with third-party APIs, secure API keys, and tokens must be used to ensure that external service interactions are secure.

**Secure User Sessions:** User sessions within the app should be secure, with features such as auto-logoff after periods of inactivity.

**Regular Security Audits:** Regular security audits and vulnerability assessments should be conducted to identify and address potential security issues.

## **Software Quality Attributes:**

Software quality attributes determine the overall quality and user experience of the application:

**Usability:** The app should be intuitive and user-friendly, with a well-designed interface that caters to users with varying levels of technical expertise.

**Reliability:** Users should have confidence in the accuracy and reliability of disease detection and pesticide recommendations. The app should have a low rate of false positives and false negatives.

**Availability:** The app should be available 24/7, with minimal downtime for maintenance. Scheduled maintenance should be communicated to users in advance.

**Maintainability:** The app's codebase should be well-documented and maintainable to support future updates and enhancements.

**Performance Efficiency:** The app should perform efficiently, with low latency for image recognition, rapid access to information, and minimal resource usage on the user's device.

**Portability:** The app should be available on both Android and iOS platforms, ensuring a wide user reach.

**Scalability:** The application should be designed to scale horizontally and vertically to accommodate the increasing number of users and data.

**Interoperability:** The app should be compatible with various devices and screen sizes, ensuring that users have a consistent experience across different mobile platforms.