AFAAS Agri-Digitalisation Information System (ADIS) using Ignitia Weather API
ADIS System Requirements Document (SRD)

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1. Introduction

The African Forum for Agricultural Advisory Services (AFAAS), with support from the **CAADP-XP4 Programme**, is developing the **Agri-Digitalisation Information System (ADIS)**—a groundbreaking initiative aimed at transforming agricultural extension and advisory services across Africa through digital innovation. ADIS is designed to serve as an integrated platform that empowers smallholder farmers, extension actors, with timely, localized, and actionable agricultural weather information.

A central feature of ADIS is the integration of **weather services**, including advanced forecasting and early warning capabilities powered by partnerships with service providers such as **Ignitia**. ADIS will include Mobile-based alerts through **WhatsApp**, **Android application**, and **Dynamic Web Dashboard**. The ADIS delivers hyper-local weather data, climate-smart advisories, and agricultural tips directly to farmers and extension agents. This enhances decision-making at the farm level, boosts resilience against climate variability, and supports early and anticpatory agricultural production actions by the farmers.

By combining digital tools, weather intelligence, and farmer-centered design, ADIS represents a key step in operationalizing the AFAAS Digitalisation Strategy that is entrenched in AFAAS mandate of Extension where Digitalisation was pronounced as a key indicator, while contributing to the broader goals of the CAADP-XP4 programme and the transformation of Africa's agricultural landscape.

In line with AFAAS commitment to Africa-wide AEAS Digitalisation and expanding the Marketplace platform's utility and relevance to farmers across Africa, this ADIS justifies the need for **integration of Ignitia's Weather API services** into the **web and mobile** versions of AFAAS' AESMarket.africa.

1.1 Purpose

The purpose of this System Requirement Document (SRD) is to outline the functional and non-functional requirements for the development of an integrated digital system. In a **System Requirements Document (SRD)**, both **functional** and **non-functional requirements** play distinct but **interconnected** roles in ensuring the success of a system. The **Functional Requirement shall** allow farmers/users to register using their phone number and location whereas the N**on-Functional Requirement** shall support large number of farmers/users to have

concurrent registrations without system performance degradation. The AFAAS system shall comprise of three Service Delivery Modules (SDM):-

SDM 1. **WhatsApp-based weather alert system**
SDM 2. **Weather-focused Android mobile app**
SDM 3. **Web portal/dashboard** for farmers and administrators

The 3Modular system leverages on **Ignitia's weather API** to provide hyper-local weather updates.

2. System Overview
Farmers will subscribe via WhatsApp or the mobile app, and administrators will use the web dashboard to manage analytics and registration data.

SDMs	Role
WhatsApp Bot	Allows farmers to subscribe to alerts and receive weather updates via chatbot interface.
Android App	Enables farmers to receive push alerts and view 3-day forecasts.
Web Portal	Provides a weather dashboard, farmer registration analytics, and system management tools.

3. Functional Requirements
3.1 <u>WhatsApp Alert System</u>
User Registration via WhatsApp:
- Farmers register by sending a keyword (e.g., "WEATHER") to a number.
- The system collects name, location (via district/village or coordinates), and crop(s).

Daily Weather Alerts:
- Based on the registered location, farmers receive localized daily alerts.

Multi-language Support: Local language options for interaction.
Unsubscribe Feature: Option to opt out by replying "STOP".

3.2 <u>Android Mobile App</u>
User Registration:
- Form-based registration capturing name, contact, location (with GPS fallback), and crop(s).

Weather Forecast:
- 3-day and 7-day forecast using Ignitia API.

Push Notifications:
- Real-time alerts for rain, drought, or abnormal weather.

Offline Mode:
- Stores last forecast data if the device is offline.

Language Support:
- English, Luganda, Kiswahili (more can be added).

<u>3.3 Web Portal</u>
Admin Dashboard:
- View registration stats by location, crop, and platform (WhatsApp vs App).

Weather Dashboard:
- Real-time weather map integrated via Ignitia API.

User Management:
- Add/edit/remove farmers.

Analytics & Reporting:

- Export data (CSV, PDF).
- Daily/weekly reports of user activity and alerts sent.

Alert Monitoring:

- View historical weather alerts sent to users.

4. Non-Functional Requirements

4.1 Scalability

The system should support 1M+ users across WhatsApp and App.

4.2 Availability

99.9% uptime; alerts must be delivered promptly (under 1 minute).

4.3 Security

User data encryption (at rest and in transit); GDPR & local compliance.

4.4 Performance

API response times < 500ms; dashboard loads under 3 seconds.

4.5 Localization

System should be easily translated to new languages.

4.6 Accessibility

Mobile-first design for farmers with low digital literacy.

4.7 Integration

Fully integrated with Ignitia API and WhatsApp Business API (Cloud API).

5. Technical Requirements

5.1 Integration Points

Integrated Services	API Required
Ignitia Weather API	Location-based weather forecast
WhatsApp Cloud API	Messaging interface for alerts
Firebase / OneSignal	Push notifications for Android
Google Maps API	Location selection & validation

5.2 Platforms

Integrated Components	Technology Stack (Suggested)
WhatsApp Bot	Node.js + Twilio / Meta WhatsApp Cloud API
Android App	Kotlin / Java, Firebase, Retrofit for APIs
Web Portal	Php
DB	PostgreSQL / MySQL
Hosting	AFAAS Dedicated Server

6. User Roles and Permissions

Designate Users	Role Description
Farmer	Subscribes via app or WhatsApp, receives weather alerts.
Admin	Manages the system, views analytics, generates reports.
Extension Agent (optional)	Can assist with onboarding and monitoring uptake.

7. Data Requirements

Data Requirement Point	Source
User Location	Manual input or GPS
Weather Forecast	Ignitia API

Registration Data	App/WhatsApp Form
Alerts Sent Log	System logs
Analytics Data	Aggregated user activity

8. Risks & Mitigations

Risk	Mitigation Strategy
Delayed API response from Ignitia	Cache recent data; retry mechanism in backend
Poor network in rural areas	Offline sync and scheduled alerts
Farmers' digital literacy gaps	Use of voice notes and images in WhatsApp Bot
System overload	Auto-scaling infrastructure (e.g., AWS Lambda, EC2)

6. AFAAS Agri-Digitalisation Information System (ADIS) Project Implementation Requirements and Budget Implications

6.1. Timeline (Suggested)

Phase	Duration	Timeline
Planning & Final Specs	1 week	Week 1
WhatsApp Bot	2 weeks	Week 2–3
Android App (Lite)	3 weeks	Week 3–5
Web Portal	2 weeks	Week 4–6
Integration & Testing	2 weeks	Week 7–8
User Testing & Feedback	1 week	Week 9
Final Deployment & Handover	2 weeks	Week 10–12

6.2. Reporting & Deliverables

System Deliverables	Due By
UI Designs and System Architecture	End of Week 2
WhatsApp Bot Functional Prototype	End of Week 4
Android App Beta	End of Week 6
Web Portal Functional Version	End of Week 7
Final Integrated System	End of Week 9
Training Manual and User Guide	End of Week 10
Final Report + Source Code	End of Week 12

6.3 Updated Budget Breakdown – $6,000 USD

#	Budget Item	Description	Estimated Cost (USD)
1	**WhatsApp Bot Development**	Development of chatbot using Meta WhatsApp Cloud API, includes: - Farmer registration - Daily alerts - Multi-language interaction - Integration with Ignitia API	$1,200
2	**Android Mobile App (Lite Version)**	Development of an Android app including: - Registration - Forecast display - Push notifications - Offline support	$1,500

3	**Web Portal (Admin Dashboard)**	Admin portal to: - Monitor registrations - View farmer data - Export reports (CSV) - View alert logs	$1,000
4	**API Integration (Ignitia & WhatsApp)**	Backend integration with Ignitia and WhatsApp APIs. Includes: - Data parsing - Location-matching logic - Retry mechanisms	$800
5	**Testing & Quality Assurance (QA)**	Thorough system testing for all modules, devices, and farmer workflows. Includes UI checks, alert timing, app stability.	$400
6	**Project Management & Coordination**	Timeline tracking, documentation, sprint review meetings, team collaboration, and content validation.	$300
7	**Google Play Store Developer Account**	One-time fee to publish the Android app on the Play Store (developer account)	$50
8	**Support & Post-Deployment Bug Fixes**	1-month light support for troubleshooting & minor changes after system go-live	$750
	Final Total		**$6,000 USD**

6.5 Value for Investment

The integration of Ignitia's services is a strategic pathway to reaching tens of thousand of farmers with tailored, real-time agro-weather information, directly supporting AFAAS' mission to promote climate-smart, evidence-based extension services across Africa.