

## PROJECT PLAN

### Project Information

Project: ACAP-BICOL (ACAP 1.0) – Rice Crop Manager Advisory Service (RCMAS) Collaboration

Release Number: 1.0

Time Frame: June 21 – August 21 2023

Date Updated: September 13, 2023

Attached references:

- Agro-Climatic Advisory Portal - Bicol (ACAP-BICOL 1.0) Project Plan v4.0  
(*acap\_1.0\_project\_plan\_v4.0.pdf*)

### Summary of Project

The collaboration project between ACAP-Bicol (ACAP 1.0) and IRRI aims to bridge the PAGASA weather forecast data, being utilized by ACAP for generating crop recommendations and bulletin PDFs with IRRI's RCMAS application for sending timely SMS crop recommendation advisories to select farmers in the Bicol region.

ACAP created several new well-documented REST API endpoints to allow the sharing of its internal PAGASA weather forecast data in a structured and organized format, with little to fewer modifications to what ACAP uses with IRRI and other trusted clients securely through the use of hard-coded tokens. Furthermore, ACAP started storing and archiving past weather forecast data for historical purposes, also made available on the REST APIs to use as a reference for backtracking and lookup.

The PAGASA weather forecast data shared by ACAP through the new API endpoints are subject to further interpretations as required by the requesting trusted clients.

Since this is a prototype project that uses existing ACAP Bicol components, the team had ACAP re-created on a separate infrastructure that mirrors the official ACAP Bicol system along with its standard-pricing plan cloud infrastructure for development purposes, where the new updates and features are made and tested on top of the existing system.

The *new REST APIs* and *historical weather forecast* archiving features, which are core new products produced during the collaboration, have plans for integrating back with ACAP Bicol on its 2.0 version, should the DA RFO 5 consider using them for official purposes.

This document discusses specific software development plans, approaches, and strategies for implementing the collaboration updates to ACAP Bicol.

It also mentions abridged summaries of several ACAP Bicol concepts where applicable, discussed in more detail in the supplementary ACAP Bicol (ACAP 1.0) Project Plan document ([\*acap 1.0 project plan v4.0.pdf\*](#)) for context and reference.

## ACAP Bicol

The Agro-Climatic Advisory Portal Bicol (ACAP-BICOL) is an online web application for disseminating weather and climate information of the Adaptation and Mitigation Initiative in Agriculture (AMIA) Villages in the Bicol Region. It follows a hybrid type of three-tier web application architecture consisting of a website for the client layer, the Firestore database for the database layer, REST APIs running on a NodeJS server, and several client-side logic for the business layer.

The portal aims to guide extension workers in creating and disseminating relevant and tailored advisories and recommendations for farmers and fisherfolk that will help them address the impacts of climate change through the use of its online-accessible tools for linking smart automatic bulletins PDF creation linking with PAGASA weather forecast data, the centralized process of making information available for general viewing or download and by relaying PAGASA weather-related data for laymanized public viewing in a readily-accessible and timely manner.

## ACAP Bicol (ACAP 1.0) and IRRI

The collaboration project's requirements involve utilizing and building upon existing ACAP Bicol components and features. Therefore, they share similar architecture, processes, and workflows with ACAP Bicol. This information is discussed in more detail in ACAP Bicol's project plan document ([\*acap 1.0 project plan v4.0.pdf\*](#)), provided as a reference for this document.

The collaboration project's specific requirements from ACAP Bicol consists of the following components:

- **PAGASA Weather Forecast REST API Endpoints**
  - Seasonal Weather Forecast API
  - 10 Day Weather Outlook API
  - Special Weather Forecast API
- **PAGASA Historical Weather Forecast REST API Endpoints**
  - Historical Seasonal Weather Forecast API
  - Historical 10 Day Weather Outlook API

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- Historical Special Weather Forecast API
- **PAGASA Historical Weather Forecast Data Management**
  - Archiving and storage of Historical Seasonal Weather Forecast
  - Archiving and storage of Historical 10 Day Weather Outlook Forecast
  - Archiving and storage of Historical Special Weather Forecast
  - Automatic deletion of outdated Historical Seasonal Weather Forecast
  - Automatic deletion of outdated Historical 10 Day Weather Outlook Forecast
  - Automatic deletion of outdated Historical Special Weather Forecast

## Hosting Summary

This project also uses similar standard-plan hosting services with ACAP Bicol (ACAP 1.0), except for the publicly viewable web pages, made accessible on Firebase Hosting through the <https://acap-rcmas-dev.web.app/> domain.

Its NodeJS backend running the REST APIs is available as a Render Web Service (Blueprint) app running on an Individual (free tier) plan at <https://amia-cis-tzvd.onrender.com/>.

Moreover, to address the slow loading issues of REST APIs when using a standard-plan (free) Render hosting account, in which NodeJS server apps running the REST APIs take about 1 – 2 minutes to become responsive after “*sleeping after 15 minutes of inactivity*”, the project also deployed its REST APIs on Vercel (standard pricing) to provide fast response times on API access.

The project’s official REST APIs are available on the <https://acap-rcmas.vercel.app/> domain.

*(The project’s official REST APIs should be easily accessible on <https://amia-cis-tzvd.onrender.com/> should the project have budget for premium server alternatives, such as subscribing to paid Render accounts or other Platform-as-a-Service (PaaS) cloud services alternatives).*

## Summary of Methodology

### *General Development Approach*

The team follows the three generic phases of software engineering on the four major aspects of the software project. Analysis, design and implantation of:

- Database – Firestore collections and documents schema and design
- REST API development
- Historical weather forecast data management
- Deployment to live, production environments

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- Documentation
- Testing

##### *Project team organization*

The project team consists of supervised sub-teams:

Team	Assigned
Project conceptualization, ideas and technical workflow process	Gaye, Ma'am Weng, Jerome, Angel, Primo
Data preparation and acquisition (manual encode seasonal weather forecast in the PAGASA Excel file template)	Angel
PAGASA Weather Forecast REST API management, development and deployment	Angel
Testing (using and preview of core features)	(All)

##### *Development and collaboration tools*

ACAP uses the following tools and technology choices:

- **HTML5, CSS and JavaScript (React/NextJS)** – for the website user interface (UI)
- **NodeJS** – for the backend server with custom-created REST API endpoints to manage authenticated background processes (such as creating PDF files, managing Admin accounts and sending SMS)
- **GitHub** – for project progress, code revisions tracking
  - The collaboration project git repository, accessible in a private GitHub repository forked from the stable ACAP Bicol (ACAP 1.0) repository is available for access or collaboration upon request on <https://github.com/ciatph-dev/acap-rcmas/>
- **GitHub Actions**
  - We use GitHub Actions, also available in the GitHub repository, for deploying the ACAP-RCMAS client and server apps to development and production environments.
  - We also use the GitHub Actions scheduled workflow (cron) feature to run the Cron job NPM scripts for regularly syncing PAGASA's 10-day, El Nino / La Nina, and Severe Tropical Cyclone Bulletin data to ACAP's Firestore database.

- **Firestore Hosting** – for hosting the website’s UI (web pages)
  - The public-viewable web pages are currently hosted on Firestore Hosting under the <https://acap-rcmas.web.app/> domain.
  - We chose Firestore Hosting so as to make the prototype project’s website not easily searchable and discoverable on search engines, i.e., Google Search.
- **Firestore** (Spark Plan) – A set of cloud-based Backend-as-a-service (BaaS) development tools by Google that helps developers build, deploy and scale custom-built mobile or web applications. It offers several pre-made functioning services, allowing developers to focus on building the business logic of their apps. ACAP uses (3) three of these services:
  - **Firestore Authentication** (Spark plan) – for user authentication and for managing user registration and login
  - **Firestore Database** (Spark plan) – Firestore NoSQL database for storing user and site data
  - **Firestore Cloud Storage** (Spark plan) – Firestore storage for storing and hosting PDF files
- **Render** (Individual plan) – a cloud Platform-as-a-Service (PaaS) for hosting the NodeJS backend
  - We like to note that NodeJS apps running in a Render standard (Individual plan) ***“sleep” after 15 minutes of inactivity***. This causes a delay of 1 – 2 minutes “waking up” (starting the server) if anyone uses it after it sleeps, for example, when generating a bulletin PDF preview or accessing the REST API.
  - We decided to host the REST API on another standard-plan hosting service, Vercel, to overcome this limitation for the ACAP-RCMAS collaboration.
- **Vercel** (Hobby plan) – a serverless alternative to Render for hosting the REST APIs. Unlike Render, its Hobby (free) plan account has shorter “cold starts” and thus provides faster API response times.

The mentioned (limited) standard-plan cloud infrastructure services currently host the collaboration project’s production website user interface and backend. A Windows or Linux PC/laptop can act as a local development environment for the web app by downloading the project repository and following its set-up instructions.

### *Control of changes*

New functionalities, updates, modifications, and enhancements written in the codes will be properly documented and committed to the ciatph GitHub repository at <https://github.com/ciatph-dev/acap-rcmas>. All documents will have assigned revision numbers.

### *Project Plan manner of update*

This project plan will be updated as needed throughout the project and sent to team members thru email or shared from Google Docs.

## Software Development Work Breakdown Structure and Estimates

The following work breakdown estimates are tentative and subject to change according to development risks, described in more detail in the Risks section.

\*It is worth noting that a web developer does each task one after another and not in parallel.

Step	Description	Estimate (hours)
<b>1.</b>	Inception	
<b>1.1.</b>	Requirements Gathering	
<b>1.2.</b>	Requirements Specification	
<b>1.3.</b>	Requirements Validation	
<b>3.</b>	Elaboration	
<b>3.1.</b>	High-level Design	
<b>3.1.B.</b>	Identification of Main Objects and Relationships	
<b>3.2</b>	Low-level Design	
<b>3.3</b>	Object Design	
<b>3.3.A.</b>	Database Design	
<b>3.2.</b>	Design Review and Evaluation	
<b>4.</b>	Construction	
<b>4.1.</b>	System Implementation	
<b>4.1.A.</b>	Database Implementation	
<b>4.1.B.</b>	<b>PAGASA Weather Forecast REST API Endpoints</b>	

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<b>4.1.B.1.</b>	Seasonal Weather Forecast API	
<b>4.1.B.2.</b>	10 Day Weather Outlook API	
<b>4.1.B.3.</b>	Special Weather Forecast API	
<b>4.1.C.</b>	<b>PAGASA Historical Weather Forecast REST API Endpoints</b>	
<b>4.1.C.1.</b>	Historical Seasonal Weather Forecast API	
<b>4.1.C.2.</b>	Historical 10 Day Weather Outlook API	
<b>4.1.C.3.</b>	Historical Special Weather Forecast API	
<b>4.1.D.</b>	<b>PAGASA Historical Weather Forecast Data Management</b>	
<b>4.1.D.1.</b>	Archiving and storage of Historical Seasonal Weather Forecast	
<b>4.1.D.2.</b>	Archiving and storage of Historical 10 Day Weather Outlook Forecast	
<b>4.1.D.3.</b>	Archiving and storage of Historical Special Weather Forecast	
<b>4.1.D.4.</b>	Automatic deletion of outdated Historical Seasonal Weather Forecast	
<b>4.1.D.5.</b>	Automatic deletion of outdated Historical 10 Day Weather Outlook Forecast	
<b>4.1.D.6.</b>	Automatic deletion of outdated Historical Special Weather Forecast	
<b>4.1.E.</b>	<b>Technical Documentation</b>	
<b>4.1.E.1.</b>	Software Documentation	
<b>4.1.E.2.</b>	End-User Guide and Manual – API Usage Documentation (for web developers audience)	
<b>4.2.</b>	<b>Testing</b>	
<b>4.2.A.1.</b>	Testing Planning	
<b>4.2.A.2.</b>	Test Execution	
<b>4.3.</b>	Implementation Review and Evaluation	
<b>4.0</b>	Transition	

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<b>4.1.</b>	Release Packaging	
<b>5.0</b>	Reflection	
<b>5.1.</b>	Postmortem Report	
	<b>Total</b>	

\*Please note that the total time estimate is tentative, and may be subject to change as we further along during the development process

## Deliverables in this Release

<b>Deliverable Name</b>	<b>Description</b>	<b>Delivery Date</b>
Project Plan	Updates on project evaluation and management	September 6, 2023
SRS for the ACAP-IRRI Collaboration	Software Requirements Specification (draft)	September 6, 2023
Initial Release	Core to ~40% System Functionality <ul style="list-style-type: none"> <li>PAGASA Weather Forecast REST API Endpoints (10-day, and seasonal)</li> <li>PAGASA Weather Forecast REST API Online Documentation (10-day, and seasonal)</li> </ul>	June 15, 2023
2nd Release	Core to ~60% System Functionality <ul style="list-style-type: none"> <li>PAGASA Weather Forecast REST API Endpoints (special weather forecast)</li> <li>PAGASA Historical 10-Day Weather Forecast REST API Endpoint</li> <li>Archiving and storage of Historical 10 Day Weather Outlook Forecast</li> <li>PAGASA Weather Forecast REST API Online Documentation (special, historical 10-day weather forecast)</li> </ul>	June 30, 2023
Final Release	Full system functionality ready for official usage, including:	September 1, 2023



	<ul style="list-style-type: none"> <li>• API Usage Documentation (complete)</li> </ul>	
Completion of on-going items	Software Documentation including: <ul style="list-style-type: none"> <li>• Feature sets</li> <li>• Process flows and diagrams</li> </ul>	September 7-10, 2023

\*Please note that the time estimates are tentative, and may be subject to change as we further along during the development because of the items mentioned in the **Risks Management** section and other unforeseen circumstances.

## Risk Management

The risks of this project are tied closely with the ACAP Bicol (ACAP 1.0) risks, discussed in more detail in the attached ACAP 1.0 Project plan *document* ([acap 1.0 project plan v4.0.pdf](#)). Specific planning risks that lean more toward the collaboration project include:

1. We may need funds to subscribe to Firebase’s Blaze (pay-as-you-go) plan if the accumulated data usage and storage over time exceeds Firestore’s free-tier limits.
2. We may need funds to subscribe to Render’s paid subscription plan (or check out Heroku, Firebase Functions, or similar premium, more stable cloud service alternatives) if ACAP REST API users feel the need for fast API response without being restricted by the Render Individual plan’s apps “sleeping” after 15 minutes of inactivity (if they chose to use the Render-hosted ACAP REST API at <https://amia-cis-tzvd.onrender.com/>).
3. We may need funds for subscribing to paid cloud services subscriptions if the time comes when ACAP enters an active development phase – standard (free) pricing cloud service accounts, which the official ACAP 1.0 and this collaboration project uses are not readily shareable to (2) two or more developers for flexible development and collaboration.
4. The cloud services used by ACAP may change their service usage policies, access methods, and other usage aspects which their respective companies deem relevant after a while, for example, 3, 5, or several years from now. ACAP may cease to function as expected should these changes happen. ACAP developers should stay tuned for such updates and update ACAP accordingly.

5. Similar to the above, the technologies, software, and tools that ACAP uses may be considered obsolete in the next few years, or more suitable, new technologies may appear. ACAP 1.0 will continue to work as expected until these technologies are considered outdated.
6. The cloud services that ACAP uses may experience partial outages now and then, leading to ACAP service downtimes.
7. The PAGASA (seasonal outlook, El Nino/La Nina, and severe tropical cyclone) web pages may change in structure and content shortly. If this happens, ACAP's Cron job NPM scripts for web scraping and syncing the contents of these pages to ACAP's Firestore database will fail. The NPM scripts should be re-programmed to handle new formatting and content of these web pages.
8. The PAGASA 10-Day weather forecast Excel files may change in structure, format, and content shortly. Or, the PAGASA URL where they are accessed may change. If this happens, ACAP's Cron job NPM scripts for downloading, extracting, and parsing the Excel file contents to ACAP's Firestore database will fail. The NPM scripts should be re-programmed to handle the new formatting and contents of the PAGASA 10-Day weather forecast Excel files.
9. We need more information on the best time to schedule running the ACAP Cron Jobs for fetching the **PAGASA 10-day weather forecast** from their public downloadable Excel files, aside from our initial assumptions based on past observations (daily 9:00 AM – 12:00 PM). If this information is not readily available, knowing its reason or cause will help us effectively communicate the reason for the inconsistent timing to prospective API users and general users
  - a. The reason for this need is we encountered inconsistent PAGASA data updates during the collaboration project duration, in which PAGASA data update happens before or after the expected "exact" date and time.
  - b. Although the inconsistent window time of updating seems negligible since the fetched forecast is valid within (10) 10 days and the DA RFO 5 can manually update this data by manually downloading and uploading the PAGASA's 10-Day weather forecast Excel files if they feel a need for it (**UC-26**), a more informed timing of the best time for the Cron Job's automatic updating will lead to more timely data delivery.
10. With regards to timely syncing PAGASA's seasonal weather forecast similar to item #9, we may need more information on the best time to advise ACAP personnel to start manually updating the PAGASA seasonal weather forecast Excel file template with the latest PAGASA seasonal

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weather forecast, which they should manually look-up by visiting the PAGASA Seasonal Weather Forecast [web page](#).

- a. This process is a workaround that we concluded as an alternate option to keep updating ACAP's seasonal weather forecast data for the collaboration project after PAGASA stopped sending us updated seasonal weather forecast Excel files (thru email) after the ACAP 1.0 project ended last December 2022, and while waiting for PAGASA's seasonal weather forecast API to be published.
- b. We do the manual seasonal weather forecast Excel file editing and uploading every 22nd and 27th of the month, as advised by DA RFO 5.
- c. We decided to upload the updated Excel file at 9:00 AM office hours (every 22nd and 27th of the month) since we are currently unsure of the exact time PAGASA updates their posted seasonal weather forecast data.
- d. This workaround option is a risk because manually editing the Excel files is prone to human error, and the assigned ACAP personnel may not always be available to update it (i.e., they got sick or are busy with other priority tasks).

11. Manually editing PAGASA's shared seasonal weather forecast Excel file for updating the seasonal weather forecast is prone to human error until the PAGASA's seasonal weather forecast API, an external dependency, is published or shared for public use.

## Project Planning Dependencies

*Does this project conflict or compete for resources with any other project?*

No, this project has its resources (database, hosting, and data) set apart from what the official ACAP Bicol (ACAP 1.0) uses. These data can be readily set up and acquired.

*Are the same human or machine resources allocated to maintenance of past versions and/or planning of future versions during this release time period?*

This release is the first official release within the initial collaboration project duration (June 21 – August 21, 2023). The human resources (team) remained partly the same from the development of past versions up to this release period. We cannot say if all or some members of the current team from both parties will be available on future versions from this release period.

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*Does this project depend on the success of any other project?*

Yes. This collaboration project is derived from ACAP Bicol (ACAP 1.0) and relies on its success. It is unclear if these collaboration project updates can continue without ACAP 1.0 backing in the background.

This project is already functional, but its seasonal weather forecast component will improve more after setting up automatic syncing with the seasonal weather forecast API from PAGASA. The seasonal weather forecast API from PAGASA is not yet available for now.

*Does any other project depend on this project?*

Yes. (1) One project depends on this collaboration project.

1. The new development APIs available at <https://acap-rcmas.vercel.app/> have plans for integration back with ACAP 1.0 or 2.0 should DA AMIA Region Field Office 5 (DA-RFO 5) decide to use it for future purposes.

*Are there any other important dependencies that will affect this project?*

Yes. ACAP 1.0 depends on external files, cloud services, and project collaboration agreements. These external dependencies carry on to the ACAP-RCMAS collaboration project as well. Some ACAP 1.0 dependencies to note are:

- ACAP 1.0 has external dependencies whose availability and structure/formatting will affect the established ACAP processes and operations.
  - PAGASA 10 Day Climate Forecast Excel files (day1.xlsx – day10.xlsx) [[link](#)]
  - PAGASA El Nino / La Nina Monitoring web page [[link](#)]
  - PAGASA Tropical Cyclone Bulletin web page [[link](#)]
  - PAGASA seasonal outlook forecast Excel file (shared thru email by PAGASA)
- ACAP's uptime, considering only the new PAGASA Weather Forecast APIs, depends on the continuous uptime and availability of the cloud services:
  - Firebase

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- Render
  - Vercel
  - GitHub Pages
  - GitHub Actions (schedule workflows)
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- ACAP 1.0 depends on collaborations and memorandum of agreements (MOA) between UPLB Foundation, Inc. (UPLBFI), Alliance Bioversity International, the Department of Agriculture (DA), AMIA DA Regional Field Office 5 (RFO 5), and the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA).