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Harnessing Digital Innovation for Smarter Agricultural Systems

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From SISAGRO to Smart Agricultural Policy: Building Digital Public Infrastructure for Climate-Resilient Agriculture

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Outlines

- Background
- Experiences in Korea
- SISAGRO Platform
- Roadmap
- Conclusion

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Adaptation Through Digital Innovation

- **Climate Smart Agriculture**
- to strengthen **Resilience**
- though **Management**
- of **Water/Soil**
- powered by **Digital Innovation**

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Challenges in Implementation

- Agricultural data/information is fragmented and inconsistent across institutions.
- Governance and regulatory frameworks for data sharing are underdeveloped.
- Policymakers lack real-time analytics for evidence-based decisions.
- Monolithic information systems limit data exchange and scalability.

Experiences in Korea

- Integrated Agricultural Meteorology Information System has been deployed.
- Crop models have been developed to predict crop yield at national scale.
- Data service platform has been developed for agricultural models.

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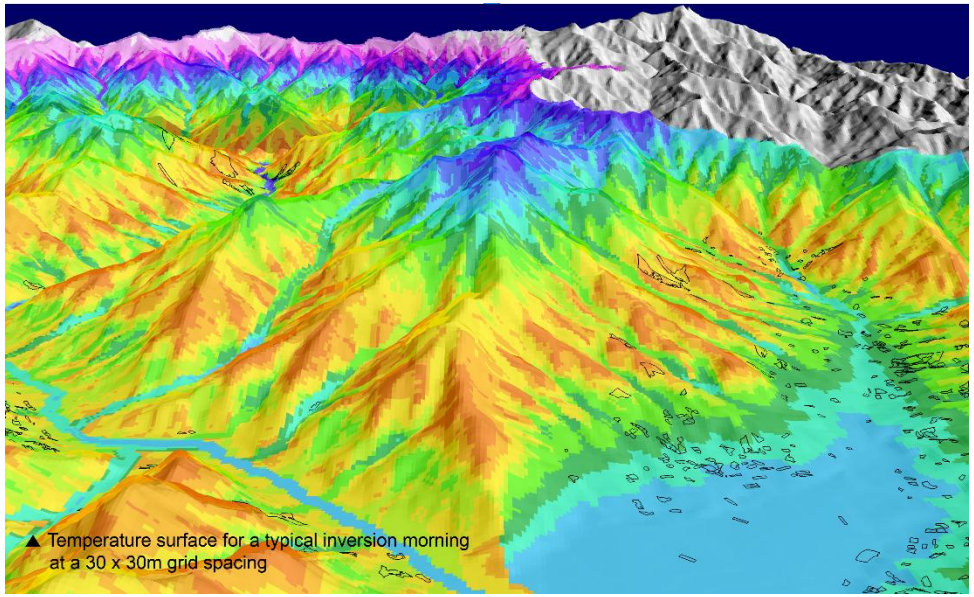
Early Warning Systems

- High-resolution farm-level weather information
- Crop-specific disaster risk alerts
- Practical response guidance
- Multiple delivery channels
- Decision support for climate resilience


▲ Temperature surface for a typical inversion morning at a 30 x 30m grid spacing

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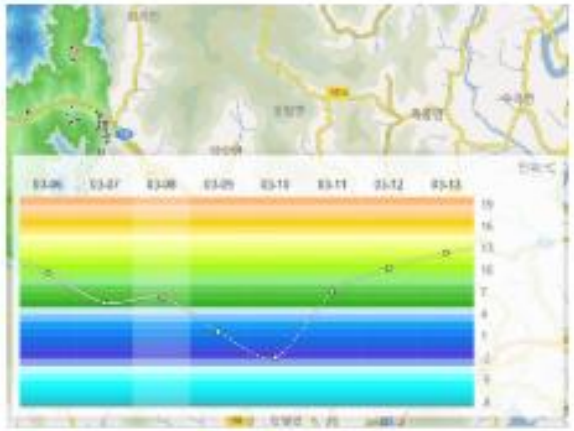
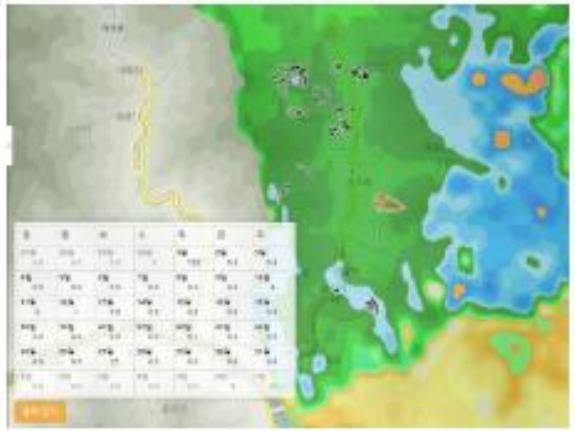
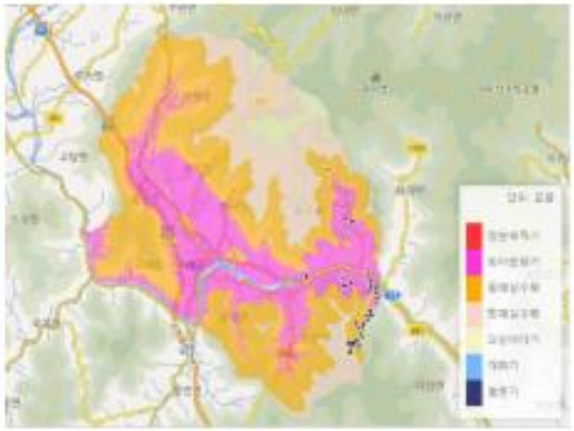
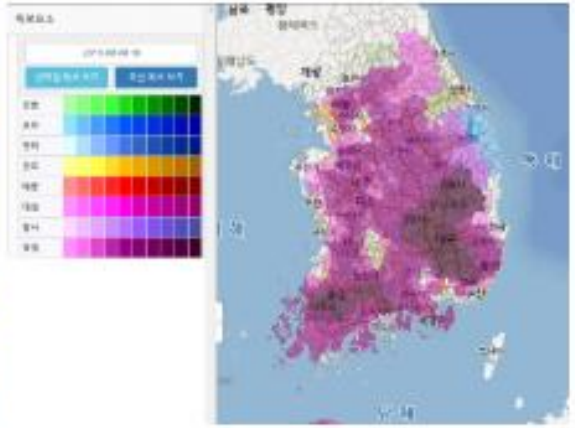
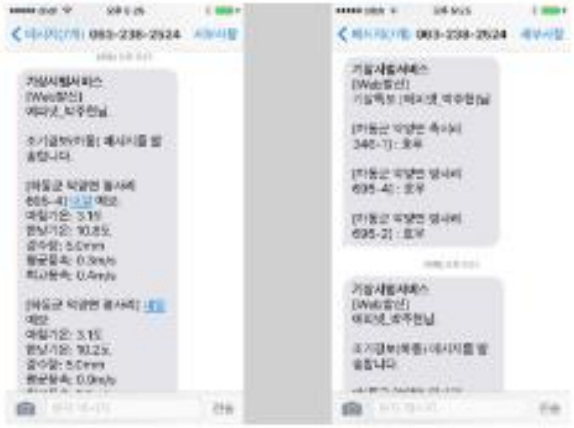
Early Warning Systems











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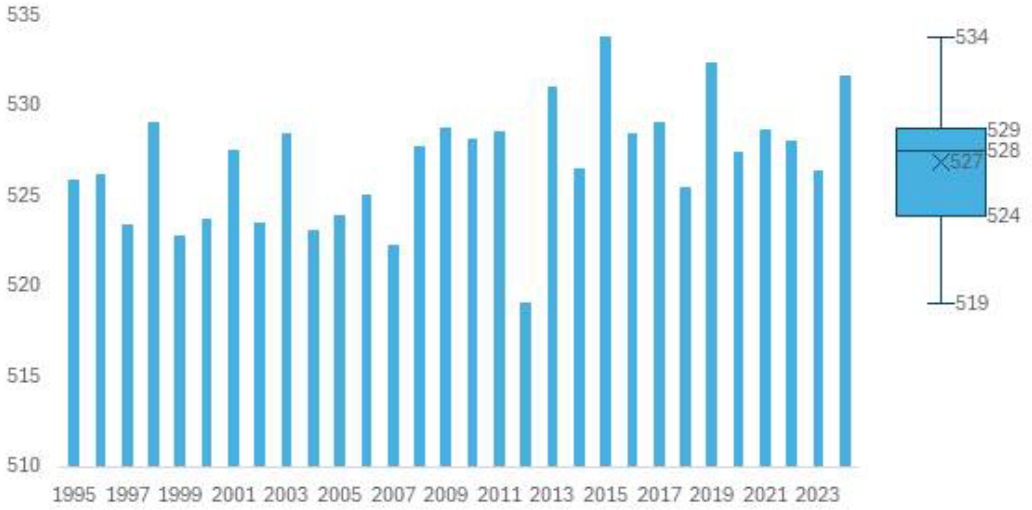
Pre-harvest Crop Yield Forecast System

- An operational rice yield forecasting system based on a process-based crop growth model
- High pre-harvest prediction accuracy as of September 15
  - **2024:** 513 vs. 514 kg/10a (**0.2% error**)
  - **2025:** 527 vs. 522 kg/10a (**1.0% error**)



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Open Data Service Platform for Agricultural Models

Web-based agricultural modeling platform

- Crop growth simulations
- Environmental assessment
- Yield prediction
- Pest/disease risk analysis

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SISAGRO platform:
Digital Innovation for Honduras

MISSION

To empower a climate-resilient and sustainable agri-food sector

- To develop and operate an integrated digital platform that transforms diverse agricultural data into insights
- To connect national and regional institutions through interoperable systems
- To ensure that decision from farm to policy is informed by accurate, real-time information

VISION

To organize agricultural, environmental, and market information and make it universally accessible and actionable for every farmer, policymaker, and citizen

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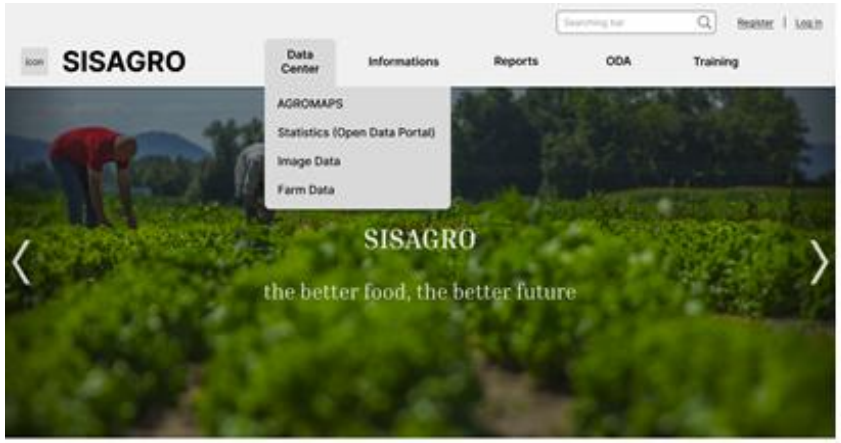
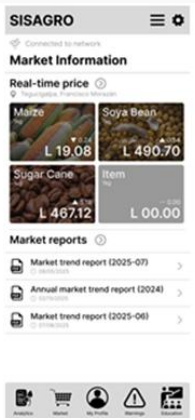
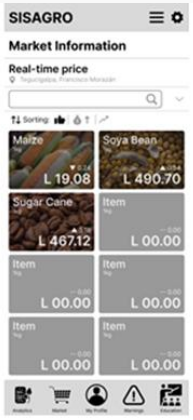
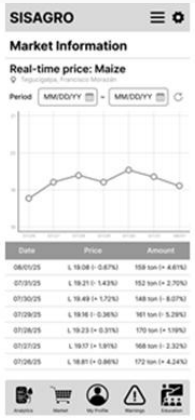
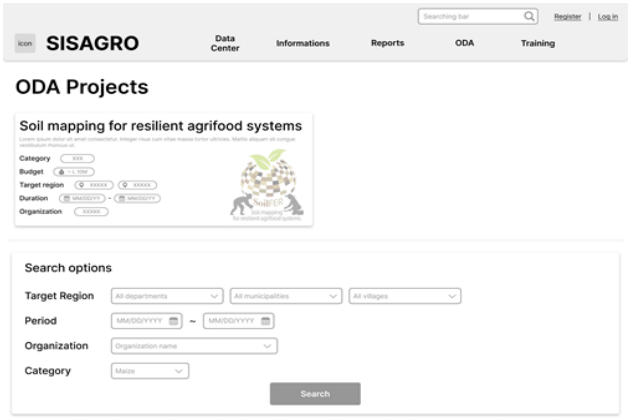
Personalized User Interface











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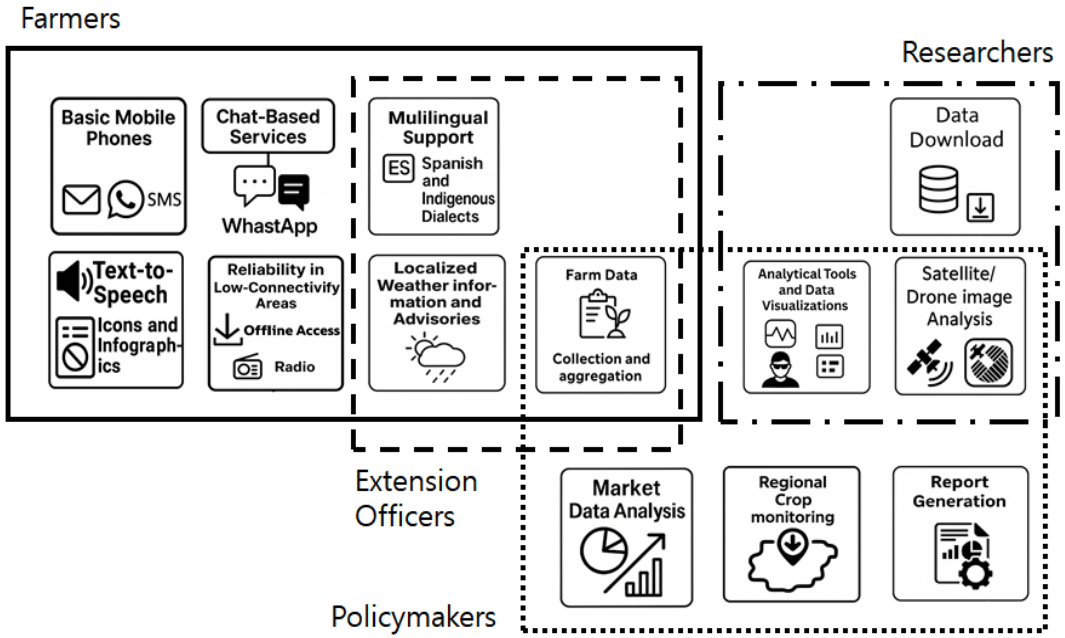
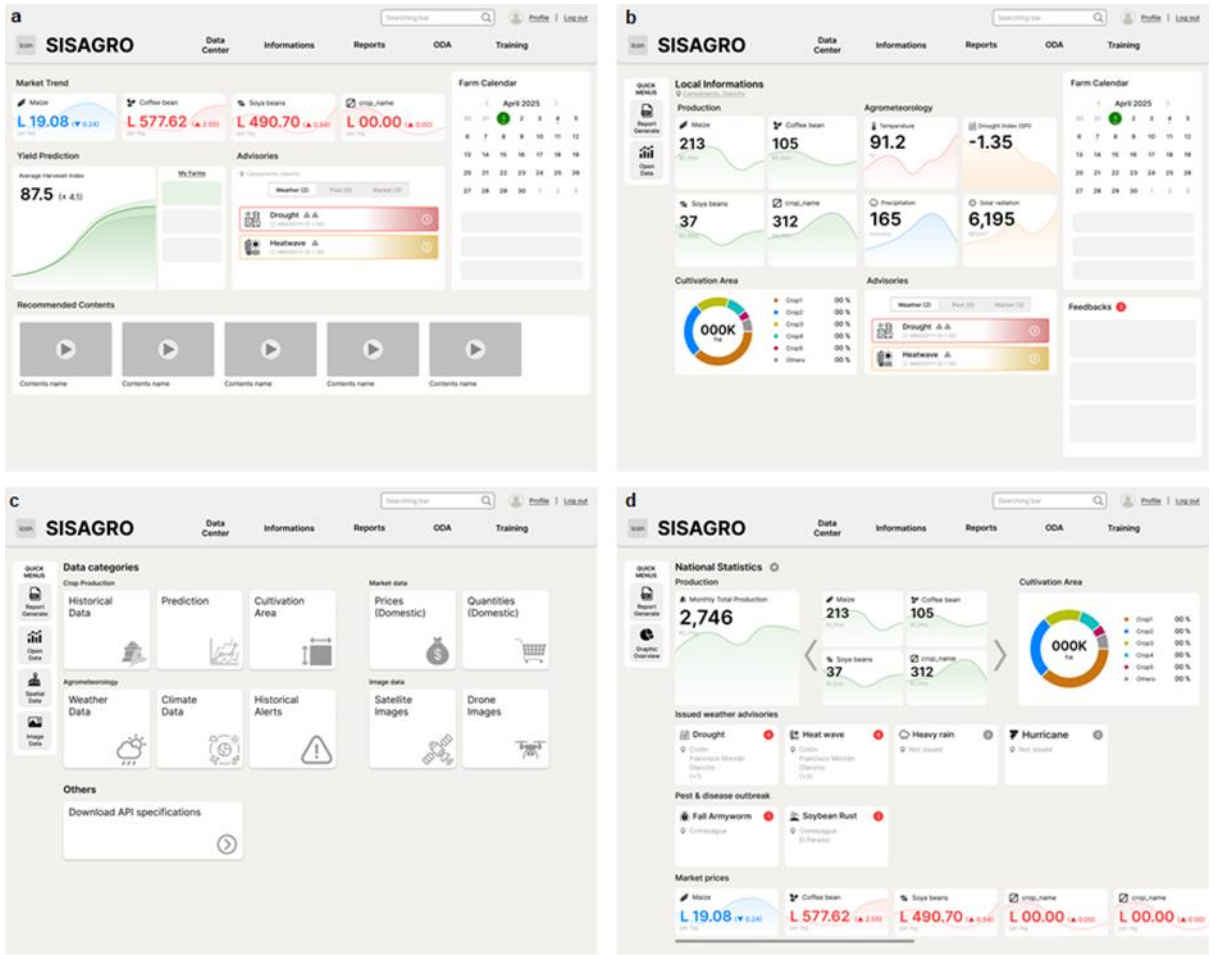
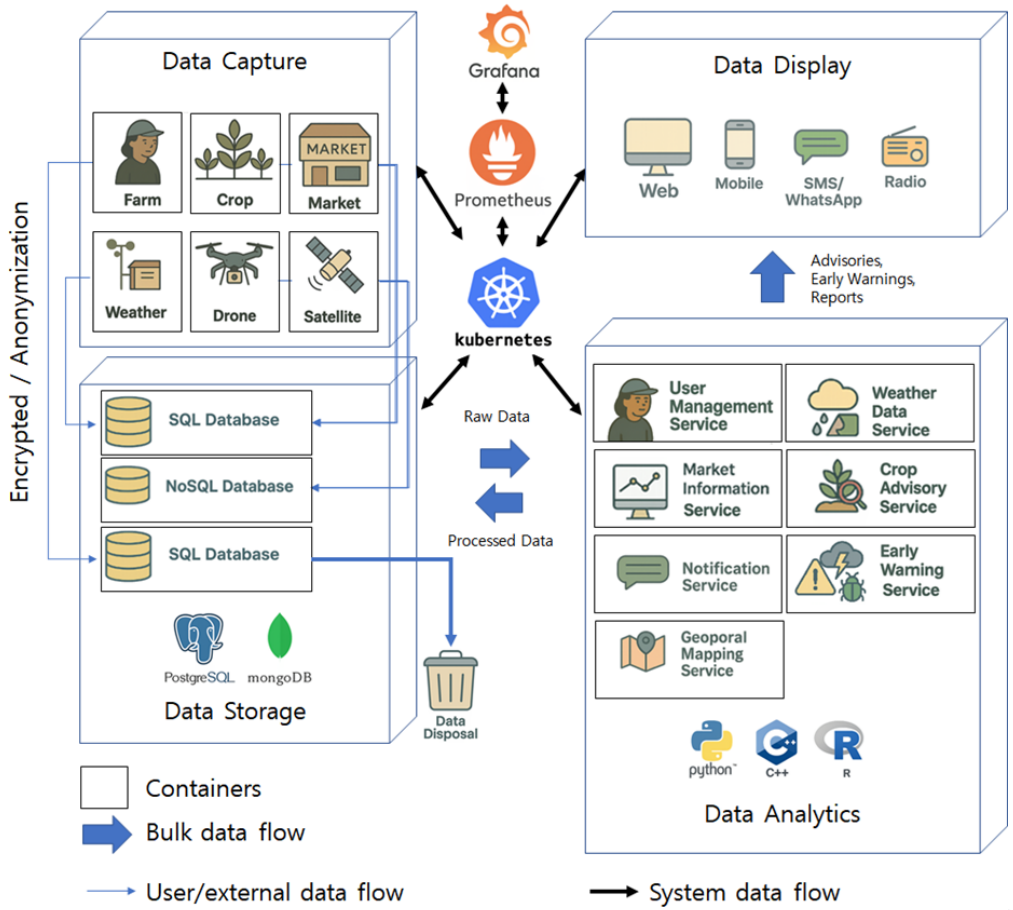
User-Oriented Services

- Farmers: Weather, crop alerts, market prices at farm scale
- Policy makers: Reports on production trends & risk forecasts
- Researchers: Access to raw datasets and analytical APIs
- ODA agencies: Program tracking and collaboration dashboard



Frontend & Backend





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Unified Information Platform

- Multiple Data Sources
  - Site-specific Data: SIMPAH, COPECO, ENEE
  - Satellite Data: CHIRPS, GEOS, Sentinel, VIIRS
  - Gridded Weather Data: ERA5/AgERA5 Reanalysis Data
  - Local surveys: INE

- Processing pipeline
  - Data fusion → Validation → Analytics → Policy dashboard

- Real-time access for policymakers
  - Through Graphic User Interface

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Scalable Infrastructure for Agricultural Data and Services

- Integration of multi-source data
  - Weather, Soil, Satellite, and Drone
  - Implementation of quality control and standardization protocols
- Development of hybrid IT infrastructure
  - SQL + NoSQL databases
  - Cloud oriented open-source backend system
- Microservice architecture with APIs
  - Containers for individual services
  - Kubernetes for management of containers
- Support for low-connectivity environments
  - WhatsApp message for farmers

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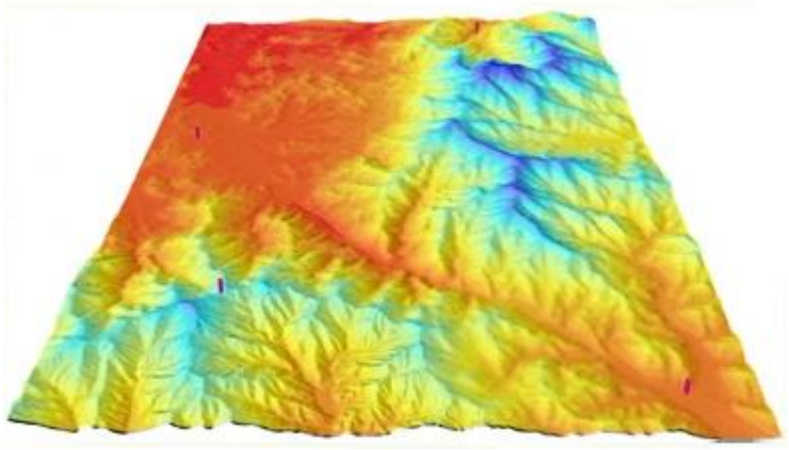
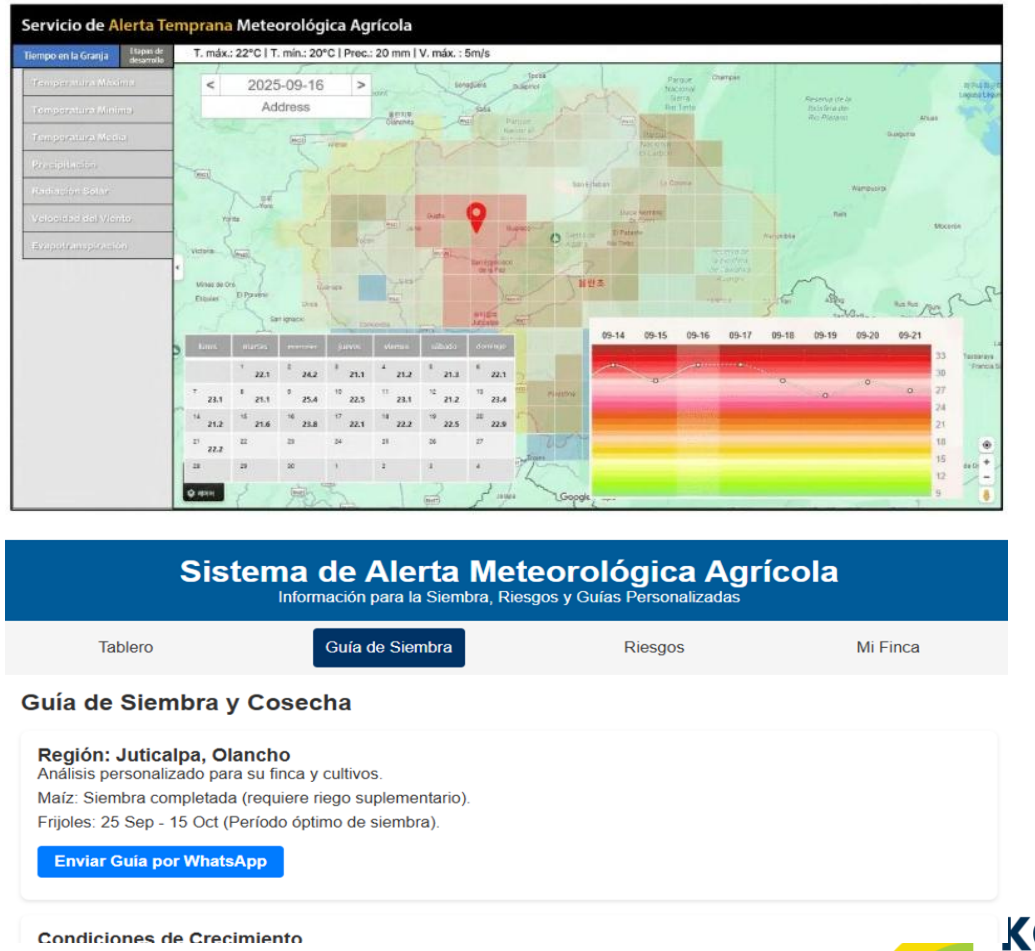
Component: Ag-Meteorology Service Module

- Early Warning Services at a farm scale
  - Crop Management
  - Pest Management
  - Extreme weather conditions



Site Specific Weather Data Estimation
@ 30 m resolution



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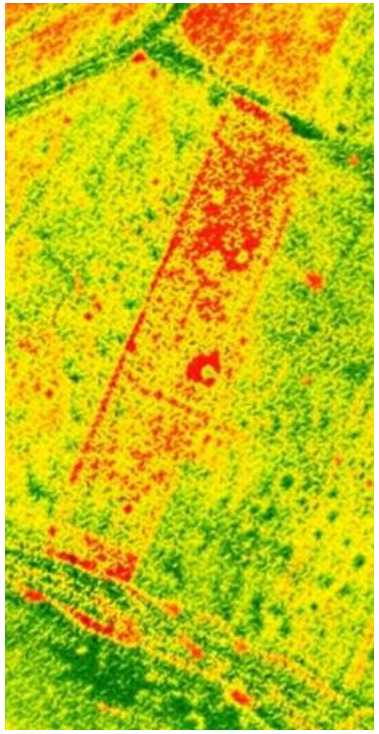
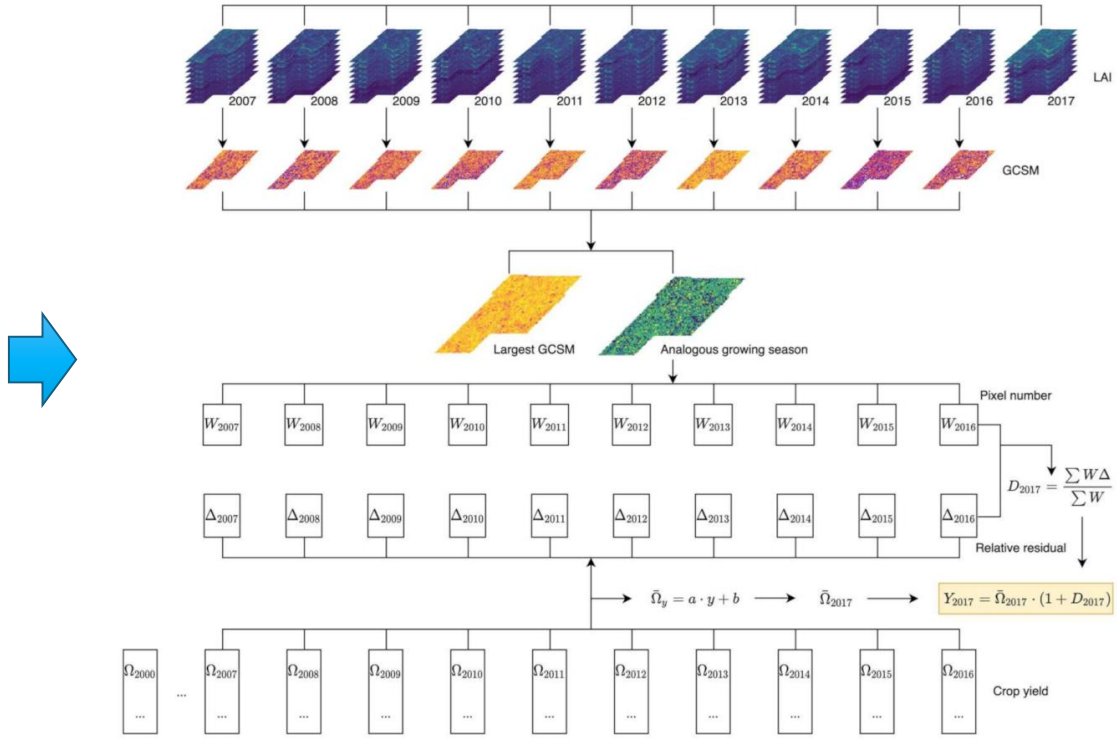
Component: Crop Monitoring & Prediction Module

- Management of Drone images
- Drone-image based regional monitoring reports
- Data-driven crop production prediction models





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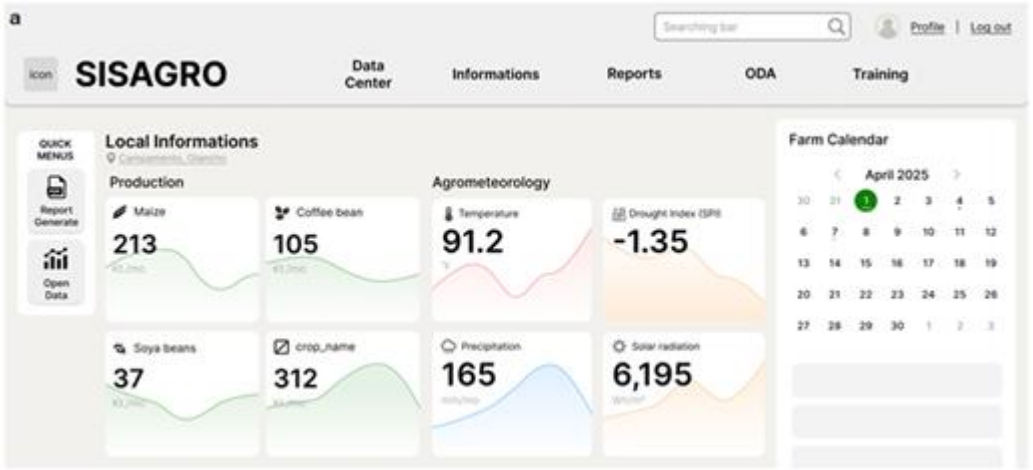
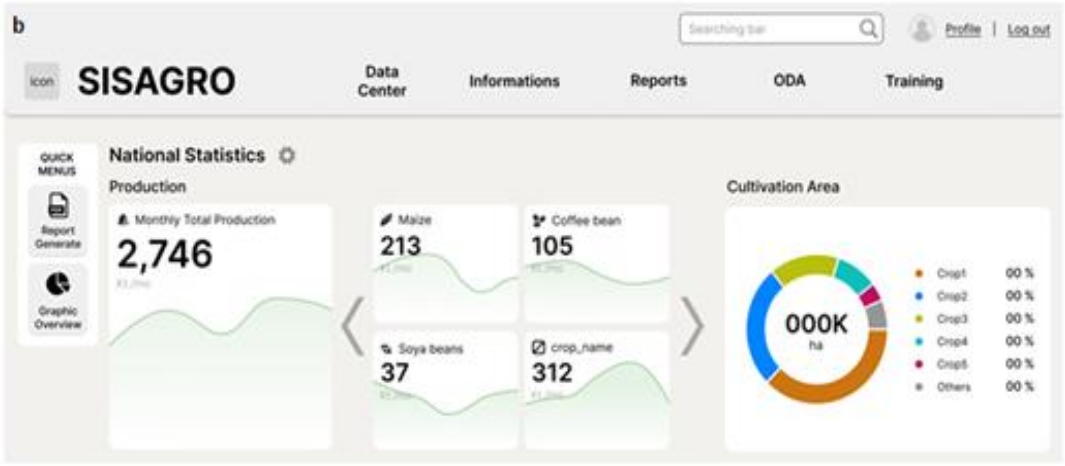
Component: Policy Support Module

- Data Analytics for Decision-Making
  - Crop yield, risk monitoring, and food security dashboards
- Monitoring & Evaluation Tools
  - Track national programs and ODA project outcomes





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Expected Impacts

- Real-time early warning and decision support
- Improved crop monitoring and yield prediction
- Integration of production and market data
- international data exchange and collaboration.

- Enhanced climate risk preparedness
- Evidence-based agricultural planning and policies
- Improved food security and rural economy
- Strengthened regional climate resilience

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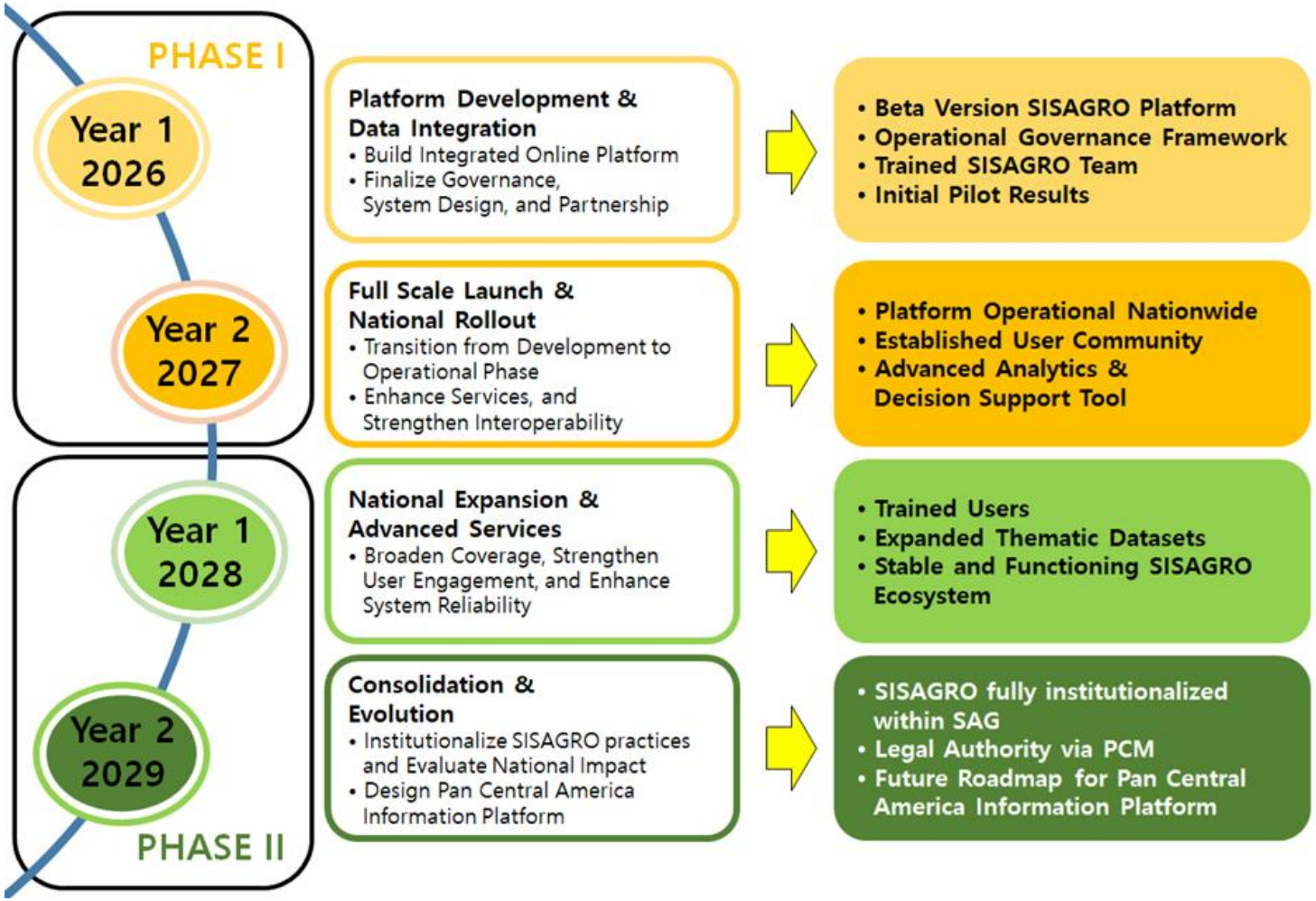
Roadmap for Policy Support & Implementation



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Conclusion

- SISAGRO platform is a transformative step in digital agriculture in Honduras.
- It enables data-driven decisions for sustainable, resilient food systems.
- Future success depends on collaboration, capacity building, and sustained investment.

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Gracias! / Thank You!

- Acknowledgments
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