



Republic of Malawi

Climate & Health Initiative

Malawi: Climate & Malnutrition

Use Case Overview

Linking food security, climate & health data to forecast and respond to child malnutrition

Tiwonge D. Manda



Climate
data



Food
security



Nutrition
outcomes



"I" EWARS

A Use Case for
Integrated Early Warning



PROBLEM SETUP

Climate shocks & the malnutrition burden



Adverse weather conditions and rising costs of leaving continue to affect household food security and nutrition in Malawi.

Evidence on the ground



>4 major cyclones and severe storms since 2019

Since 2019, Malawi has suffered from >4 major tropical cyclones and severe storms.



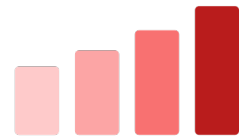
Rising costs of living

Combined pressure on household food security and child nutrition continues to deepen.

SAM admissions 2024

44,573

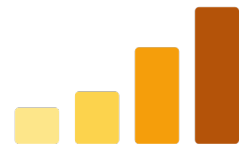
▲ +18% from 37,839 in 2023



Moderate wasting 2024

38,963

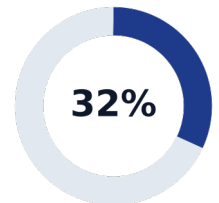
▲ +76% from 22,158 in 2023



Districts exceeding expected SAM caseload

32%

9 of 28 districts · December 2024





WORK OBJECTIVES

What we are setting out to do



Primary Objective

Explore appropriate **models** and combinations of **covariates** to inform programming.

Identify which climate, food-security, and socioeconomic signals—combined in which models—best predict malnutrition case burdens early enough to act.

 Horizon: 3 to 6 months



Models

Statistical & ML approaches



Covariates

Climate · food · socioeconomic



Programming

Inform response & resourcing



PROBLEM SETUP

Weak early warning systems



The Gap

Weak early warning systems to predict malnutrition case burdens, given certain food insecurity data and climatic events, are due to the following:



DRIVER 01

Insufficient incorporation of climatic data

Climate signals—rainfall, temperature anomalies, and cyclone tracks—are rarely brought into routine analysis and planning for nutrition response.



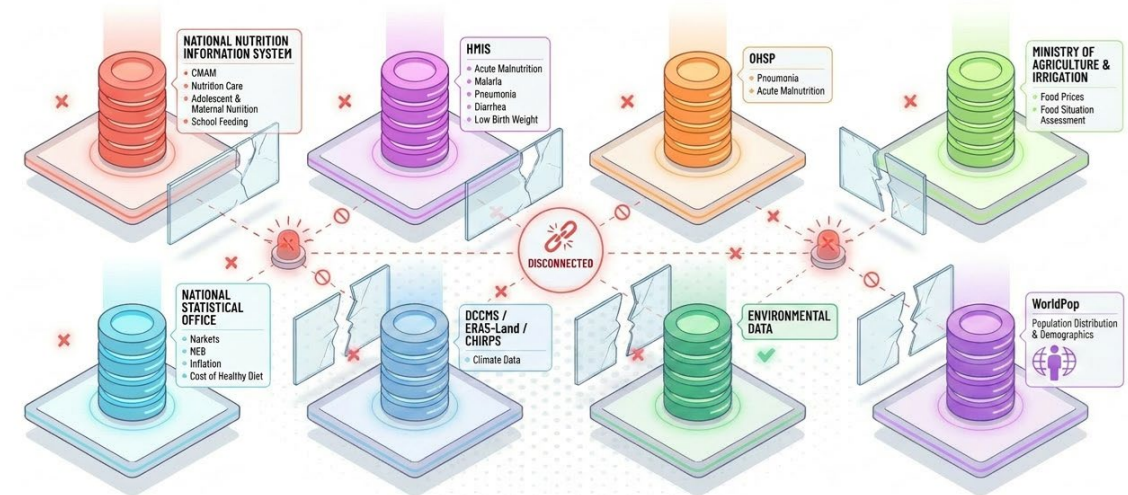
DRIVER 02

Siloed data systems

Health, food security, food prices, and other socioeconomic datasets sit in disconnected systems—preventing the joint analysis needed for early warning.

THE DATA SILO PROBLEM

9 Isolated Data Sources — No Integration





KEY FOUNDATIONAL ISSUES WE ARE ADDRESSING

Building blocks for an integrated early warning



01 / FOUNDATION



Data architectures & platforms

For streamlining and automating data provisioning across health, food, and climate systems.

02 / RESOLUTION



Data gridding

Work around gaps and align resolutions across datasets so we can model at the sub-district level.

03 / SYSTEM



Architecture for a unified EWARS

One unified Early Warning, Alert and Response System that brings the signals together.

04 / COLLABORATION



Cross-country knowledge & technology sharing

Building on regional expertise—for example, working with **HISP Uganda**.



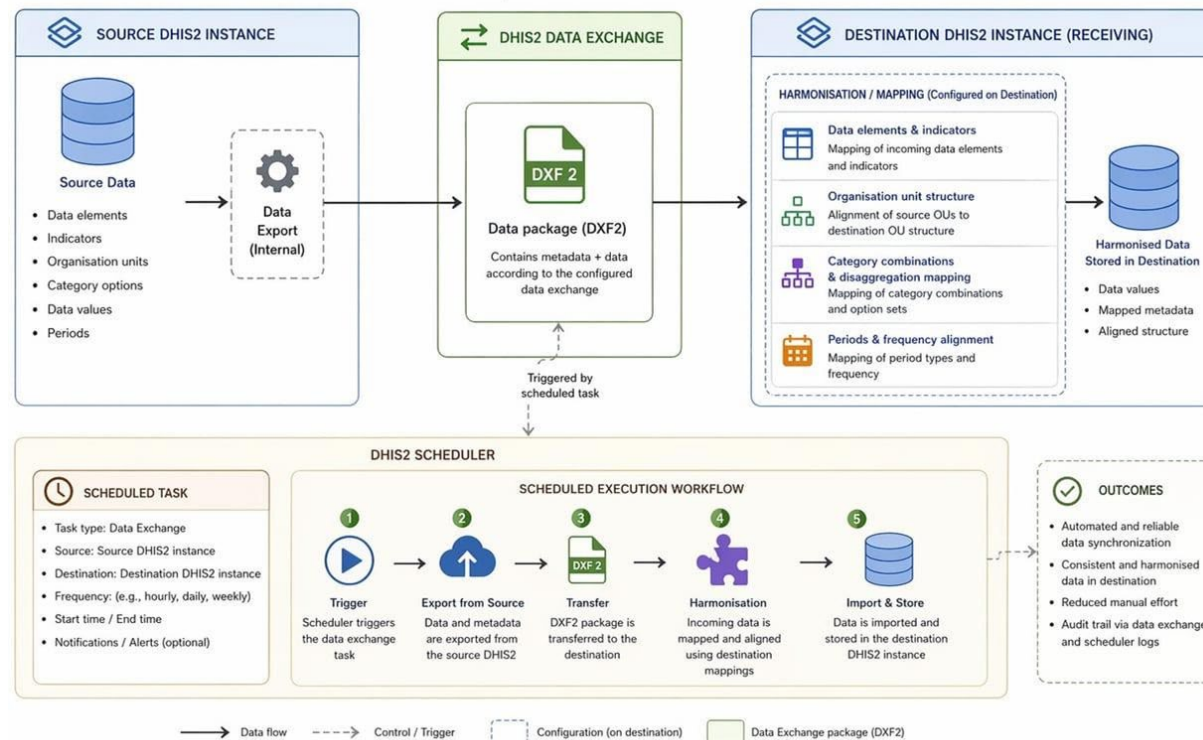
DATA ARCHITECTURE

DHIS2 harmonisation workflow



DHIS2 Harmonisation Workflow using Data Exchange and Scheduler

Automated, scheduled and structured synchronization of data between a source and a destination DHIS2 instance



Components

The pieces of the architecture



Unified data instance + Data harmonization worker

A single instance with a worker process that harmonises records from upstream systems.



Climate Tools / Climate App

Domain tooling to surface climate signals where analysts and programme teams need them.



Open Climate Services

Provides:

Climate data & climate indices

ENACTS integration

WorldPop

Home

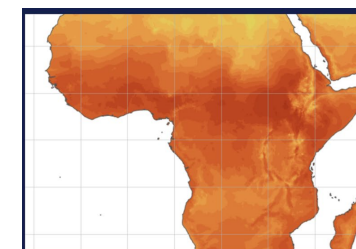
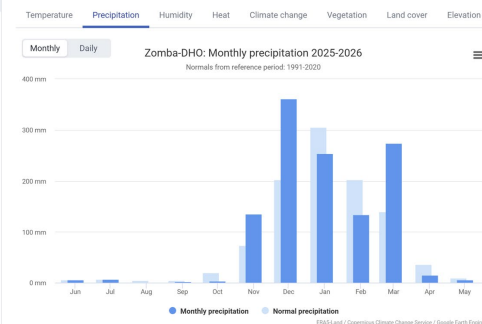
Explore data

- MOH MALAWI Govt
 - Central East Zone
 - Dowa-DHO
 - Kasungu-DHO
 - Nkhosakota-DHO
 - Ntchisi-DHO
 - Salima-DHO
 - Central Hospital
 - Central West Zone
 - North Zone
 - South East Zone
 - Balaka-DHO
 - Machinga-DHO
 - Mangochi-DHO
 - Mulanje-DHO
 - Phalombe-DHO
 - Zomba-DHO
 - South West Zone

Import data

Setup guide

Zomba-DHO



DHIS2 Climate Tools

An open, collaborative toolkit for accessing, processing, and uploading climate, weather and environmental data to DHIS2 and the Chap Modeling Platform.

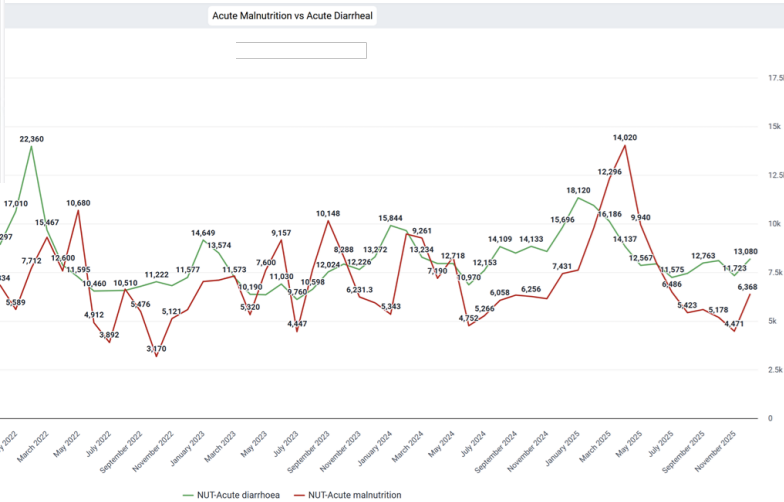
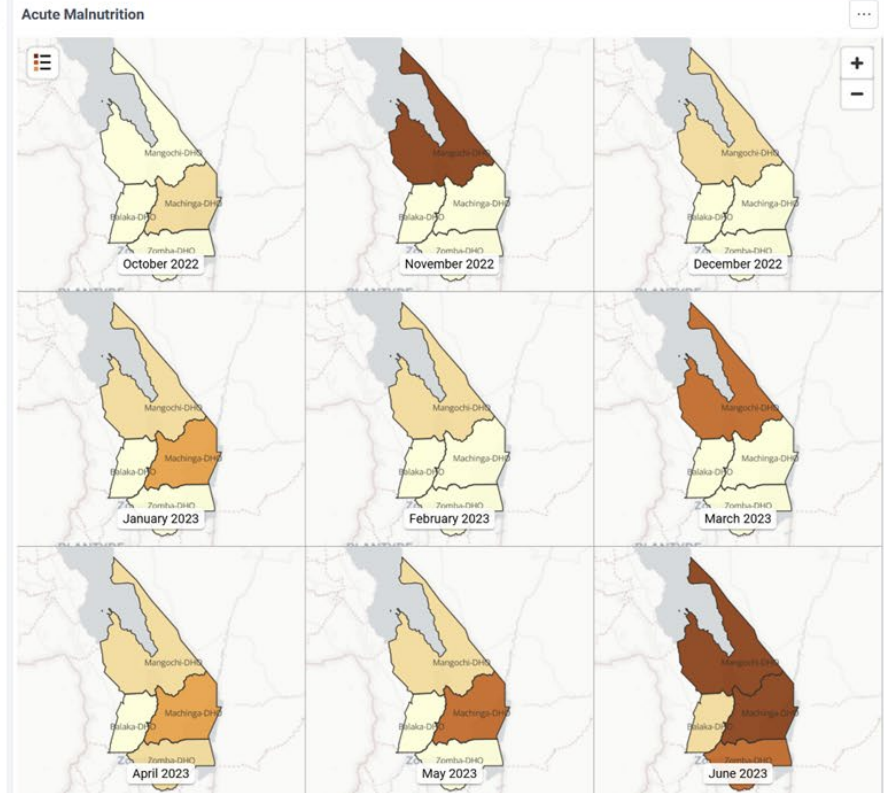
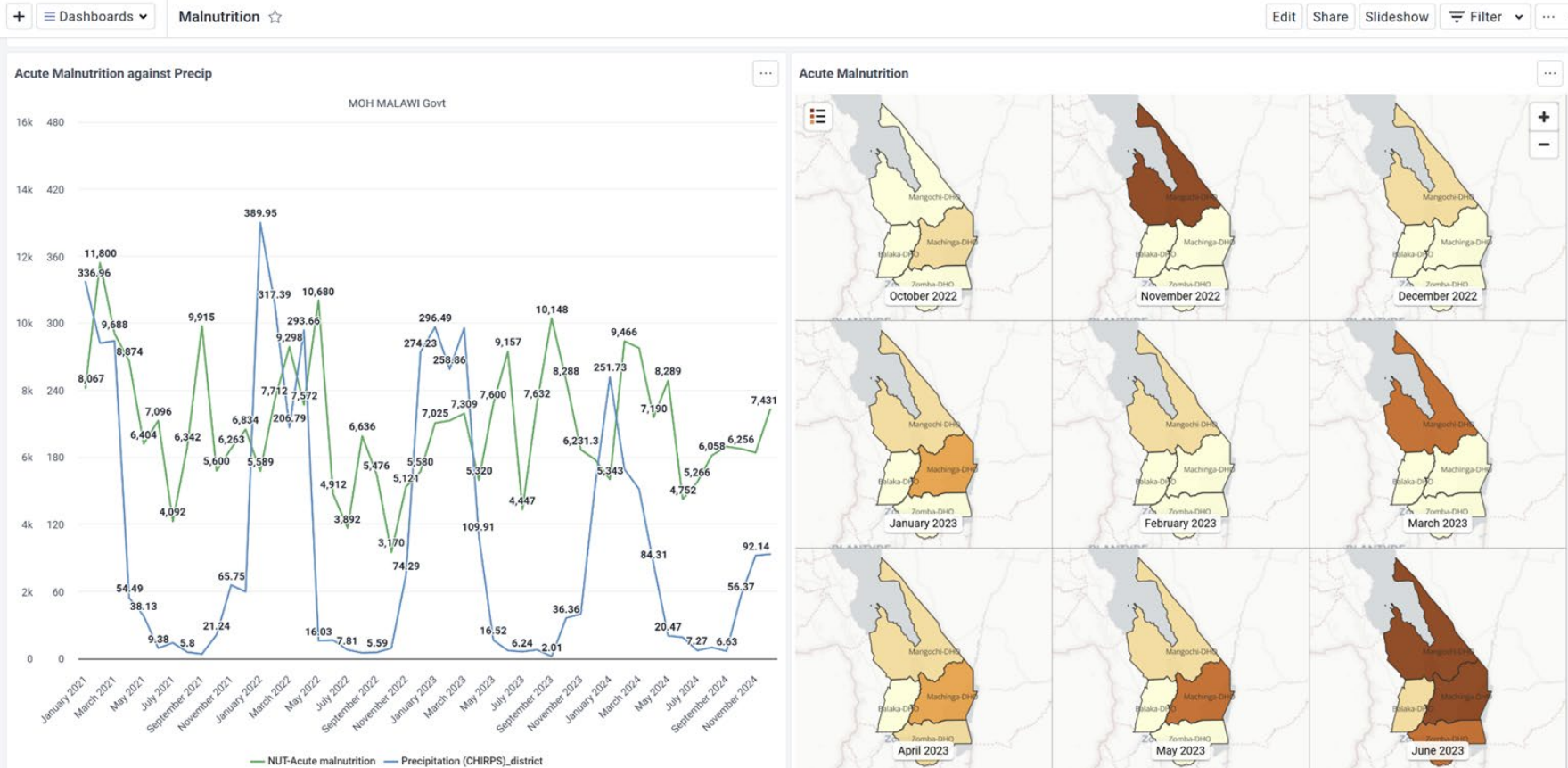
Get Started

Learn More



SCREENSHOTS OF COMBINED DATA ANALYTICS

In-app views — placeholder





DATA GRIDDING: ADDRESSING DATA GAPS, RESOLUTION

From district aggregates to sub-district insight



Approach

We are exploring data gridding to:



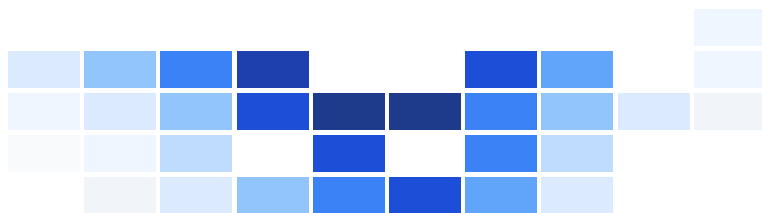
Work around data gaps

Fill missing observations by borrowing strength from neighbouring grid cells



Reconcile data resolution

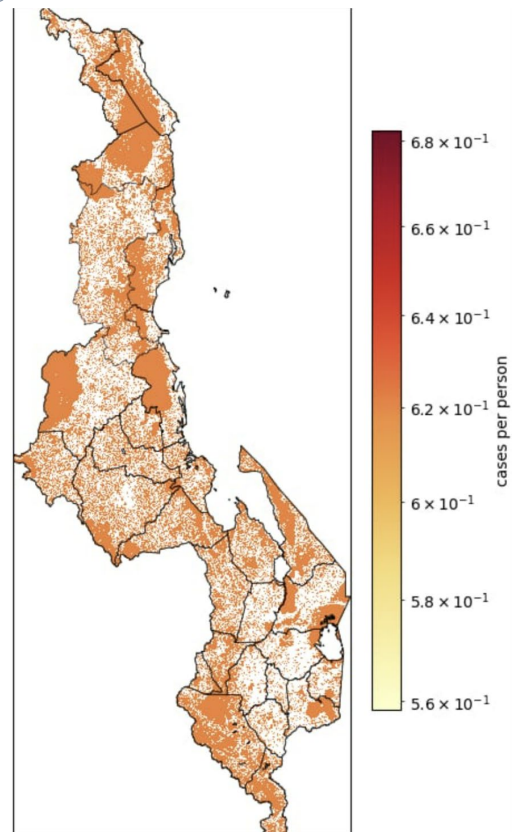
Difference in data resolution — to allow for modeling at the sub-district level.



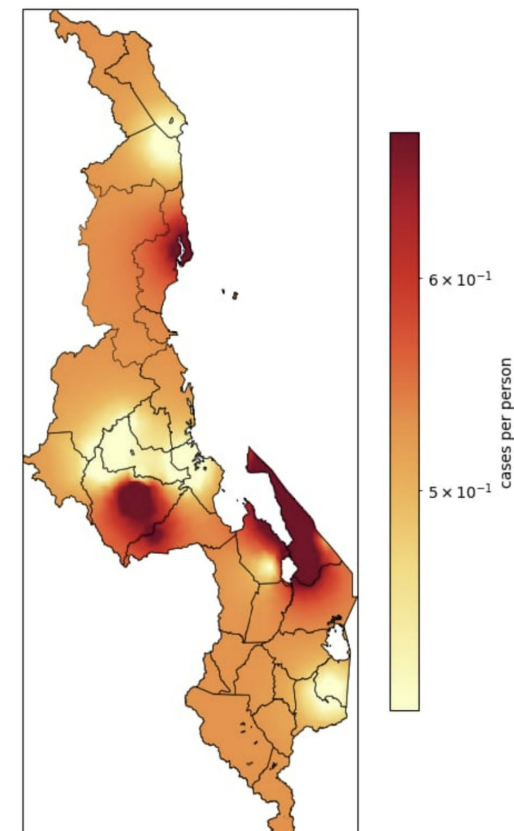
From source · spatial outputs

Spatial Distribution

Logarithmic scale



Bayesian posterior mean incidence rate





INTEGRATED EWARS ARCHITECTURE

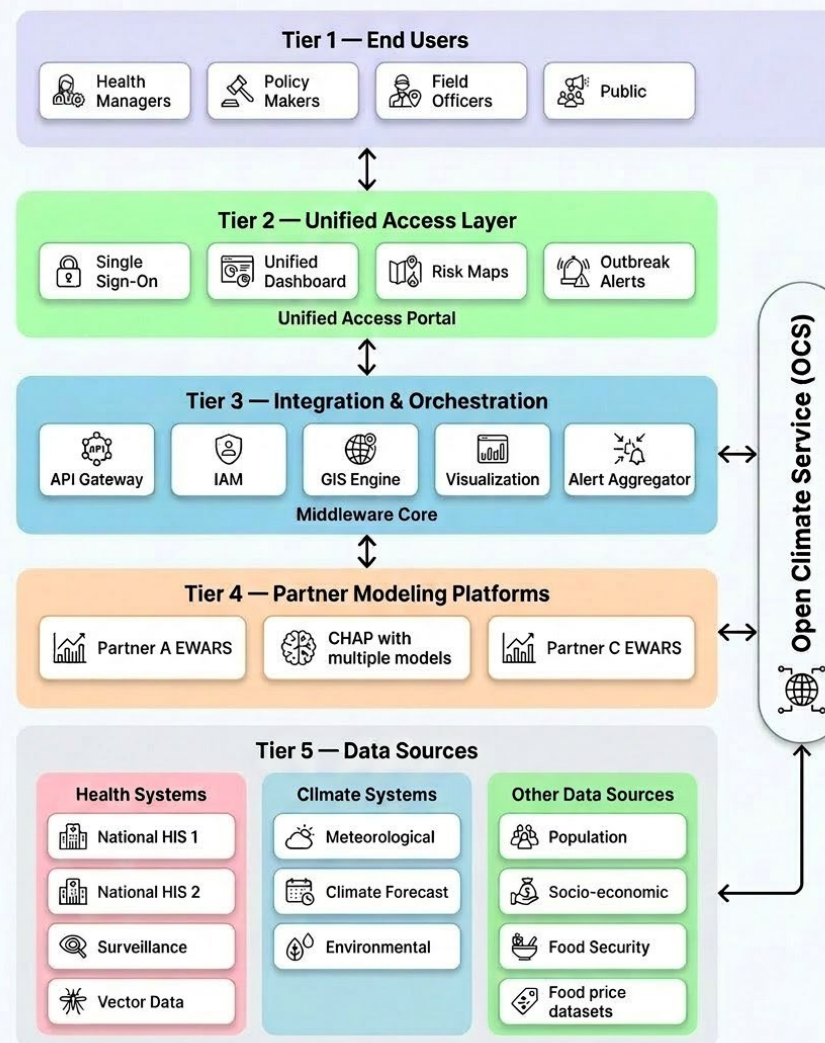
Towards a unified early warning system



Context

Working in a context with multiple use cases and players with potential EWARS solutions, we are working towards a unified EWARS architecture.

Climate-Sensitive Health EWARS Architecture





Forward roadmap

Three commitments towards getting an operational system.

01



DATA WORKFLOW

Complete data workflow integration into Open Climate App

Finish the end-to-end pipeline so climate, health and food signals land in one workflow.

02



PARTNERSHIPS

Pursue partnerships for data consolidation and modeling

Build the alliances that bring data custodians and modellers around the same table.

03



UNIFIED EWARS

Continue actualisation of the unified EWARS architecture

Keep iterating the architecture into a working system used by programme teams.