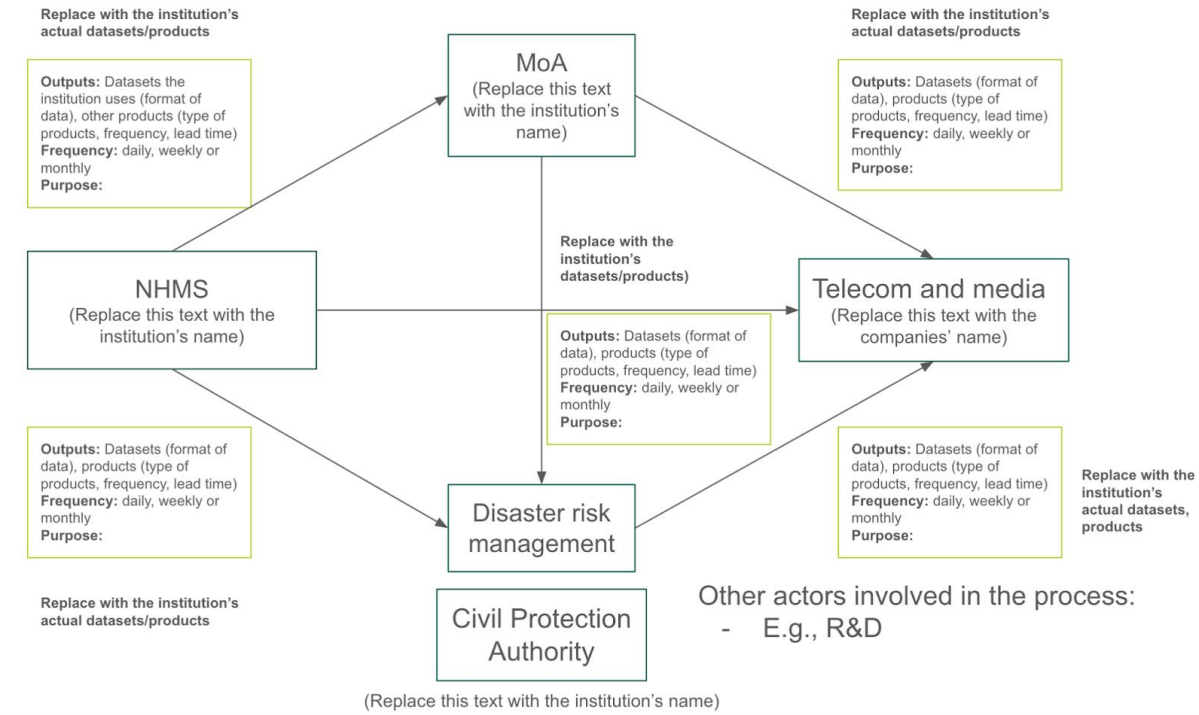
Pre-training template for CONOPS Development

Please review this document to familiarise yourself with the process of developing a Concept of Operations (CONOPS) for an integrated agrometeorological hazard early warning system. The document describes the essential sections that a CONOPS should obtain and explains good practices to follow when developing it. It is intended to serve as a reference tool to support your thinking on how to collect and organize the information needed to complete the template provided below.

1. **Current Roles and Responsibilities.** Diagram your institution's roles and responsibilities and how they fit within an end-to-end (E2E) agromet advisory service landscape.

    a. **Institutional List -** Institutions identification in the E2E agromet advisory service landscape

Who are the key institutions/actors within the E2E chain? List out the institutions that act in your current operational landscape. Show NMHS, MoA, DRM, telecom/media, NGOs, and private sector actors: List key service providers in the E2E agromet advisory, thinking about observations, forecast generation, forecast communication, and training.

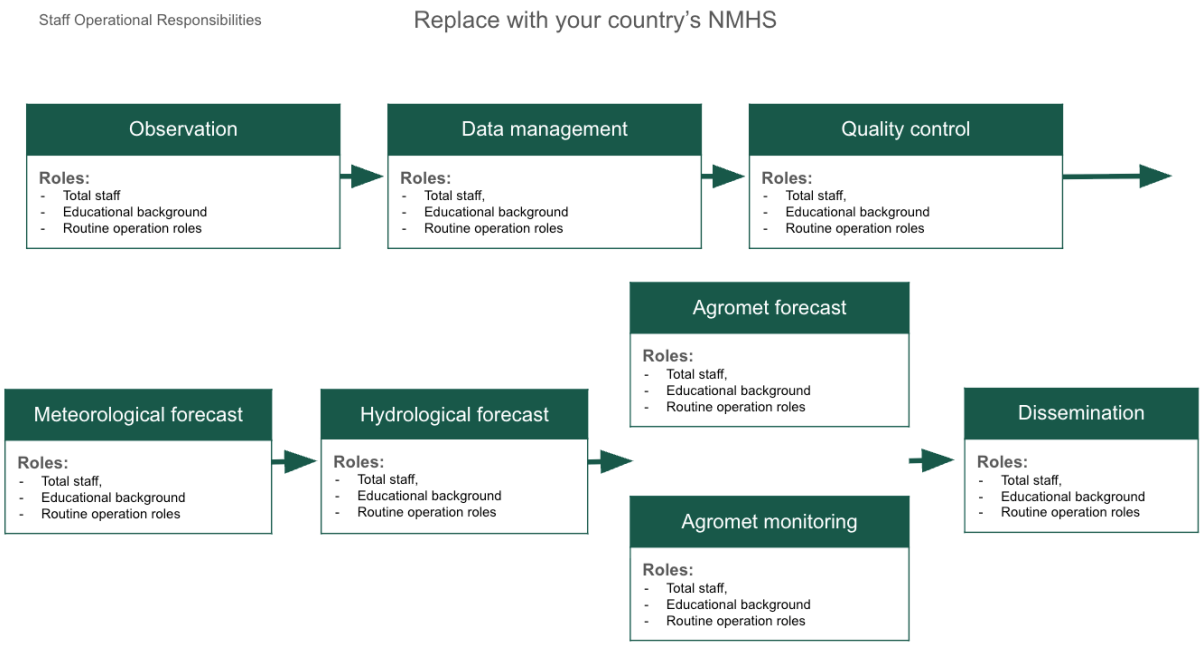


    b. **Current Workflow -** Diagram how the operations flow from observations to advisory across these groups and the timeline when they occur (from observations to advisory). As you look at the list of institutions you made, add to your map how these institutions interact with each other, including the frequency with which advisories get sent out, the types of advisories, and the data that is flowing between groups.

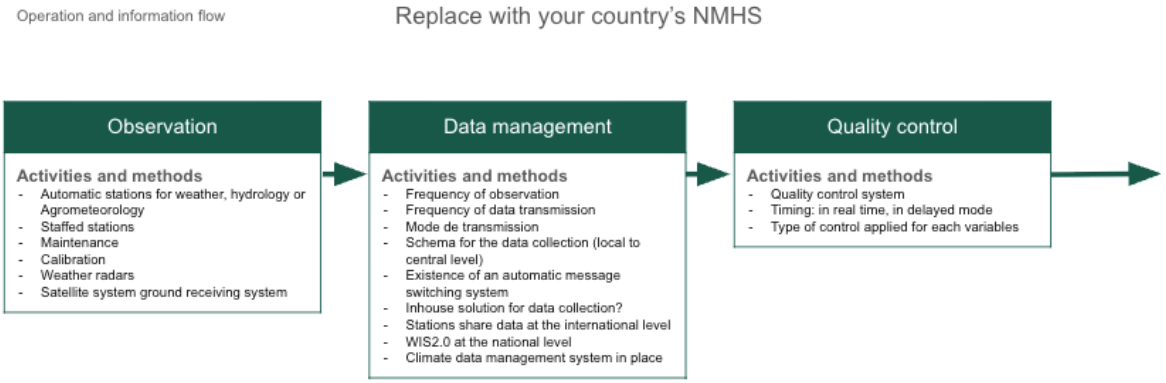
Within your institution, diagram in more depth how information flows. Diagram: current daily/Weekly/monthly forecast/advisory workflow timeline.

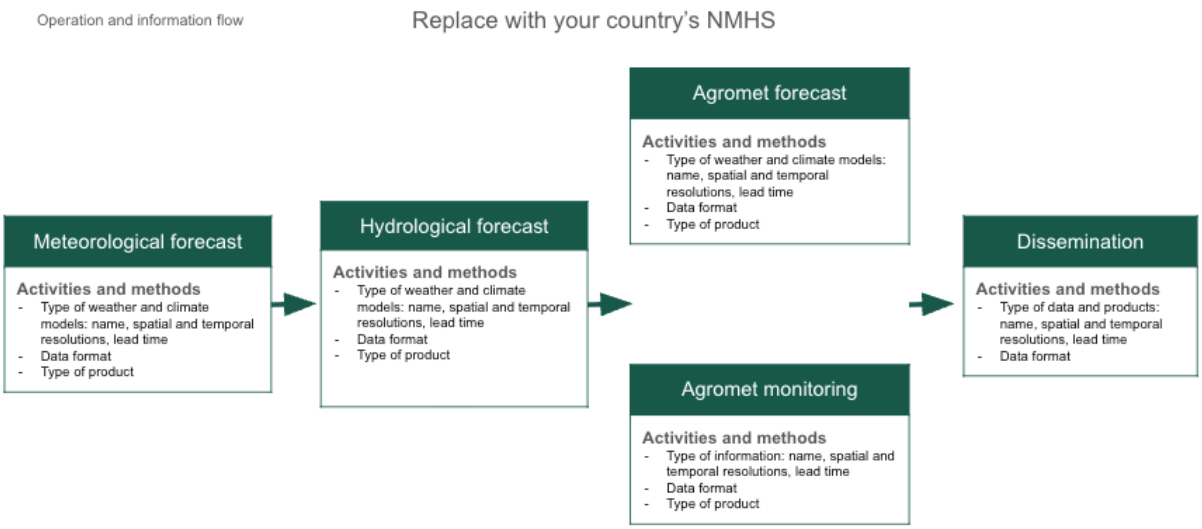
For the National Meteorological Services

- **Staff Operational Responsibilities**



- **Operation and information flow**





Think about the following items when organizing the operations connected to the observation and data management processes:

Observation

- Automatic stations for weather, hydrology, or agrometeorology: Brand and model, number of stations per brand, central servers (yes/no), variable measured, geographical distribution (Map, Excel sheet with geographical coordinates), age of the station (date of installation)
- Staffed stations: variables observed, geographical coordinates, and working hours of the station.
- Maintenance: central/local, SOP available (yes/no), resources (staff allocated, competencies, vehicles, maintenance workshops and tools, etc.)
- Calibration: Central/local, calibration facilities and equipment, SOPs, resources, and more information on the type and nature of the collaboration with RICs.
- Are there weather radars available? Present status, type (C, S, X band), technology (Doppler, single or dual polarisation)
- Is there any satellite system ground receiving system available? Is there any satellite in use?

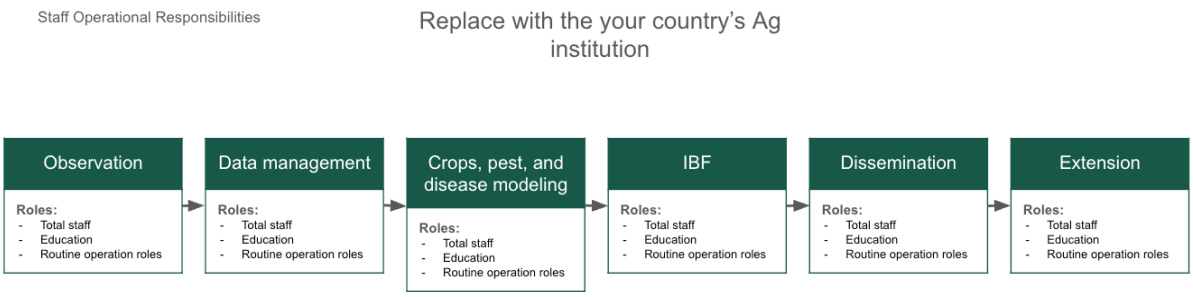
Data management:

- Frequency of observation, particularly for precipitation,
- Frequency of data transmission (1 min, 10 min, 1 hr, 3 hrs, 6 hrs, 12 hrs, 24 hrs)
- Mode de transmission (GPRS, GSM, Radio, File transfer, Email, etc.)

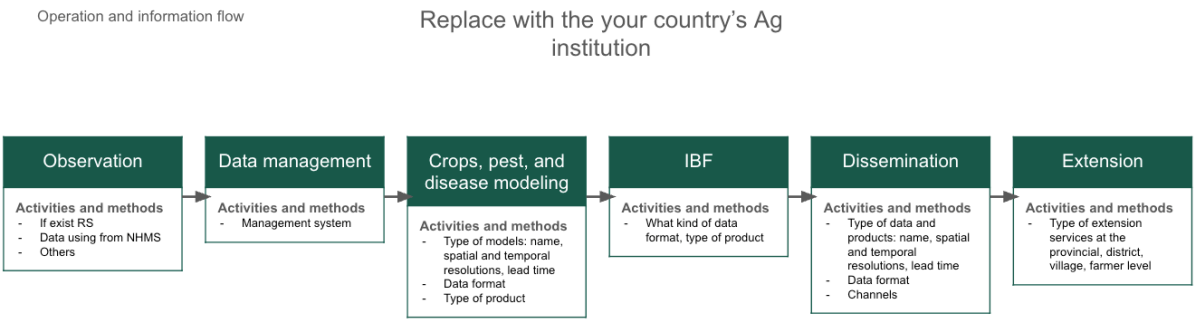
- Schema for the data collection from the local level to the central level
- Existence of an automatic message switching system in place.
- Existence of an in-house solution for data collection
- Number of stations that share data at the international level
- Existence of a WIS2.0 implemented at the national level.
- Climate data management system in place (CDMS); e.g., MCH, Climsoft, proprietary systems like Clisys, CLDB, etc

For Agricultural institutions

- **Staff Operational Responsibilities**



- **Operation and information flow**



Create a copy of this template to work on your institution's CONOPS and workflows.

2. Identify current gaps in your E2E system. Describe any current limitations you see within the existing E2E agromet service that you summarized above.

3. Identify opportunities for innovation. Where do you see opportunities to improve the landscape you illustrated above, and are there places within the workflow where you see the opportunity for potential technical innovations (e.g., through the use of AI technologies) or increased coordination across actors?

4. What support structures would you need to create the opportunities you identified above?

a. IT, communications, and Technical Components?

b. Research and Development? Training?

c. Infrastructure investment?

Example of places to identify changes to operations to support E2E agricultural advisory

National Meteorological Operations

- Surface Observation Data collected (real-time and other), Database description, Data products distributed, Maintenance & Operation of data network (architecture)
- Radar operations (where available)
- Satellite Data Products needed
- Models (NWP or AI-based with spatial and temporal resolutions)
- S2S forecasting tools and products
- Agromet-related Product(s) Overview
- Dedicated Weather Delivery data system, Mobile Technology, Social Media, Emergency Communications (HF/VHF ham radio), Cell broadcast, etc.

Agricultural Department Operations

- Routine vs. hazard-specific products to communicate information with farmers. Format (maps, SMS, bulletins, audio, generative AI like agrochatgtp)
- Extension agent support
- Crop-specific trigger thresholds and associated recommendations for action
- Vulnerability maps for impact-based forecasts

CONOPS Checklist

The following suggested checklist is not intended to be exhaustive or prescriptive, but only an example of good practices for the CONOPS development.

At a minimum, agromet hazard EWS CONOPS should include the following elements:

Documentation

- Distribution List: every person who must receive a copy of the CONOPS
- Revision List: addenda and revised drafts that have been released since the original draft was released

- Associated Documentation: all manuals, guidelines, or policies that support the CONOPS
- References and Sources: who and what were consulted in the preparation of the CONOPS

Introduction

- Scope: the vision, purpose, and scale of the system
- Description: an understandable and straightforward definition of the system
- Priorities: the priorities to be addressed by the system
- Method: the process used to develop the CONOPS
- Contributors: names and affiliations of all those involved in developing the CONOPS
- Glossary of Terms: the meaning of all key terms used within the CONOPS
- List of Acronyms: the complete spelling of all terms abbreviated within the CONOPS

Strategic Framework

- Mission Statement: clear, succinct articulation of the ultimate deliverables of the system
- Policy Mandate: basis for the NMHS to deliver the mission requirements
- Goals & Objectives: specific, measurable, attainable, realistic, and time-bound
- System Definition: the system's description, in simple and understandable terms.

Operational Framework

- Facilities: identification of all existing and new infrastructure required for the system to become "operational"
- Roles and responsibilities: description of each subsystem operator's contribution at an operational level
- Staffing: listing of all staff required to operate the system successfully, in both the short and long-term

- Skills Development: description of the training, exercises, and drill regimen necessary to ensure long-term system sustainability
- Communications: description of the primary and redundant channels through which information will flow between and beyond each subsystem
- Data: inventory of the information requirements of each subsystem, including the need for historical data for model calibration as well as real-time data for agromet forecasting
- Models: description of hydrometeorological models used to generate various agromet forecasts
- Products and services: definition of the various outputs generated by the system
- Hardware: description of the system's technological infrastructure and hydrometeorological sensors, including gauge, radar, and satellite networks
- Software: description of the application and operating packages used by each subsystem
- Maintenance and replacement: prediction of the maintenance requirements and longevity of each subsystem
- Research and development: provision of the framework for involving system operators and other partners in the development of applications
- Outreach and public education: identification of the strategy for ensuring strong community-level participation in the success of the EWS

Appendices

- Overall System and Subsystem Diagrams
- Operational, Maintenance, and Replacement Budget Plans

Important Points to Remember about CONOPS Development

- Development of a Concept of Operations is the first step in the Integrated agromet hazard early warning system engineering life cycle that will become part of the EWS ROADMAP.
- Every CONOPS is a unique and "living" document that requires input from all stakeholders and regular maintenance.
- A CONOPS attempts to answer, using relatively simple language, a system's who, what, why, where, when, and how.

- Don’t take shortcuts with developing a CONOPS – it requires serious, devoted attention by strategic and operational personnel in order to be effective.