INITIATIVE ON
Excellence in Agronomy

CGIAR

PROTOCOL FOR THE VALIDATION EXERCISES

Guidelines with templates for EiA Use Case teams

Excellence in Agronomy Initiative of the CGIAR
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During the development of a Minimum Viable Product (MVP) or as Use Case teams commence activities, they are required to validate the MVP or Decision Support tool (DST). Use Cases must perform a validation exercise to test the benefits of their product. This document provides Use Cases with a template to design their protocol for this validation exercise.

The critical parts of the protocol are listed in bold below, with an example of the content in italics taken from the *SAA Nigeria Use Case (SAA UC) for the MVP component: Rice Advice Lite (RAL)*. It is recommended that Use Cases follow this template. Remove the italics sentences in each section and replace them with information related to your Use Case. EiA TRANSFORM provides the guidelines to help Use Case teams set up the validation exercise.

DESIGNING THE VALIDATION EXERCISE

Brief description of the MVP/DST

Provide a brief description of the Minimum Viable Product or Decision Support tool. In this guide the examples are from the SAA UC.

Example: *Co-development of digital solutions to deliver fertilizer and time of planting advice for rice, maize, and cassava (Nigeria).*

Component validated (If the MVP has several components)

Provide a brief description of technology component(s) to be validated. *Example:*

Example: *Fertilizer recommendations for rice – Rice advice Lite (RAL)*

Objectives of the validation exercise

List the objectives of the validation.

Example:

1. *Testing whether monetary returns to RAL fertilizer rates are positive.*
2. *Testing whether the performance of RAL against a zero-fertilizer control is satisfactory.*
3. *Testing whether the light version of Rice Advice fertilizer recommendations performs better than the currently available blanket fertilizer recommendation.*
4. *Testing whether apparent nutrient use efficiencies remain within optimum limits established in literature.*

Key performance indicators (KPIs)

List the key performance indicators that will be considered in the validation.

Here is the list of main KPIs considered in EiA Use Cases: Yield, Yield stability, Profit, Nutrient-use efficiency, NUE for N, NUE for P, NUE for K, Water productivity, Labor productivity, Soil organic carbon, yield-scaled GHGs, Product quality.

Example: *Yield, Profit and Apparent nutrient use efficiency for N and P*

Performance metric for each KPI

Define the target metrics (or acceptable values) for each KPI.

Example: *The performance metric will be evaluated by cumulative distribution curves for yield and profit (partial factor analysis: profit = yield x price of produce – amount of fertilizer x cost of fertilizer).*

Yield

a. *Significantly increase yield in more than 75% of the sample compared to the **zero-control fertilizer**; yield loss in less than 10 % of the sample*
b. *(This could be combined with a minimum average yield increase)*
c. *Significantly increase yield in 50% of the sample compared to the **blanket fertilizer rate**; yield loss in less than 10 % of the sample*

Profit

d. ***Positive profit from RAL** in more than 90 % of the sample (price of produce – cost of fertilizer for RAL)*

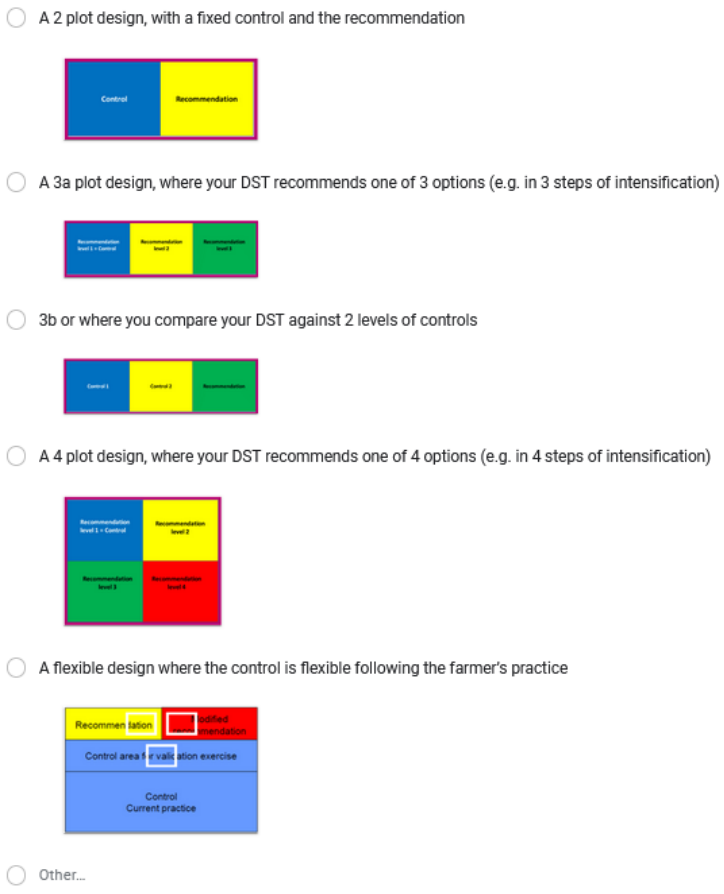
e. *Significantly increase profit in 75% of the sample compared to the **zero-control fertilizer** negative profit in less than 10 % of the sample (profit RAL – profit zero control fertilizer)*
f. *Significantly increase profit in 50% of the sample compared to the **blanket fertilizer rate**; negative profit in less than 10 % of the sample (profit RAL – profit blanket fertilizer rate)*
g. *Attention to instances where profit of RAL (price of produce – cost of fertilizer for RAL) is already negative. If a negative profit of the blanket fertilizer rate is deducted the result may become positive, however the farmer would have lost money in both cases (RAL or blanket fertilizer rate and been better off not applying any fertilizer at all)– indicate these cases and assess how they compare to the total sample.*

Apparent nutrient use efficiency

h. *Boxplots to assess how nutrient use efficiencies of RAL compare to published optimum use efficiencies and against the blanket fertilizer rate.*

Experimental design

Select the experimental design. Some options are provided in Figure 2. Although Use Cases may define a different design as needed. Add details on your experimental design (assign the color codes).



Example: *Simple site by site comparisons will be installed in farmers' fields across the intervention area of the partner (figure 2). Plots are colour coded for ease of management. Ideally the sequence of plots is randomized for each site/farmer/household. (Ideally, the plots are integrated into the farmer's main field without any borders around the plots. Plots are only identified thru permanently installed pegs that carry the colour of their respective plots. However, actual field management may make it necessary to have visual and clear borders. In that case, the border area could be planted by a low non-competing crop/vegetable that does not receive fertilizer or specific treatments that could interfere with the validation plots).*

Figure 2: Experimental designs examples for the validation exercise

Treatments

Describe the **objective of each treatment** and how it relates to the performance metric.

- Describe the control treatment(s)
- Describe the treatment for the recommendation(s). If the recommendation has the objective to:
  - **Validate a generic agronomic solution that does not depend on a decision tree** (e.g, direct seeding of rice versus transplanting; or blanket fertilizer rates by specific zones).
    - The treatment is defined in the protocol.
  - **Validate a dynamic agronomic solution that follows a decision tree**:
    - The different possible recommended treatments that depend on input obtained by the farmer are integrated in a digital tool called the field operable DST. The extension agent and the farmer jointly use the tool to determine which recommendation to apply and apply it in the test plot. The recommendation applied by the farmer, as well as all required data, is captured in the tool and shared to the research team. Example ODK forms of field operable DSTs

Experimental protocol

Describe how the trials are practically implemented.

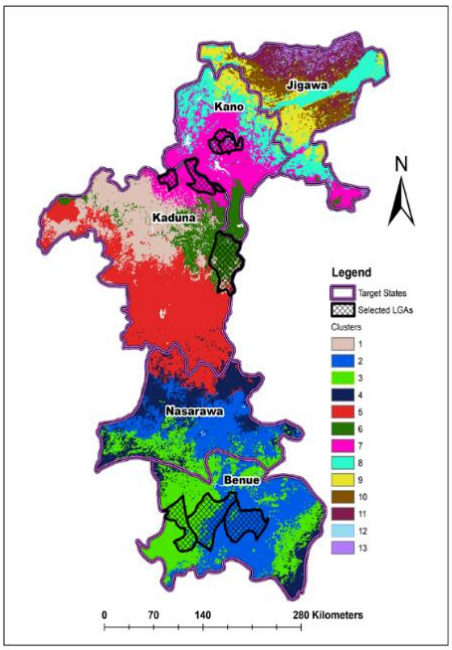
- Describe the **target domain** and the identified environmental clusters. Were clusters or areas excluded? Why? How many trials will be implemented in each cluster?
- Describe the **organization of trial** management. Who coordinates the administrative unit and how many extension agents does that person coordinate? How many farmers / trial sites does one extension agent serve and how are they arranged (e.g., clustered in an area with a radius of about 5 km).
- Detail which **aspects of plot management follow the farmer's practice** and which management details are defined by the experiment and treatment details.
- Provide a **guideline of plot and trial establishment** (see Guidelines for measuring agronomic gain KPIs in on-farm trials and Guidelines for correct crop yield determinations). Consider consulting the links in Annex 2 as well, but keep in mind that the validation exercise is a "rapid consumer test", not a research trial.
- Describe the **details of planting** as required by the experiment.
- Describe the **details of any input management**, e.g., fertilizer application.
- Describe the details of in season data collection.
- Describe the **details of the harvest procedure** and data collection.
- Provide an **overview of management activities / events** at the field site, including monitoring and data collection.
- Describe **how the treatments are implemented**. In the case of a decision support tool, it will be applied on site by the farmer with the extension agent. In the case of a generalized recommendation, the details of the treatments are predefined (see above).
- Describe obtaining of **informed consent**

Sampling frame

One farm represents one replicate in the validation exercise. Ideally, one extension agent oversees a **management cluster** of farmers (e.g., 10 farmers) who host one side by side comparison each. The test sites within these clusters should be close to each other (e.g., within a diameter of 5 km) to facilitate management through the extension agent at similar weather and, ideally, general environmental conditions.

One validation exercise comprises **several environmental clusters** that are spread across the target intervention area of the partner. To allow for approximate coverage of the environmental conditions across the target area, the management clusters are distributed across the environmental clusters. These **environmental clusters** are established in the **procedure on sampling frames**.

The sampling frames tool can also help with the forming and distribution of the management clusters *(feature to be developed).* Environmental clusters that appear irrelevant or very small in size may be excluded. If socioeconomic clustering is relevant, the environmental clustering can be followed by socio-economic clustering to reflect, for example, relevant farmer segments. The number of participating farmers per cluster needs to be proportional to the importance or size of the cluster in the target area. The number of environmental clusters, or the heterogeneity of the target area partially determines the total number of side-by-side comparisons. Other aspects are expected loss of sites (e.g., thru floods, cattle damage, mismanagement, etc…); 25 to 50 % of the initially implemented sites may turn out as not usable for evaluation and analysis.



Example: *The target number of sites is 90 with one site by site comparison each (1 participating famer/HH represents one replicate). The 90 trials are distributed across our partner's intervention area following an environmental clustering exercise (figure 3).*

FIGURE 3: MAP OF SAA UC TRIALS

IMPLEMENTING THE VALIDATION EXERCISE

General roles

PARTNERS

The validation trials are often managed on a day-to-day basis by either EiA researchers or partners or a mix of both. It is important to define who is doing which activities, and what the role of each is in the management of the trials, and the data collection process. For example, some partners may oversee obtaining the data from the plots and/or the farmers (can be termed trial supervisors), collating the data at village level, or checking the submitted data and collating at district/province level (can be termed trial coordinators). In terms of capacity building for the validation trials, the Research Partner (for example a national research institution) may need a different type of capacity building and may also cascade the information/training to Ground Partners (who may be the same as the Demand partner and may act as trial supervisors and/or coordinators).
In the agreement with partners, the roles will be associated with specific costs. The EiA Team can also agree with partners on specific incentive mechanisms that relate to the collection and submission of validation data. If farmers are managing the plots, it is important to define which Ground Partners are coordinating which farmers, providing technical support, and collecting the data. Thus, some of the roles to consider are: Implement the validation trial (farmer), collect data (enumerator, trial supervisor), provide training and technical support (trainer, Ground Partner, Research Partner), collate the data (data manager, Research Partner), implement spot checks on the validation trials (quality assurance, Research Partner).

FARMERS

The farmers who consent to participate are also bound to specific agreements on their roles for management of the validation trials. Farmers need clear guidelines on the technical management of the plots, as well as discussions on data collected from their farmer's practice plots. Farmers also need to know when data are being collected from their fields, or if there is any requirement for them to report the data. Agreements on resources or inputs provided, labor to be contributed by the farmer, as well as use of the harvested produce should be clear and if possible documented.

Selection criteria for trial supervisors, farmers, and field sites

TRIAL SUPERVISORS

The Research and Ground Partner identify coordinators for a suitable administrative unit. For example, the Ground Partner can identify one extension agent or trial supervisor for clusters of about 10 farmers. The total number of farmers and clusters depends on the environmental clustering exercise (see guidelines). The trial supervisor should live close to the targeted cluster of trials to facilitate logistics. Consider a balance of women and men extension agents as trial supervisors. These trial supervisors should be used to smartphones to facilitate data collection with ODK forms. These trial supervisors should be used to smartphones to facilitate data collection with ODK forms.

FARMERS

The participating farmers need to be selected considering several criteria. An important requirement is the farmer's consent to participate and provide data. It is also useful to balance the need for random geographic site selection and the identified farmer possessing a certain set of farming skills. The farmer needs to be a reliable counterpart who can implement the validation activities as specified in the protocol.

The number of participating farmers in an area needs to be proportional to the importance or size of the cluster in the target area. The EiA Add-On Farmer Segmentation assists in creating a typology that may be used to overlay the bio-physical environmental clusters to capture the effectiveness of an MVP across different farm types of interest.

Example: *The farmers were selected thru the demand partner by their state coordinators (Nigeria's first level administration unit) and EAs. Selection criteria from SAA NG UC:*

- *Selection of farmers was based on their interest, needs and willingness to cooperate in the EiA validation exercise*
- *Should be a full-time farmer resident in the community; (Benue should have 50% male and 50% female. While Kano and Kaduna should have 70% male and 30% female each).*
- *Women farmers: a roughly equal share of un-married (e.g., single or divorced or widowed) women from female-headed households (FHH) and married women from male-headed households (MHH). Where possible, a portion of unmarried men can also be included.*
- *Willingness to participate and commit him/herself to the EiA concepts*
- *Respected in the community – honest and trustworthy*
- *Should be an active member of a farmers' group*
- *Should have the ability to learn and be an innovator*
- *Should be able to communicate, explain the new technologies, and have the time to do so*
- *Committed to attend all training sessions (NB.: training sessions can be adapted to accommodate other duties of the farmer so that attendance is convenient for all genders)*
- *Committed to host field days*
- *Committed to host and give trainings (NB: training sessions ca be adapted to accommodate other duties of the farmer so that attendance is convenient for all genders)*

FIELD SITES

Depending on the MVP/DST, and the field of the farmer, the Research Partner or trial supervisor can decide with the farmer on selection of the plots for the validation exercise. This choice must consider the design of the experiment and enable comparison across plots.

Example:

- *Minimum field size to host the trial plots and allow for some border area.*
- *All plots for one crop must be a homogeneous 'management unit', the land has the same cropping history and inputs received in the past 3 seasons.*
- *The land is also uniform in the type of weeds or other vegetation and physical characteristics (soil texture, colour, drainage, compaction and elevation).*

- *There are no discontinuities: no termite mounts, no trees, no soil conservation structures or contour ridges or old bunds.*
- *The land/area for the plots is typically used by the farmer for the target crop.*
- *The field is sufficiently accessible to allow frequent visits*
  If trees are present around in the vicinity of the field, they must be at least 5-10m away from the trial area (depending on the type and size of trees).
- *The field has no or only a gentle slope.*
- *The field must not be close to a house, homestead, stable, etc…*
- *The field must be surrounded by other fields.*
- *The plots have not been used for fertilizer trials in the last 2 years.*
- *The plot must not be in a flood risk area.*
- *Rice plots must be in the lowland area (fadama).*

Creating a simplified protocol for trial supervisors and farmers

For good involvement of trial supervisors and participating farmers a "farmer friendly protocol" needs to be developed. This protocol covers the important trial lay out, and management aspects. It also includes the relevant agreements between farmer and Use Case, for example, who provides what type of input, who owns the produce, are samples collected, willingness to contribute to data collection and adherence to the protocol instructions. These agreements are also covered again in the informed consent form (link to an example). Below are examples from ACAI on validations for AKILIMO fertilizer recommendations.

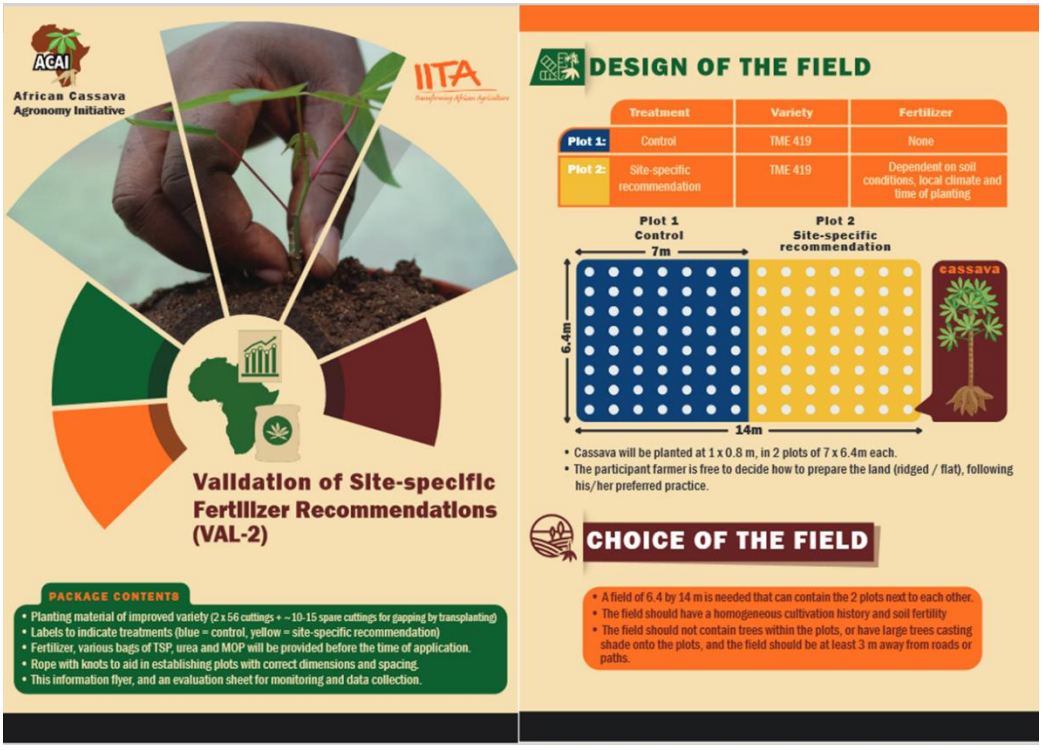


FIGURE 4: FARMER PROTOCOL AND AGREEMENT BETWEEN FARMER AND ACAI, PAGES 1 AND 2.

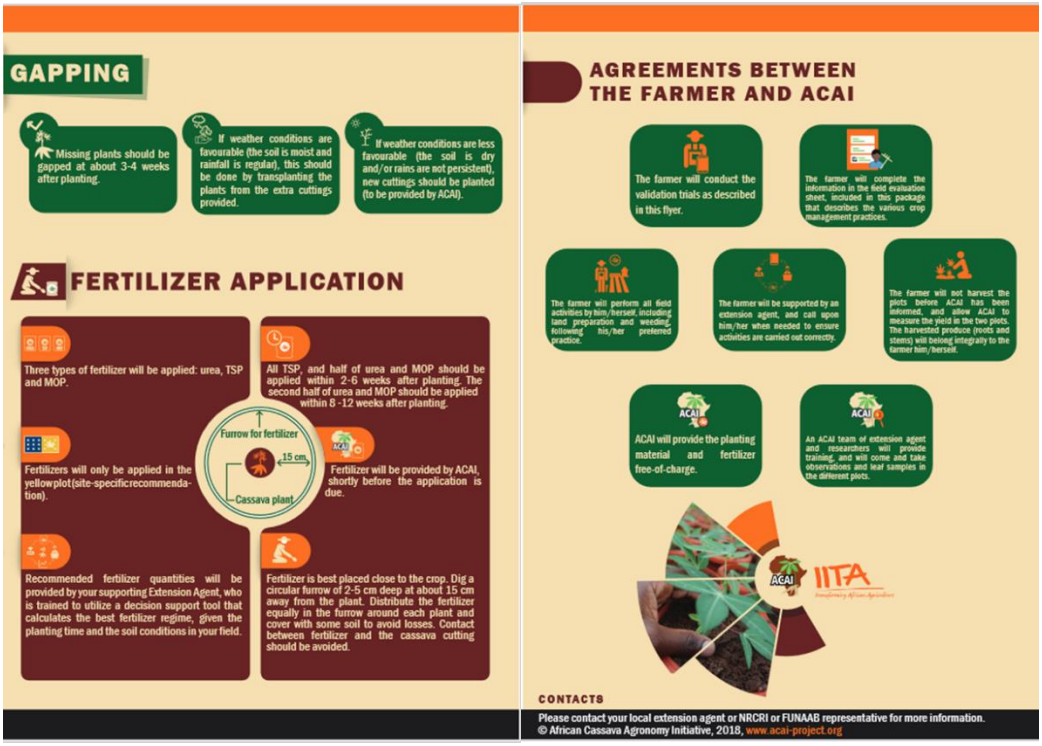


FIGURE 5: FARMER PROTOCOL AND AGREEMENT BETWEEN FARMER AND ACAI, PAGES 3 AND 4

Training

Before starting the validation experiments, a training plan will be defined. There are several modules for the training: 1) The trial design, technical components, and management of the trial plots; 2) The logistical coordination for the validation trials; 3) The data collection from the trials; and 4) Coordinating participatory learning (if this is included in the plans of the Use Case). Depending on the role of the partner, they will be included in training for the different modules relevant to them.

Step-down training may also be necessary where there are many Trial Supervisors and Research Partners. This means that the Use Case Team will train the Research Partners who will then cascade the messages to the partners who interact more closely with farmers. In this situation, it is important that the training materials are clear, and Research Partners are equipped when they must do the step-down training.

Distribution of inputs

To ensure uniformity and rigor in the implementation of the validation trials, it is important that Use Case researchers provide inputs and coordinate the distribution. First, this follows the agreements set together with farmers on what inputs will be provided. Secondly, a crucial part of this is ensuring the correct amount of inputs for the validation trial plots. It is also important to be able to check that the inputs provided are being put on the trial plots. Third, the timely distribution of the inputs is important for the validation trials. Thus, the discussion and planning for the distribution of inputs need to be started before the cropping season.

Reward system and certification

There will be Ground Partners that need to visit the farmers several times over the cropping season to collect data as well as monitor the validation trials. The Use Case team can consider a system for incentives and rewards based on what is possible in their area, and what can be motivating for the partners.

Examples for this could be covering the costs for internet/phone data based on the submission of validation trial data. IDs for the partners or some team-building gatherings can also be motivating to ensure they feel part of the team. Moreover, providing certificates for the partners can be a simple reward system for their engagement. Lastly, costs for their operation, including extension work being covered through the contracts with these partner organizations can ensure they are able to go to the field for the validation trials.

Example:

The validation exercise is managed jointly by the partners of the Use Case, Research Partners (e.g., CG centres and NARS partners) and the demand partner(s) or Ground Partners.

SAA UC: the Research Partners from AfricaRice, CDA-BUK and IITA developed the protocols, conducted the training of trial supervisors (extension agents (EAs)) and field monitoring visits supported by SAA. SAA selected responsible EAs from their network for relevant trial sites and supported the EAs thru state coordinators. The trials at farmers' fields were managed by the respective farmer according to her or his management practice. Only trial relevant aspects were implemented according to protocol and supervised by the EA.

TABLE 1. LIST OF TASK RESPONSIBILITIES (TO BE ADJUSTED AS APPLICABLE FOR THE USE CASE) AND ASSOCIATED PARTNER WHO IS RESPONSIBLE FOR THE IMPLEMENTATION.

Activity/Task	Partner	Person(s)	Links
Identify target domain	Demand + Research		
Determine environmental clusters	Research		Sampling frames tool. Sampling frames doc.
Identify trial coordinators	Demand		
Identify extension agents or enumerators	Demand		
Identify farmers	Demand	Assign specific persons to make sure the job is taken care of	
Develop research protocol	Research		
Develop farmer protocol	Research		
Obtain ethical clearance (IRB procedures)	EiA Research		
Develop version zero of the MVP/DST to be used in the validation exercise	Research		
Adapt the data collection tool	Research		Data collection DataScribe
Manage barcodes	Research		Barcodes
Describe your validation exercise for the VSG	EiA Research		Describe validation
Develop a training of trainers for the implementation of the trials	Research + Demand		
Conduct step down trainings	Demand + Research		Register EN Training attendance
Obtain informed consent from EA[1)]	Research		Informed consent EA
Obtain informed consent from farmers	Demand (EA)		Informed consent HH
Archive informed consent forms	EiA Research		
Provide required inputs for trial implementation	Research		
Organize logistics for inputs to reach the farmers in correct units and quantities	Research + Demand		
Apply the recommendation in the field (MVP/DST in field applicable form = V0)	Demand (EA)		
Implement the trials	Demand (EA + farmer)		Register HH
General plot management	Farmer		
Data collection	Demand (EA)		
Monitor trial on regular basis	Demand (coordinator)		
Specific monitoring visits for quality control	Research		Monitoring ODK
Monitoring of data uploads (dashboard)	Demand (coordinator)		Dashboard
Check data uploads for their validity	Research		
Data cleaning	Research		
Data analysis	Research		
FAIRscribing of data	Research		FAIRscribe
Upload data to data pool	EiA Research		Data pool
Reporting of validation results	EiA Research		Report validation

* *EA = extension agent or enumerator*

Data collection

To maximize data quality and reduce data management time, data is collected using mobile devices. The ODK Collect app is used to collect data. ONA platform is used to gather collected data. Trial supervisors and farmers receive barcode cards.

DATA COLLECTION FORM

Generalized standard data collection forms are available here in Excel format or here in DataScribe.
The forms are organized by data collection events combined with field management activities like fertilizer application or harvest. The same form is used repeatedly until the crop is harvested.
Data is collected by assigned trial supervisors from each of the participating farmers. A schedule for the data collection is planned. The farmer meets with the trial supervisors at the trial site for each data collection event.
The trial is uniquely identified a) thru its GPS coordinates that are recorded at each event and b) the participating farmer has a unique barcode that needs to be presented at each data collection event. This ensures that data collected across different forms are linked to the same farmer for each unique barcode.
For each data collection operation, the trial supervisors scan their Enumerator ID, the Household ID of the farmer and select the event for which they visit the field. Then, only the questions related to the event will be prompt (i.e: only harvest related questions will be prompt when visiting during harvest).

> **A note on ODK Collect**
> https://play.google.com/store/apps/details?id=org.odk.collect.android&gl=US
>
> ODK Collect is a free and open-source Android app that helps replace paper forms used in survey-based data gathering. It supports a wide range of question-and-answer types and is designed to work well without network connectivity. ODK Collect supports location, audio, images, video, barcodes, signatures, multiple-choice, free text, and numeric answers. All trial supervisors need to download ODK Collect via the Play Store app of their Android mobile or tablet.
> The next step is to connect ODK Collect app to their ONA account using their ONA username and password. The steps are explained here. After each data collection and when Internet signal is available trial supervisors submit data collected to ONA.

WORKING WITH BARCODES

To simplify data collection and errors tracking, EiA works with barcode cards.

Assigning a barcode to trial supervisors

Each enumerator or trial supervisor is assigned a barcode during the training and receives a barcode card. A short survey allows to collect basic data about enumerators to facilitate professional interaction and feed secondary data analysis (age, gender, education) – an ODK form Register Enumerator is used.

Informed consent of the enumerators is obtained during the training via the short survey. Every time enumerators collect data; they will be asked to scan or type their barcode in the ODK Collect app.

Assigning a barcode to farmers

The participating farmers are also registered and receive unique barcodes. Before setting the trial in the fields, a visit to each household will be made. A short survey called (Register Household) allows to gather information about the farmer in charge of the trial and assign him/her a barcode. The survey includes collecting informed consent from the participating farmer. During following visits, scanning the household barcode is enough to link data to the correct farmer. This saves time during data collection.

Printing barcodes

Valid barcodes are composed of:

- Use Case ID: can be found here, in the tab ''Affiliation'', column D.
- Barcode type abbreviation: EN (enumerator), HH (household), SS (soil sample).
- Country Code ISO alpha 2 (2 letter code accessible here): ie. NG for Nigeria, KE for Kenya, PE for Peru.
- 6 numbers between: 000000 and 999999

examples: SGENNG123456, SGHHNG123456

The barcode will follow the structure above, with no modification, as all activities related to EiA use this same structure to facilitate data storage, retrieval and sharing.
A barcode card template for enumerators and farmers is available here. You may use it to create the cards. Print the cards on a material strong enough to last during the entire validation exercise.

Data storage

Collected data are gathered on the ONA platform, which is a data management system. A direct link between ODK Collect app and ONA is made by configuring ODK settings.

> **A note on ONA**
>
> ONA (https://ona.io/login) is a platform to save ODK forms, share it with trial supervisors and gather data collected. EiA has a professional account in ONA allowing data collection without limitation. We support ONA and highly recommended to collect all EiA related data via ONA.
>
> Uses case members involved in data collection, monitoring or analysis need to create an account in ONA. Then, share ONA usernames with Celine Aubert (c.aubert@cgiar.org) to get access to a folder dedicated to your Use Case in ONA.
>
> The Use Case leader (or the person managing data for the Use Case) will have admin rights to a folder in ONA for this validation exercise. Admin rights allow the user to manage access rights to the

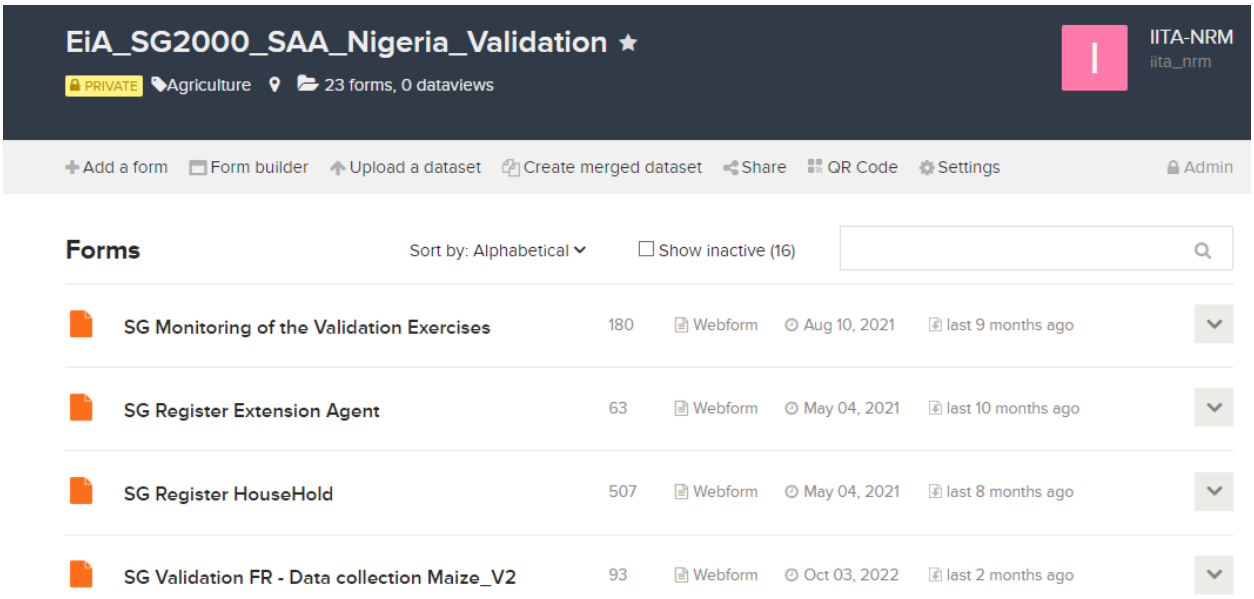


FIGURE 6: EXAMPLE OF A VALIDATION EXERCISE FOLDER/PROJECT OF THE SAA NG UC

Manage access to data in ONA:

- Every team member has their own account and ID on ONA
- Keep the team with access to ONA small.
- Give enumerators the role of "can submit" and block access to any data.
- Keep the number of people with editing and downloading rights to a minimum and ensure they adhere to IRB standards.
- One Use Case member needs to have admin rights. Other default project members with admin rights are defined by Transform to manage the overall EiA ONA project.

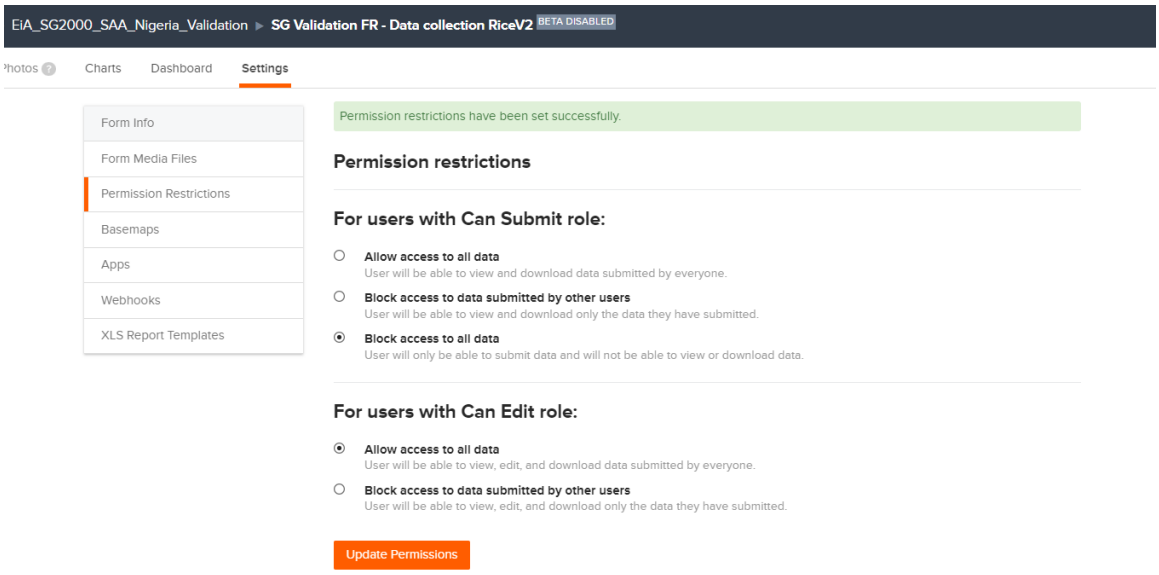


FIGURE 7: PERMISSION MANAGEMENT PAGE IN ONA

Data collection timeline

Develop a timeline for all activities for planning of logistics and monitoring of progress. For the monitoring of progress of field activities or events and data collection the **monitoring dashboard** can assist (see below). However, delineation of time of expected start and end time of activities are important input parameters. Timeline that depends for example of the data of planting can be calculated by the dashboard if the information of min and max time span after the date of planting/seeding is provided (e.g., first fertilizer application at 10 to 14 days after planting/seeding).

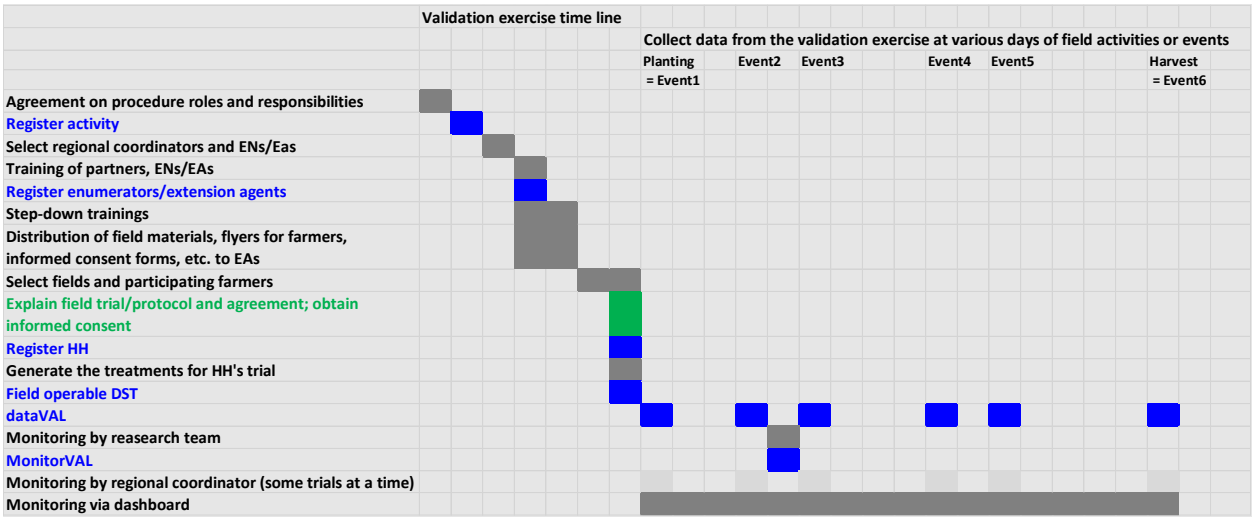


FIGURE 8: EXAMPLE OF A VALIDATION EXERCISE TIMELINE

Monitoring of the trial sites

Use Case teams need to plan that all validation exercises are implemented correctly. Thus, timely monitoring of the trials on site is also needed. This can be done by the Research Partner or researchers from the Use Case.

Physical monitoring by the research team: At least once, early in the growing season, (all) sites are visited by a team from research (and ideally the demand partner). The trial plots are assessed for correct lay-out, treatment implementation and presence of disturbing factors inside or close by the plots and/or yield reducing factors like pests and diseases.

Physical monitoring by the demand partner: the coordinator visits the trials and supports the extension agents on a needy basis, but all fields should be visited on a regular basis.

Monitoring dashboard

Aligned with the data collection schedule, ensuring that data is collected and uploaded is also needed. The Research Partners need to do this in a timely and correct way. Remote monitoring via the monitoring dashboard: The coordinator and the research team from the side of the partners will monitor the regular upload of data thru the monitoring dashboard and act when data is not submitted, or irregularities appear. The monitoring dashboard is available in EiA. Access will be given upon request for the specific Use Case team members to protect sensitive data of participating farmers.

REPORTING THE VALIDATION RESULTS

The results of the validation need to be reported and shared within EiA. We have developed a template for the reporting of validation results (https://enketo.ona.io/x/M5WuXF4o).

This form is available thru MyEiA (under your Use Case step 5b) and is used to facilitate the stage gate between technical validations and the piloting stage. For the reporting, basic information about the Use Case and the type of trials will be collected. The person reporting will be asked to describe the design of the validation trial. This includes questions on the number of validation sets for each location, number and description of test treatments as well as control or reference treatments. It also includes the KPIs that have been set for the validation trials. Therefore**, the results of the validation exercise will be reported and evaluated against the performance metric of each KPI as defined at the start of the validation exercise**.

The assessment for the reporting uses the analysis for the whole validation experiment (not per site). The **performance metric evaluations for the reporting are based on cumulative distribution curves for yield and profit** (for example, the partial factor analysis uses (yield x price of produce) – (amount of fertilizer x cost of fertilizer) to assess profit. On the performance metric, four categories for selection will be provided:

- At least 75% of the observations are significantly positive.
- At least 90% of the observations are positive.
- Alignment with an optimum range (no comparison).
- Other.

Thus, the Use Cases need to prepare to present the analysis accordingly. The last category is open for the analysis or presentation preferred by the Use Case. For all the analysis, there is a possibility to upload a word document to show the results and other details. There is also space for the Use Cases to describe their own evaluation of the validation results. These can be used to explain for example if the underperformance of the technology is critical, etc. Lastly, the Use Cases can report their decision whether they consider it successful and are moving to pilots, partially successful and will pilot only some components, or not successful.

After the form has been submitted, TRANSFORM will contact the Use Case for an evaluation webinar.

Annex 1: List of ODK forms

Actions to take before the validation exercise starts

- Check whether the Use Case team is all set for the validation exercise:
  - Describe your validation exercise.
  - Enable targeted interaction with the VSG and TR for support needs.
  - Information collection to enhance the validation guidelines and support opportunities.
  - Go-ahead to start validations.
- Register the activity:
  - Register Activity (used by the UC facilitator to register the validation exercise on ONA).
  - A folder in ONA will be assigned for the validation exercise.

Actions during the validation exercise

- Register the enumerator or extension agent (EiA_Register_Extension). Used by the research team at the training event or by the state coordinator.
- Register the household/the farmer in charge of the trial plots (EiA_Regster_HH). Used by the enumerator or extension agent at the trial site or the homestead.
- Generating the recommendation with the field operable DST (Exemples) Used by the enumerator or extension agent at the trial site together with the farmer to collect field data.
- Collecting data during the trial duration EiA_Validation_survey_template. Used by the EA at the trial site together with the farmer.
- Monitoring the validation trials (Example: monitorVAL) by the research team at the trial site; see monitoring sections above).

Actions after the validation exercise

- Report your validation exercise.

Link to all forms and documents for validation

Annex 2: Link to support documents

- Field boundary delineation and cropped area measurement: https://cgspace.cgiar.org/handle/10568/134606
- Soil sampling (disturbed and undisturbed), handling and storage for soil chemical, biological and physical properties: https://cgspace.cgiar.org/handle/10568/134603
- Irrigation water measurement: https://cgspace.cgiar.org/handle/10568/134602
- Measurement of barley grain yield and aboveground biomass at maturity for crop cut at plot level: https://cgspace.cgiar.org/handle/10568/134600
- Determination of cassava root yield and aboveground biomass by crop cut at plot level: https://cgspace.cgiar.org/handle/10568/134604
- Measurement of cowpea grain yield and aboveground biomass at maturity by crop cut at plot level: https://cgspace.cgiar.org/handle/10568/134605
- Measurement of maize grain yield and aboveground biomass at maturity by crop cut at plot level: https://cgspace.cgiar.org/handle/10568/134599
- Measurement of potato tuber yield at maturity by crop cut at plot level:https://cgspace.cgiar.org/handle/10568/134598
- Measurement of rice grain yield and aboveground biomass at maturity by crop cut at plot level: https://cgspace.cgiar.org/handle/10568/134609
- Measurement of sorghum grain yield and aboveground biomass at maturity by crop cut at plot level: https://cgspace.cgiar.org/handle/10568/134611
- Measurement of soybean grain yield and aboveground biomass at maturity by crop cut at plot level: https://cgspace.cgiar.org/handle/10568/134666
- Measurement of teff grain yield and aboveground biomass at maturity for crop cut at plot level: https://cgspace.cgiar.org/handle/10568/134667
- Measurement of wheat grain yield and aboveground biomass at maturity for crop cut at plot level: https://cgspace.cgiar.org/handle/10568/134669

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