GenAI for Ag Advisory Ethics Toolkit

Mitigating risks and maximizing benefits of generative AI in agricultural advisory

CABI's GAIA project team

GAIA phase II: Overview

GAIA phase II is developing GenAI chatbots further to deliver sophisticated, accurate and timely agricultural advisory.

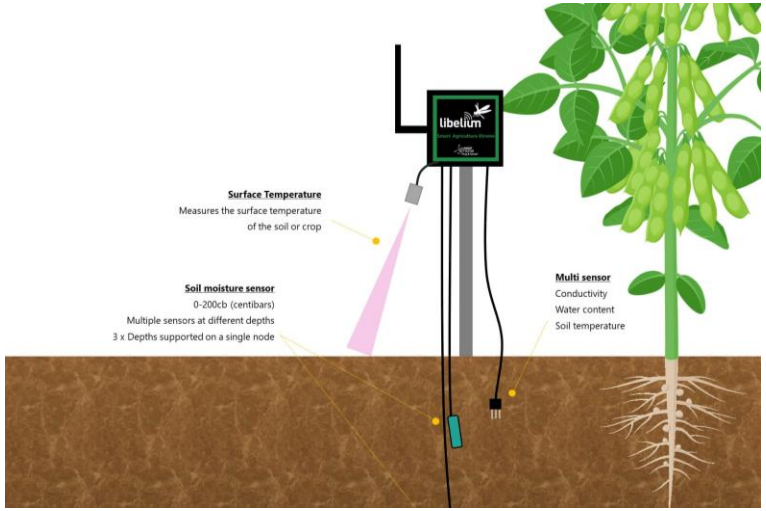
The focus is on:

a. Improving sharing and access to reliable, robust scientific data for AI training, finetuning and development
b. Examining the role of model content licences to improve such access to AI-ready content
c. Addressing ethical concerns in GenAI chatbots (e.g. gender and other biases, transparency, legal compliances)

GenAI for agricultural advisory use cases

Chatbots on common agricultural practices and queries (e.g. pest and inputs management)

Weather predictive AI systems (e.g. advising on issues such as cropping patterns)



Crop and soil monitoring AI systems (e.g. soil health related advisories)

Image © Manx Technology Group

GAIA Ethics Toolkit: Background

- Use of AI systems, including generative AI, can pose several risks and ethical challenges
- Existing frameworks are either generic or not focused on specific aspects of risk mitigation
- Extant work on AI ethics has limited practical resources for the agricultural advisory use case

Classification of AI risks in agriculture

Data-driven risks

- Hallucinations and reliability
- Biased outputs
- Access to traditional knowledge
- Repetitive or redundant tech solutions

Non-data risks

- Environmental cost
- Farmer autonomy (top-down adoption)
- Labour impacts (e.g. employability of traditional advisory and extension officers)

GAIA Ethics Toolkit: Theory of Change

Problem statement: Farmers lack timely, context-specific insights. Developers face barriers (specifically around data access) to build reliable and explainable GenAI systems for agricultural advisory.

Inputs

- Fairly licenced content is made available to GenAI developers
- GAIA Ethics Toolkit allows developers to consider and address key ethical concerns in advance

Outputs

- A clearly structured checklist for the different stages of the AI lifecycle (covering design, development and deployment)
- A checklist that addresses risk mitigation, legal compliance and feedback mechanisms

Outcomes

- Developers are mindful of the risks and downsides and aim to address these adequately when designing and developing safe and reliable GenAI models
- Reliability improves trust and adoption of these systems in agricultural advisory

Impact

- Sustainable, equitable, and data-driven agricultural systems empowered by AI-driven advisory solutions
- Solutions that improve farmer livelihoods, productivity and climate resilience

Assumptions:

- Developers adopt the GAIA Ethics Toolkit
- Farmers and institutions engage with AI advisories
- Data and digital infrastructure remain accessible

GAIA Ethics Toolkit: Objectives

- The Ethics Toolkit aims to create prompts (questions) for developers of GenAI systems for one or more use cases in agricultural advisory
- The prompts will cover the entire lifecycle of AI design, development and deployment
- The prompts will target **four priority areas:**
  i. Risk identification and mitigation
  ii. Community and stakeholder engagement
  iii. Legal and regulatory compliance
  iv. Feedback and complaints

Stages for the GAIA Ethics Toolkit

Design

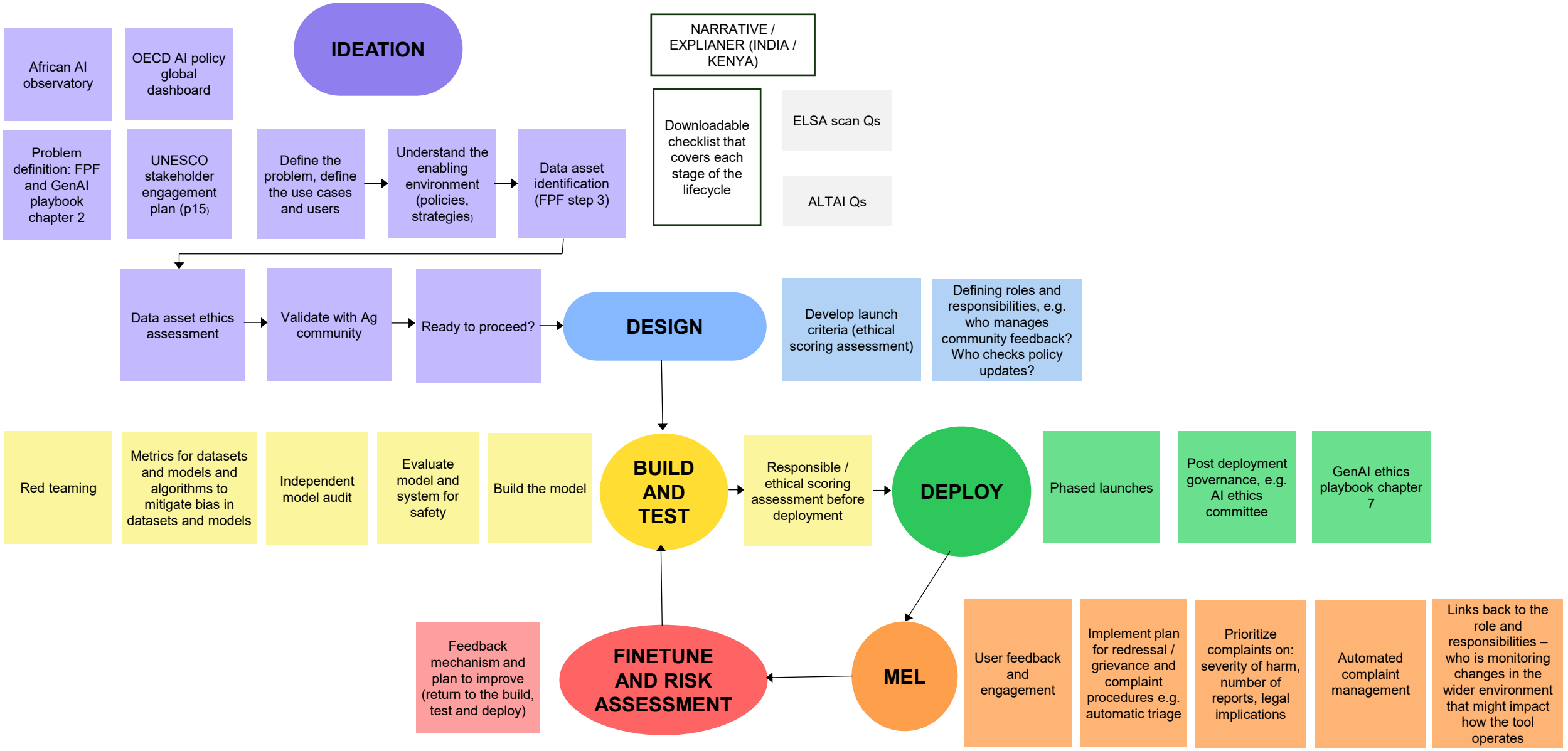
- Defining the use case (understanding context, problem identification and proposed GenAI intervention)
- Data collection or accessing existing data assets

Development

- Model training (building the GenAI model)
- Risk assessment and pre-deployment testing and finetuning (potentially use sandboxes, where possible)

Deployment

- Legal compliance
- Feedback loops
- Complaint mechanisms
- Iterative improvements to the GenAI model


IDEATION
African AI observatory
OECD AI policy global dashboard
Problem definition: FPF and GenAI playbook chapter 2
UNESCO stakeholder engagement plan (p15)
Define the problem, define the use cases and users
Understand the enabling environment (policies, strategies)
Data asset identification (FPF step 3)
NARRATIVE / EXPLIANER (INDIA / KENYA)
Downloadable checklist that covers each stage of the lifecycle
ELSA scan Qs
ALTAI Qs
Data asset ethics assessment
Validate with Ag community
Ready to proceed?
DESIGN
Develop launch criteria (ethical scoring assessment)
Defining roles and responsibilities, e.g. who manages community feedback? Who checks policy updates?
Red teaming
Metrics for datasets and models and algorithms to mitigate bias in datasets and models
Independent model audit
Evaluate model and system for safety
Build the model
BUILD AND TEST
Responsible / ethical scoring assessment before deployment
DEPLOY
Phased launches
Post deployment governance, e.g. AI ethics committee
GenAI ethics playbook chapter 7
Feedback mechanism and plan to improve (return to the build, test and deploy)
FINETUNE AND RISK ASSESSMENT
MEL
User feedback and engagement
Implement plan for redressal / grievance and complaint procedures e.g. automatic triage
Prioritize complaints on: severity of harm, number of reports, legal implications
Automated complaint management
Links back to the role and responsibilities – who is monitoring changes in the wider environment that might impact how the tool operates

Checklists of the GAIA Ethics Toolkit

Questions serving as prompts for each stage, covering one or more of the four priority areas.

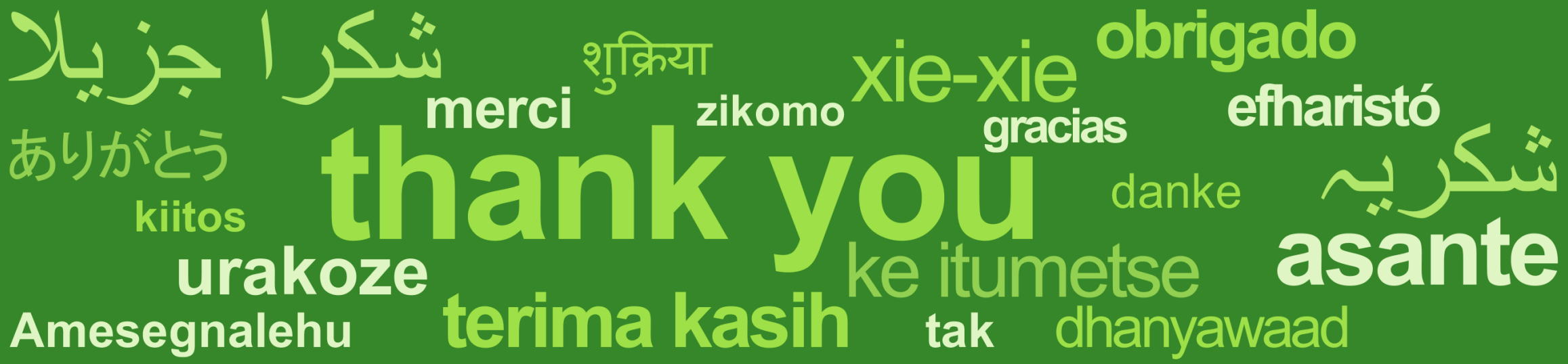
Example: Design phase regarding ideation:

- How has the problem been identified?
- Have local agricultural communities and stakeholders been engaged with to define the problem statement?
- Has a landscape review been undertaken to determine if existing interventions are insufficient? If yes, is this documented?

Phase	Question	Response (Y/N)	Reasoning
Design (Ideation)	How has the problem been identified?	TBA	TBA
Deployment (Legal compliance)	Are there any privacy laws that affect the GenAI system? Are there any legal standards or disclosures mandated under law?	TBA	TBA
Deployment (Feedback)	Is feedback collected digitally? Can feedback be submitted in other ways?	TBA	TBA

Outcomes of the GAIA Ethics Toolkit

- Create a baseline of understanding and addressing ethical concerns and risks of GenAI system (in agricultural advisory) for different developers
- Embedded AI safety by design into the development of GenAI models
- Improve participation of agricultural communities in the process which should aid:
  - Trust and confidence
  - Adoption and scaling



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More information on the GAIA project can be accessed here