

Harnessing AI to map complexity in sub-Saharan Africa: An AI-powered conversational agent for measuring multi-activity agricultural livelihoods



Amine AMAR

Al Akhawayn University, Ifrane, Morocco

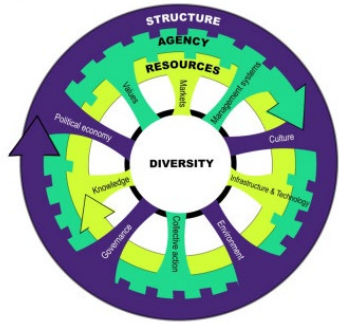
Overview

- ❑ **General context & the measurement gap.**
- ❑ **Objectives & rationale.**
- ❑ **Data & methodology.**
- ❑ **Expected results & key findings.**
- ❑ **Conclusion & policy implications.**
- ❑ **Work in progress.**

The Agricultural Measurement Gap

The limitations of traditional surveys in a complex reality

- **Household surveys:** A critical pillar of evidence-based policymaking (ex: Living Standards Measurement Study-LSMS).



- **The persistent challenge: a reality mismatch.**

- Multiple activities.
- Gender division of labour.
- Seasonal and short-term work.

- **Why traditional surveys struggle?**

- Rigid and linear.
- Focus on primary activity.
- Recall bias.
- Systematic underreporting.



Consequences

- **Poorly targeted interventions.**
- **Incomplete understanding.**
- **Flawed assessment.**



Opportunities

- **Hyper-targeted support.**
- **Proactive climate resilience.**
- **Empowerment Assessment.**



Objectives & rationale



Our core mission

To pioneer an AI-powered methodology for data collection, to capture the true **complexity, diversity,** and **gendered** nature of agricultural livelihoods in Sub-Saharan Africa.



Specific objectives

- To Design, develop, & validate the "Agri-Survey AI" prototype.
- To compare the data quality and completeness of the AI agent.
- To Assess the effectiveness of the AI agent.

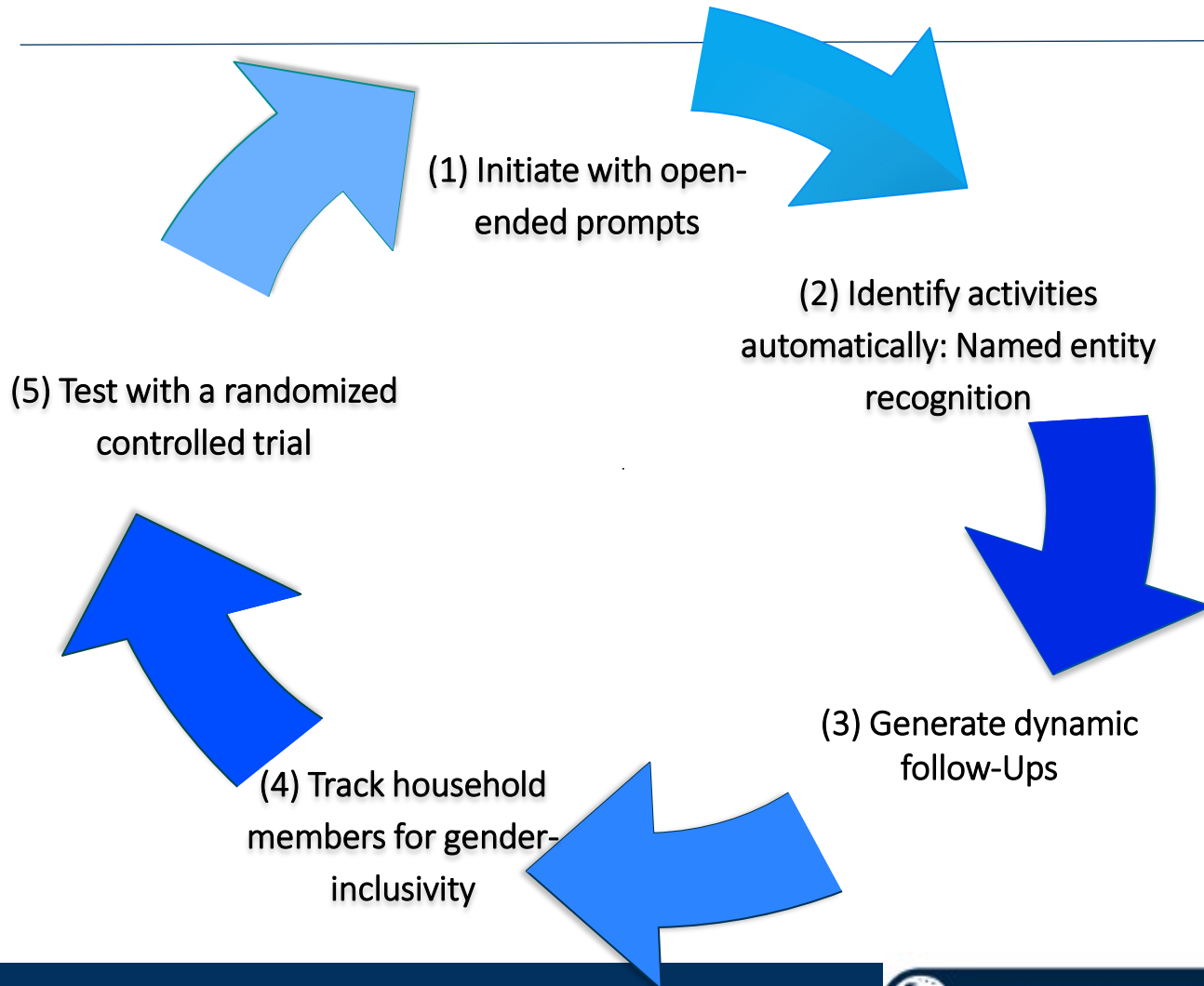


Guiding research questions

- Does the Agri-Survey AI agent lead to a significant increase in the reported number of agricultural and non-farm revenue streams per household?
- To what extent does the AI agent improve the accuracy of aggregate household income estimates?
- How effectively does the AI agent, through techniques?

Data & methodology

The Agri-Survey AI Agent (1/3)



➤ A shift from a static questionnaire to a dynamic, adaptive, and respondent-centric conversational agent:

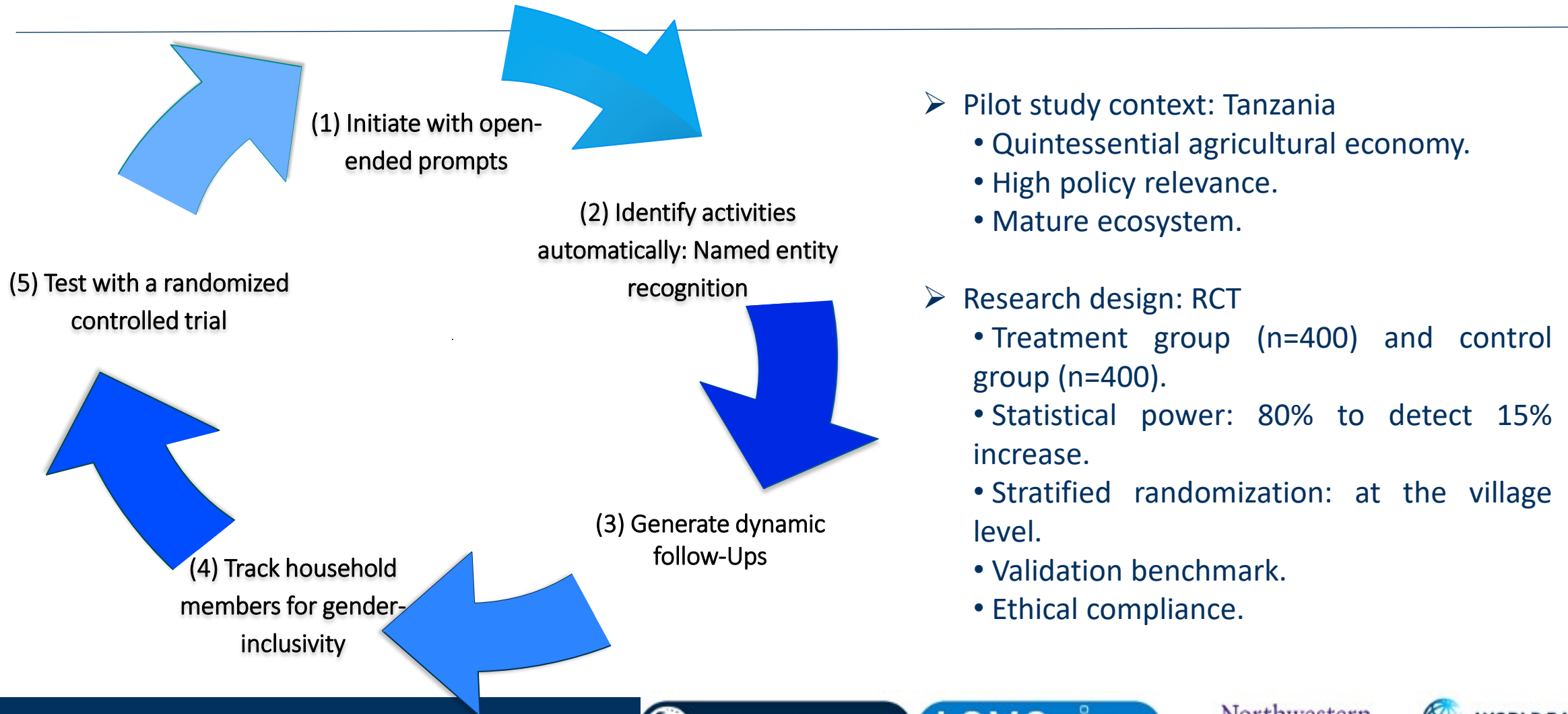
- Common agricultural livelihood patterns.
- A knowledge graph.
- A rule-based Natural Language Processing (NLP) engine.

➤ Key advantages over traditional surveys:

- Smart.
- Comprehensive.
- Inclusive by Design.
- Conversational memory jog.

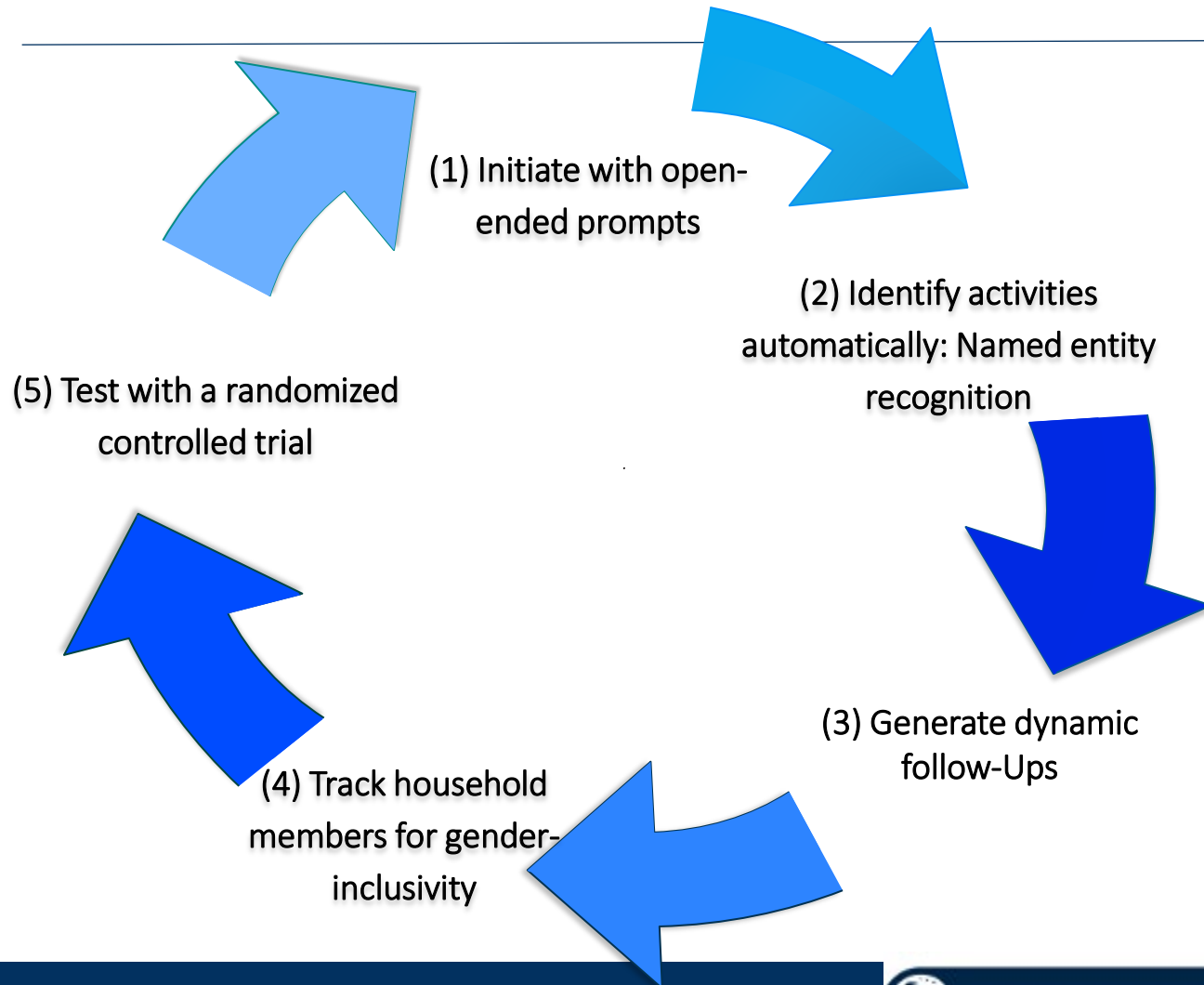
Data & methodology

The Agri-Survey AI Agent (2/3)



Data & methodology

The Agri-Survey AI Agent (3/3)



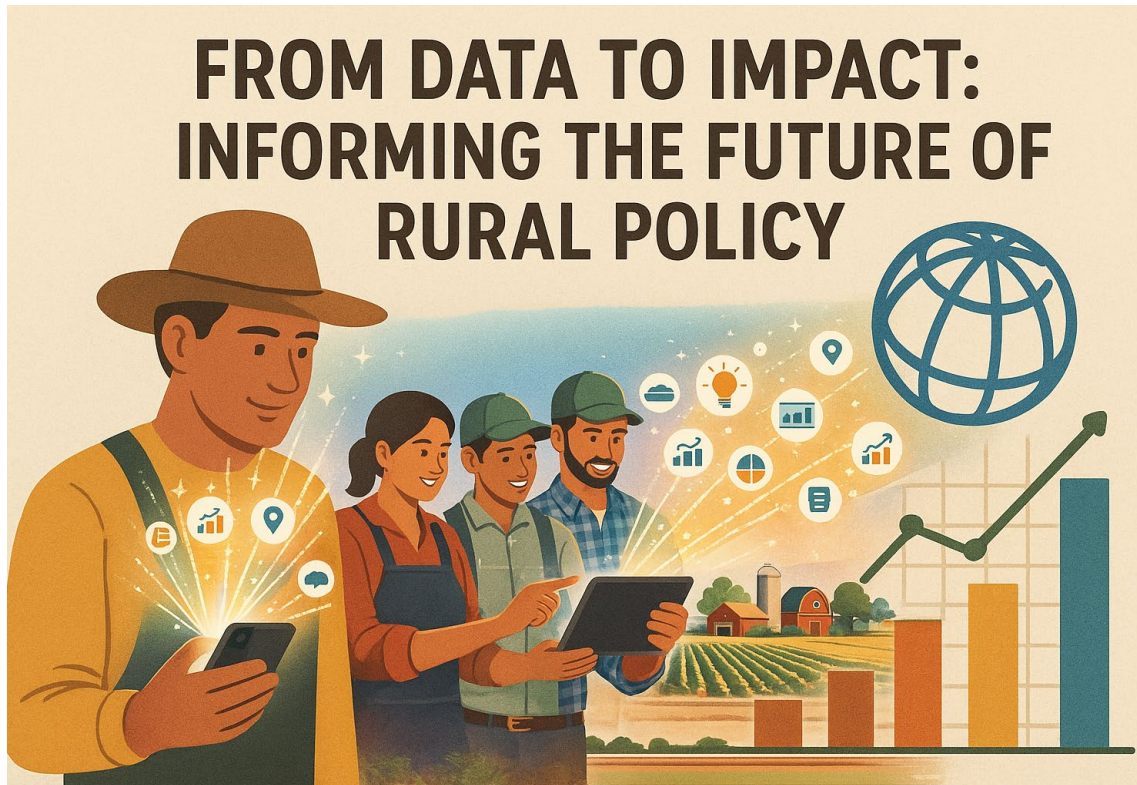
➤ Key evaluation metrics:

- Completeness.
- Accuracy.
- Gender inclusivity.
- User engagement.

Expected results & key finding

- We hypothesize that compared to the traditional survey, the Agri-Survey AI will yield:
 - 1) A more complete picture of livelihoods:
 - A 20-40% increase in the reported number of: Minor cash crops, small livestock holdings, non-farm enterprises.
 - 2) A more accurate view of women's contributions:
 - A significant rise in the reporting of women's labour inputs and management of specific assets.
 - 3) Enhanced data accuracy:
 - Aggregate household income estimates from the AI tool will show a stronger correlation with the 7-day diary validation data than the control group.

Conclusion & policy implications



➤ Making the invisible, visible.

- Build climate resilient food systems.
- Decentralize climate solutions.
- Empower the frontline of climate adaptation.
- Target resources with surgical precision.
- Tailor support to specific roles.
- Foster inclusive digital transformation.
- Enhance the targeting of public investments.

Work in progress



- ✓ Scale the methodology for real-world, large-scale application.
- ✓ Validate the framework across diverse socio-economic contexts.
- ✓ Integrate behavioural insights to refine extension program design.
- ✓ Identify the drivers behind heterogeneous effects.
- ✓ Co-design targeted policy instruments with key stakeholders.



THANK YOU FOR YOUR ATTENTION

QUESTIONS?