Outcome Report

Agroecological Transitions: Inclusive Digital Tools (ATDT)

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This Outcome Harvesting (OH) evaluation of the Agroecological Transitions: Inclusive Digital Tools (ATDT) project would not have been possible without the tremendous support of both internal and external stakeholders.

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This report is a testament to the collective efforts of all involved. To those who generously shared their stories, knowledge and insights or supported us in other ways, we extend our heartfelt gratitude. It is through their contributions that this study will be useful to its audiences, capturing not only outcomes but the spirit of co-creation and collaboration that defined the ATDT project.

Table of contents

How to use this report

This report is designed to document the outcomes of the ATDT project following the OH approach and share valuable insights with a variety of audiences. It offers lessons on digital tool development and inclusive practices, providing actionable guidance for stakeholders across different levels of involvement. Donors can use this report to identify funding priorities and strategies for scaling successful approaches. Project teams can draw practical lessons on inclusivity, co-creation of digital tools, and timeline management in digital tool projects.

The report is structured to guide readers through the project and its evaluation step by step. It begins with an introduction to ATDT, providing the necessary context and background about the project (section 1). Following this, the purpose of the evaluation (section 2), the OH approach and the methods used (section 3) are explained in detail, with additional technical information available in the annex The Theory of Change (ToC) chapter (section 4) offers a comprehensive exploration of the project's envisioned pathways to impact, emphasizing the actor-centered approach developed specifically within the evaluation project. This framework not only outlines the intended mechanisms of change but also guided the evaluation team in deriving analytical categories to assess progress and outcomes effectively. A chapter on overall signals and trends offers a comparative overview of the outcome data from the two country cases and the global level, primarily descriptive in nature and aimed at showcasing broader patterns (section 5). The discussion of the evaluation questions (EQs) forms the core of the report, where detailed findings are presented, and each outcome is described thoroughly (section 6). The final chapter translates these findings into recommended points for consideration, offering targeted recommendations tailored to different stakeholder groups (section 7).

To make this report as accessible as possible, we encourage readers to focus on the sections most relevant to their roles. Digital tool developers (DTDs) and other implementers may find the two unique case studies particularly insightful; these are detailed in sections five and six, with country-specific information marked by flags for easy navigation. Management-level readers and donors can skim through the main text, focusing on the conclusions highlighted in light blue and summaries of the evaluation findings presented at the beginning of each subsection in boxed paragraphs. All stakeholders are advised to pay close attention to the chapter on recommended points for consideration, where recommendations are addressed directly to relevant groups.

By following this structure and using the reading tips provided, readers can efficiently access the insights and lessons most relevant to their needs while gaining a comprehensive understanding of the ATDT project and its outcomes.

Abbreviations

1M5R	1 Must-Do, 5 Reductions
AAS	Agricultural advisory services
AE	Agroecology / agroecological
ARB	Agricultural Research Body
AR4D	Agricultural Research for Development
ASS	Agricultural Advisory Service (Extensionists)
ATDT	Agroecological Transitions: Digital Tools Project
AWD	Alternate Wetting and Drying technique
CIAT	Centro Internacional de Agricultura Tropical
CIFOR-ICRAF	The Center for International Forestry Research and World Agroforestry
DCP	Department of Crop Production
EMATER	State-level agriculture support agency in Brazil
FarMoRe	Farm-activity Monitoring and Reporting
GDPR	General Data Protection Regulation
GFRAS	Global Forum for Rural Advisory Services
GHG	Greenhouse gas
ICRAF	World Agroforestry Center
IFAD	International Fund for Agricultural Development
iNGO	international non-governmental organizations
IRRI	International Rice Research Institute
DCP	Department of Crop Production at MARD (Vietnam)
DTD	Digital Tool Developer
EQ	Evaluation question
MARD	Ministry of Agriculture and Rural Development (Vietnam)
MRV	Measurement, Reporting, and Verification
MVP	Minimum Viable Product
OH	Outcome Harvesting
PATH2DEA	Paving the Way towards Digitalisation Enabling Agroecology for European Farming Systems
PDPD	Decree No. 13/2023/ND-CP on Personal Data Protection (Vietnam)
SEMAS	Pará Department of Environment, Brazil
SENAR	National Rural Learning Service, Brazil
SRP	Sustainable Rice Platform
SSC	Study Steering Committee
ToC	Theory of Change
TPP	The Transformative Partnership Platform on Agroecology
PWA	Progressive Web App (PWA)
CRP	CGIAR Research Centers

Key messages

The Agroecological Transitions: Digital Tools (ATDT) project (2022–2024), led by the Alliance of Biodiversity International and CIAT, aimed to promote inclusive digital innovation to support farmers and technical advisors in adopting climate-resilient agroecological practices at scale. The project targeted sustainable rice production in Vietnam and sustainable beef production in Brazil, while providing global guidance and lessons learned for broader application.

This section presents ten key messages derived from the Outcome Harvesting evaluation of the ATDT project, offering a summary of its core findings, critical achievements, challenges, and lessons learned. These concise and accessible takeaways distill the essence of the study, highlighting the project's success in advancing inclusive digital innovation. This format serves as an alternative to the traditional executive summary, enhancing the practical value of the evaluation report for a diverse range of users.

Evaluation questions (EQs)

1. Enhanced farmer agency and inclusivity (EQ 1). The ATDT project successfully enhanced farmers' voice, agency, and data rights in digital tool development, particularly through its work in Brazil. Sustained engagement with farmers, including marginalized groups, led to the development of a tool, Solis, that reflected local needs and aspirations. Integrating social media features into Solis increased its relevance, but this approach required significant time and resources. In Vietnam, a focus on government alignment enabled scalability but limited farmer involvement and inclusivity: The tool FarMoRe addressed barriers like low digital literacy but was tailored more to government priorities than amplifying farmers' voices. These contrasting approaches of Brazil and Vietnam highlight the trade-offs between inclusivity and scalability in digital tool development.

2. Knowledge sharing and co-creation for climate-resilient practices (EQ 2). The ATDT project contributed to increased knowledge sharing and some degree of co-creation for farmer innovation in climate-resilient agroecological practices, with distinct variations between Vietnam and Brazil. In Vietnam, co-creation was limited due to alignment with government policies, though tools like FarMoRe fostered knowledge exchange between farmers and extensionists. In Brazil, the Solis tool facilitated co-creation through farmers who engaged in refining agroecological approaches and farmer-ambassadors who shared localized agroecological practices via videos. While the full impact of these efforts is yet to emerge, the training curricula developed in both countries hold promise for advancing agroecology through co-created practices in the future.

3. Adoption of digital tools for agroecological practices (out scaling, EQ 3a). Digital tools like FarMoRe and WaterIntel successfully contributed to farmers in Vietnam's Mekong Delta adopting sustainable agroecological practices such as AWD irrigation, reduced input use, and improved pest and straw management. These changes led to improved yields, lower greenhouse gas emissions, and environmental benefits, demonstrating the potential of inclusive digital tools to support sustainability even in regions with low digital literacy. In Brazil, the late launch of the Solis tool has shown initial promise, with early adoption by 182 farmers, but its long-term results

in terms of practice adoption will depend on various factors such as the viability of the tool's financial model, the success of media campaigns and support from public agencies.

4. Scaling through institutional and policy integration (up scaling, EQ 3b). In Vietnam, the tool FarMoRe gained government endorsement, paving the way for institutional integration and large-scale implementation. This underlines the potential of digital tools to drive large-scale, climate-resilient agricultural practices. Over 1,000 agricultural advisors were trained to use the tool for real-time data collection and decision-making, enhancing local capacity. In Brazil, while scaling efforts were in the early stages, partnerships with organizations and businesses showed promise for long-term expansion.

ATDT's contribution

5. Localized and targeted inclusivity as a strategy in tool development and advancing agroecological practices. Addressing stakeholder needs was a key concern in the project, with their priorities consistently integrated into tool development. In Brazil, the inclusive approach revealed unexpected preferences, such as the desire for a social media component, which the team acknowledged and incorporated into the tool design. The evaluation also highlighted the importance of tools that include localized content and are presented by local peers to effectively advance agroecological practices. In Vietnam's Mekong Delta and Brazil's Novo Repartimento, tailored training curricula and the involvement of local actors, such as ambassadors in Brazil, proved essential for ensuring relevance, fostering trust, and supporting co-creative, context-sensitive approaches. Further, tailored approaches addressing specific group needs, such as workshops for women and youth, were more effective than one-size-fits-all strategies. Solidaridad's adoption of this method has not only resulted in greater inclusivity but also set a precedent for replication in other contexts. These efforts emphasize the value of diversity-focused strategies in fostering meaningful engagement.

6. Building a strong theoretical foundation for inclusive digital tool development. The ATDT publication "*Principles for Inclusive Tool Development*" (*Dittmer et al.* 2022, 2024)[1] provided a robust theoretical foundation that guided the project's commitment to inclusivity and informed strategies across country-level initiatives. The global efforts created a conceptual framework and facilitated knowledge sharing, laying the groundwork for inclusive practices in Vietnam and Brazil. The lack of timely practical demonstrations at the time of writing may have limited the ability to fully engage a broader range of stakeholders on the global level, though these demonstrations are expected to follow soon.

[1] Dittmer, K.M., Burns, S., Shelton, S., Wollenberg, E. 2024. Principles for socially inclusive digital tools for smallholder farmers: A guide [Version 2]. Agroecological TRANSITIONS: Inclusive Digital Tools to Enable Climate-informed Agroecological Transitions (ATDT). Cali, Colombia: Alliance of Bioversity & CIAT. Online: https://cgspace.cgiar.org/server/api/core/bitstreams/49d17f1e-eb5a-4f27-823f-25e20e916e43/content

Recommendations

7. Bridge theory and practice for stakeholder engagement. To ensure the sustainability and impact of ATDT's innovations, partners IRRI and Solidaridad should prioritize bridging theory and practice in their future outreach and development efforts. They are encouraged to expand the reach of ATDT tools by engaging ARB and AAS stakeholders through proof-of-concept demonstrations, fostering co-creation alongside scaling initiatives, and leveraging early successes to build broader buy-in from institutional, grassroots, and governmental actors. Publishing practical, real-world examples now could greatly enhance the relevance and appeal of the inclusive principles, as this is where the real impact and learning occur for many stakeholders.

8. Embed flexibility and collaboration in digital tool development. The ATDT project demonstrated the importance of farmer-centered design, inclusiveness, and multidisciplinary teams in developing impactful digital tools. Tool developers who take inspiration from the ATDT experience should embrace flexibility in the design processes, adapting to user needs, while balancing inclusiveness with practical feasibility. Additionally, project managers should invest in building teams that integrate both digital and field expertise from the start, fostering close collaboration to create tools that are both relevant and scalable.

9. Balance trade-offs in inclusive tool development and scalability. Donors and funding partners should recognize the inherent trade-offs in inclusive tool development, balancing inclusivity, scalability, and resource allocation while accommodating regional challenges such as low digital literacy and infrastructure limitations. To maximize impact, donors should support the refinement and scaling of existing tools like FarMoRe, prioritize capacity-building initiatives for local stakeholders, and fund research to adapt tools to diverse contexts so that they are highly locally relevant but still scalable across regions.

10. Leverage regional demand for expansion. Regional demand for tools like FarMoRe provides opportunities for broader adoption across Southeast Asia. By aligning these tools with climate resilience and sustainable agriculture goals, they can expand their impact. Capacity-building initiatives and continued refinement of these tools will be crucial to adapting them for diverse agricultural systems in the region.

1. About ATDT: Inclusive digital tools for agroecological transition

The “Inclusive Digital Tools to Enable Climate-informed Agroecological Transitions (Project 2)” - or Agroecological Transitions: Digital Tools (ATDT) - was one of three projects of a broader program of the Alliance Biodiversity International and CIAT, the “Agroecological Transitions for Building Resilient and Inclusive Agricultural and Food Systems Program (TRANSITIONS)”[2]. Running from January 2021 to December 2024, ATDT aimed to promote inclusive digital innovation for farmers and technical advisories, as well as performance assessment, to enable climate-informed agroecological (AE) practices at scale, particularly in low- and middle-income countries.

The project implemented its approach in two sites and supply chains: sustainable rice production in the Mekong River Delta, Vietnam, and sustainable beef production in Pará State, Brazil. Two tools are in the main focus of this report: the Farm-activity Monitoring and Reporting tool (FarMoRe)[3] in Vietnam, and Solis[4] in Brazil. At the global level, the ATDT project played a role in providing guidance, support, and a platform for knowledge exchange, ultimately integrating the lessons learned from the practical experiences in Vietnam and Brazil to inform the broader understanding of inclusive digital tool development and co-creation of AE practices.

Figure 1: From 2024 ATDT presentation to INTPA-EU

[2] https://alliancebioversityciat.org/projects/inclusive-digital-tools-atdt ; https://agledx.ccafs.cgiar.org/about/atdt/

[3] https://ghgmitigation.irri.org/resources/mrv-toolbox/farmore

[4] https://solidaridadlatam.org/brasil/solis/

The ATDT project aimed to achieve its overarching goal – to facilitate climate change and AE transitions through the adoption of inclusive digital tools – by focusing on three key areas of action:

Objective 1: Improve the inclusiveness, local relevance and governance of digital tools to enable farmers' voice, agency and data rights in tool application and in the co-creation of climate-informed AE practices.

The ATDT project sought to empower farmers, ensuring that their voice, agency, and data rights are respected in the design and application of tools. These are in sum important preconditions that enable the co-creation of climate-informed AE practices (Objective 2).

Objective 2: Support inclusive knowledge development in digital tools for farmer innovation for climate-resilient informed AE practices.

The project fostered the use of inclusive digital tools (Objective 1) in order to facilitate collaborative knowledge sharing and innovation among farmers, as well as among farmers and other stakeholders, particularly extensionists, to co-create innovative climate-resilient AE practices.

Objective 3: Evaluate the benefits that farmers derive from improved digital access and tools and their potential to generate large-scale impacts.

The project also aimed to measure the tangible benefits farmers may derive from the inclusive digital tools and assessed their potential to generate large-scale impacts in AE transitions through scaling.

2. Evaluation purpose, objectives, questions, and scope

The ATDT outcome study followed a participatory approach. Early in the process, the two lead consultants formed a study steering committee (SSC) with representatives of the global team and country teams (annex 2). This committee jointly took decisions on the study design as described in this chapter.

Evaluation purpose and objectives

The SSC agreed on an overall purpose of the outcome study:

I. Serve for accountability to donors providing evidence for results on the outcome level. Yet, it had to be considered that the project started in January 2022, only 2.5 yrs before the evaluation began in June 2024, therefore it was expected that emerging outcomes would be at a more immediate, output-near level.
II. Serve for learning purposes for ATDT leadership. Since the project was not completed when the outcome study was conducted, the report was to highlight the likely progress and prospective impacts by December 2024, as a foundation for drawing lessons and decision-making for future work by partners on the tools.
III. Rather than being a strictly external evaluation, serve also as an engagement and reflection role beyond the technical level, engaging key stakeholders in the partner regions through a participatory approach. The study made an effort to invite their views on the results and shared findings in a transparent way to increase ownership and empower partners to take up lessons learnt and ambitiously continue efforts around inclusive digital tools for AE transitions.

Further, three specific objectives were set:

1. Document emerging outcomes the project has contributed to through an OH approach. The outcomes were compiled in a comprehensive OH Database included in Annex B of the report which was not publicly published but will serve as an internal resource for future reference.
2. In a forward looking way, infer the likely project progress by December 2024 and prospective impacts based on the expected impact pathways.[5]
3. Facilitate a participatory approach: Promote an inclusive, transparent process and dialogue on the observed results to build awareness and ownership of the emerging and potential future outcomes of inclusive digital tools for AE transitions.

[5] The scope of objective 2 was later adjusted to focus solely on observed outcomes as of mid-November, as detailed in section 3 on page 15, due to a decision by the SSC to extend data collection into November and the resulting limited timeframe for analyzing prospective outcomes before the project's conclusion.

Evaluation questions

The evaluation questions (EQs) addressed in this report were designed together with the SSC to assess the outcomes associated with the ATDT project's three core objectives, aligning each question with a distinct dimension of the objectives.

> EQ 1 - Inclusive tools: In how far do we find evidence at the outcome level for enhanced farmers' voice, agency and data rights in digital tools and digital tool development?

This question directly addressed whether the study could find evidence of farmers' empowerment and inclusion (voice, agency, and data rights) with respect to inclusive digital tool design, adaptation or piloting of co-created digital tools – in line with ATDT's Objective 1.

> EQ 2 - Co-creation of AE practices: To what extent do we find evidence at the outcome level for increased knowledge sharing / co-creation using inclusive digital tools for farmer innovation for climate-resilient informed AE practices?

The second question translated the focus of ATDT Objective 2 on co-creative knowledge development through the use of such inclusive tools into searching for evidence of such activities at the outcome level. Outcomes would comprise practical results such as sharing of knowledge and content, and co-creating innovative AE practices through the application of inclusive digital tools.

> EQ 3a - Scaling out: Is there evidence that AE practices generated through improved digital access and tools were adopted by farmers, have the potential to be scaled out (peer-to peer)?

> EQ 3b - Scaling up: Is there evidence that AE practices generated through improved digital access and tools were scaled up (technology into policy, institutionalization) with the potential to generate large-scale impacts?

Objective 3 addressed ATDT's more downstream, impact level results anticipated from the project. It focused on the tangible impacts of the ATDT project in terms of regular use of the digital tools by end-users and scalability, including horizontal scaling among peers as well as the vertical scaling into policy and institutionalization of the inclusive approach.

The actor-centered ToC developed during the design phase of the outcome study (section 4), suggested two distinct pathways for AE practices to achieve large-scale impact. Hence, both were addressed through respective questions. EQ 3a addressed the *scaling out* of AE practices, i.e., peer-to-peer sharing and individual adoption, and EQ 3b concerned the *scaling up.* i.e., institutional and policy integration of inclusive approaches. The two EQs represented different mechanisms for expanding the reach and influence of AE practices developed through the project's digital tools, involving different stakeholders and processes. The first would be farmer-driven, emphasizing peer networks, social learning, and community-level adoption. The second would involve policymakers, institutions such as DTDs or agricultural research bodies (ARBs), and other stakeholders interested in formalizing inclusive digital approaches and innovative AE practices through regulations, funding mechanisms, or public programs.

Scope

Study period: The OH study covered outcomes that emerged since the initiation of the ATDT project in January 2022 up until the middle of November 2024. This timeframe allowed for the examination of short to medium-term outcomes that developed due to project activities, providing more than a 2,5-year span to capture changes influenced by ATDT's interventions and engagements across targeted regions and stakeholders.

Linkage to ATDT contribution: Outcomes collected during the study had to have a clear and plausible connection to the activities conducted under the ATDT project, either directly or indirectly. This involved demonstrating how the project's activities have contributed to or influenced each outcome, ensuring a traceable line of influence back to ATDT's core interventions, strategies, or partnerships in these countries.

Thematic and geographic scope: The study focused on outcomes relevant to two key model systems: the rice production systems in the Mekong Delta, Vietnam, and livestock landscapes in the Brazilian states of Pará (and Mato Grosso[6]). Outcomes at multiple levels were included, encompassing local changes (e.g., village or community shifts), state-level impacts (e.g., policy adjustments in individual states), and national-level influences (e.g., sector-wide changes in agricultural practices). Opportunistically, outcomes were also to be harvested on broader regional levels, such as Southeast Asia and Latin America, as well as globally, e.g., among international non-governmental organizations (INGOs) or networks like the Transformative Partnership Platform on Agroecology (TPP, a sibling project of ATDT).

Sources and sampling: The sampling for outcome sources was inductive and opportunistic, following a snowball approach where outcomes and informants recommended subsequent sources. Sampling was initiated within the ATDT team and its partners, relying on internal resources to uncover outcomes or leads that could be developed into outcomes.

Boundaries of sampling: Boundaries for sampling were set in terms of both the number of interviews and the identification of key stakeholders. This included, but was not limited to, core ATDT partners, local implementers, and beneficiaries in Vietnam and Brazil. Decisions on sampling limits were made with resource considerations in mind to ensure the study remained manageable and targeted.

[6] Even though Mato Grosso was named in the planning documents, Solidaridad did not operate directly in that state and did not implement meaningful activities there in the context of ATDT. The plan for Mato Grasso at the time of writing this report was to present Solis to external stakeholders who may potentially collaborate in distribution of Solis after completion of ATDT. The strategy is now in place and is expected to deliver some results in 2025.

3. Approach and methods

The Outcome Harvesting approach

This study followed the Outcome Harvesting (OH) approach, developed by Ricardo Wilson-Grau and colleagues (Wilson-Grau & Britt, 2013). OH defines outcomes as observable changes in the behaviors, relationships, actions, activities, policies, or practices of individuals, groups, or organizations (see annex 5 on definitions). This approach offers a systematic process to collect ("harvest") evidence of change, identifying exactly who has changed in what way, and then works backwards to assess if and how an intervention plausibly made a contribution to these changes. OH differentiates between two stakeholder roles in relation to emerging outcomes: i) the "contributor" or "change agent" who influences an individual, group, or organization in a direct or indirect way to change their behavior, and ii) the "societal actor" who undergoes change as a result of the activities or outputs of contributors.

OH is designed as a utilization-focused and participatory approach, usually involving an intensive and interactive design phase that relies on high engagement and support from internal sources during data collection. Its six-step framework is highly adaptable, allowing customization to meet the unique needs of the program and evaluation. In the initial phase (OH Step 1), a study steering committee (SSC) comprising the two lead consultants and internal staff from the ATDT project was established to coordinate the evaluation and collaboratively make decisions on its design (annex 2). The evaluation adhered to the OH approach and principles overall, with a few noted exceptions to the methodology detailed in the following sections.

OH study design (OH step 1)

Participatory and adaptive study design. In line with the OH approach, the preparatory phase was collaborative and incorporated mutual learning and joint decision taking. After formation of the SSC and initial exchanges, a tentative design was developed and documented in a Google Presentation accessible on a shared Google Drive. It covered various aspects of the evaluation including:

- ATDT project context & framing (logic model)
- Design of the outcome study with evaluation purpose, objectives, questions, scope and initial informants
- Work-plan outlining the OH methodology adapting the 6 OH steps to this project.

The study design was available to internal ATDT stakeholders of the project (i.e. representatives from CIAT, IRRI, Solidaridad, and the "Center for International Forestry Research and World Agroforestry", CIFOR-ICRAF), as well as all four evaluation consultants. It was considered a living document, serving both as a decision-making resource and as a transparent record of design choices.

Development of actor-centered ToCs. This OH evaluation partially incorporated a theory-based approach through the development of ToCs at the global and the two country levels during the design phase. The three ToCs outlined which stakeholder groups, based on the project logic, were expected to exhibit

behavioral changes and how these changes could influence other shifts along the impact pathway. The process began with the SSC identifying stakeholders relevant to the project and discussing their anticipated changes and influence on others in the system, which was visually mapped. Subsequent discussions with additional ATDT team members then refined the ToCs further.

Outcome domains. The ToCs were instrumental in defining expected outcome domains aligned with ATDT objectives, identifying key areas of interest for the evaluation. During this process, it was determined that outcome domain 3 would be divided into two, resulting in four evaluation questions derived from the original three objectives (section 4).

The ToCs also proved helpful in practical aspects of the evaluation. They guided the SSC in selecting initial interview partners across the outcome domains and helped to align on the classification of observed behavioral changes. Hence, outcomes could be mapped onto the four outcome domains, thus directly addressing the EQs.

Types of outcomes. While guided by the ToCs, the evaluation also followed the typical OH retrospective approach, aiming to opportunistically gather evidence of unintended and negative outcomes in addition to the anticipated ones. Unintended outcomes referred to impacts or changes that diverged from the initial ATDT logic model. Negative outcomes encompassed adverse effects, such as disruptions to practices, economic impacts, or resistance from stakeholders unwilling to embrace change. Such findings would provide important valuable insights to inform future project adaptations and enhance understanding of the project's broader effects.

A unique adaptation to OH was the definition of two special types of changes, 1) process outcomes, and 2) prospective outcomes.

Process outcomes were defined as behavioral changes emerging in internal actors such as the ATDT action partners IRRI and Solidaridad. In a systemic approach such as OH, change agents not only influence other actors but are also affected themselves through their involvement in the project. This reciprocal dynamic is inherent in co-creation processes, where collaboration and interaction with stakeholders can lead to shifts in the practices, perspectives, or behaviors of the change agents themselves. Capturing these process changes seemed thus essential to understanding the project’s effectiveness. An example of such changes could be the project adopting new approaches to designing and facilitating workshops with sessions being more participatory or tailored to stakeholder needs. Another example could involve adjustments to program planning, such as integrating iterative feedback loops to better accommodate the needs and insights of various actors, reflecting a deeper understanding of co-creation and innovation of AE practices through digital tools.

As a further deviation from the standard OH approach, the original plan for the evaluation included harvesting prospective outcomes alongside the observed outcomes (Section 2a). Prospective outcomes would be drafted as projections of likely future behavioral changes by the end of 2024, based on current evidence and trends, using the same formal structure as observed outcomes (outcome, significance, contribution descriptions). These outcome statements would largely need to adhere to the OH SMART criteria, ensuring that all information and estimations were specific, logical, transparent, and verifiable in the future.

However, during design phase when aiming to align the CIFOR-ICRAF and the OH study, the SSC agreed on a clear division of labor to avoid overlap and duplication: The OH study would focus on outcomes emerging during the project cycle, i.e., from 2022 to end of 2024, while the ICRAF study would concentrate on the longer-term results emerging after the project.

Since data collection originally was planned to be completed by September 2024, this would leave a three-months period for projecting prospective outcomes. However, the SSC later decided to conduct a late field trip to Brazil in November and data collection was therefore extended to mid November, significantly delaying the planned timeline for analysis and reducing the gap until ATDT's conclusion. With only a few weeks remaining until the project ended in December, the originally envisioned window for prospective outcomes became too small and the SSC opted to focus solely on observed outcomes as of mid-November.

Data collection, validation, credibility (OH steps 2, 3, 4)

Data collection aligned with OH steps 2 and 3, involving document review, remote and in person key informant interviews, focal group discussions, and asynchronous email exchanges to iteratively draft SMART outcomes. OH relies on the skills of the "harvesters" to unearth the detailed, specific information required to meet the SMART criteria[7] (annex 6), hence no rigid OH interview questionnaire was used, but a general guidance for leading OH interviews (who changed, how, when where; why was this significant, and who contributed, in which way, when and where).

Data capture involved note taking and, for remote interviews, recording and transcription with the help of Otter.ai. The primary tool for data collection was the OH database, a Google Sheet on the Drive where all evaluation stakeholders had access to. Proper tagging in the database allowed for easy identification and clustering of outcomes with respect to, e.g., status (Leads, SMART), nature of outcome (observed, process), or actors involved.

Sampling. Potential interview partners were identified together with the SSC and documented in a shared sampling list, a Google Sheet on the Drive, which was continuously updated as new sources were identified through a snowball sampling approach. This list ensured transparency in the data collection process and allowed ATDT contributors to rank and prioritize interview partners. In total, 52 informants participated in the evaluation (see annex 8 for a list of interview partners).

In the first sampling phase, the lead evaluators interviewed the global and country ATDT team, approaching first the change agents as is typical for the OH approach. Based on these interviews, the circle of informants was widened to include six further global stakeholders, rendering 17 interview partners in total for the first phase.

[7] https://outcomeharvesting.net/wp-content/uploads/2016/07/SMART-ME-Outcomes.pdf

In the countries, most interviews were conducted in person in local languages by the two local evaluators. In Vietnam, a total of 20 stakeholders were interviewed (in addition to the three ATDT Vietnam staff). Six representatives of DTDs and of potential partners were interviewed remotely, and 16 informants in person either individually or in focal groups. This included four government actors, four government agricultural advisory service (AAS) representatives, and eight farmers during the field trip in September to two locations in the Mekong Delta: Co Do (4) and Vinh Thanh (4).

In Brazil, it emerged that the project had mostly worked with farmers and extensionists in addition to DTDs, up until November 2024. Therefore, the country evaluator focused mainly on these groups. A total of 15 sources were interviewed, including 12 farmers, five of whom were ambassadors, i.e., early adopters and champions of the digital tool Solis. The farmers were from three locations (Novo Repartimento, Pacajá, Anapu) and eight were interviewed in the field in November 2024. Additional interviews were conducted remotely with farmers, one extensionist, a social media consultant, and one further member of the ATDT Brazil team.

In addition to harvesting outcomes, the evaluators sometimes asked 'piggy-back' questions concerning the context of the project to obtain additional views on ATDT's implementation and results, thus addressing some of the evaluative questions in further depth.

Data validation and substantiation. The evaluators scrutinized all outcomes data making sure that the information was sufficiently specific to comply with the SMART criteria of OH, i.e., they provided sufficient specific and verifiable information, were relevant to the project goals, plausibly linked to the contribution of the ATDT project, and emerged within the scope of the evaluation (annex 6). However, information on some of the outcomes was insufficient and they remained outcome leads. They nevertheless provided interesting information and may be worth following up at a later stage. To strengthen the credibility of the outcome data, validation meetings were held with ATDT teams at both country and global levels, who also reviewed the data. Furthermore, the credibility of the data was enhanced by validating the outcomes through cross-referencing and discussion with multiple sources and informants. Additionally, interviewees were informed that the outcomes derived from their input would be officially included in the public evaluation report unless they explicitly objected. Overall, the evaluators and the ATDT team considered the SMART outcomes sufficiently credible evidence to be used in the data analyses addressing the four evaluation questions.

Data analysis and use of findings (OH step 5 & 6)

Data analysis was based on the SMART outcomes. The outcome leads were not directly included but regarded as "signals" suggesting that further results could have emerged in related areas. In this report, the outcome leads will occasionally be referenced in an anecdotal way to highlight additional potential areas of achievement.

During the evaluation, a categorization scheme for the outcomes was designed and documented in a Code Book, which was made accessible to all evaluation stakeholders. This classification of outcomes effectively addressed the EQs and facilitated the exploration of patterns and trends. The tagging in the OH database included, e.g., the type of societal actor, the nature of behavior change, the time of

emergence, geographic scope, relevance to the outcome domain, as well as the type of contribution and contribution strategy.

The outcomes data were analyzed and visualized using the functionalities of Google Sheet and Excel. The findings were then presented during two sensemaking workshops with the Vietnam and Brazil ATDT teams, aiming to share insights, gather input, and foster alignment. These workshops ensured that the findings were useful to the teams and owned by the organization, enhancing their relevance and applicability. At the conclusion of the analysis, the evaluation team proposed a series of recommended points for consideration. These recommendations were then rated by the members of the study steering committee. The ten recommendations that received the highest scores were deemed the most relevant and were included in this report. This approach ensures that the recommendations presented are not only relevant but also practical and aligned with the perspectives of key stakeholders. By limiting the number of recommendations, we aim to enhance their usefulness and focus, providing actionable insights rather than an overwhelming list of suggestions. It is planned that the end-evaluation report will be shared with project affiliates and donors, and will also be made publicly available.

Challenges and limitations of this study

The study faced several challenges and limitations that should be considered when interpreting the results. Timeline constraints were significant: the study coincided with critical project activities in the two partner countries in this last phase of ATDT. This made it difficult for stakeholders to dedicate their full attention to the evaluation, but still, their commitment and responsiveness were noteworthy.

Given resource limitations, the study did not aim for comprehensive sampling; rather, the SSC collaboratively determined which sources and outcomes were prioritized to maximize relevance and feasibility within the study's constraints.

In Brazil, the evaluation faced timing and contextual challenges. Fieldwork in the Amazon region was completed only three weeks before the final report submission, leaving little time for in-depth analysis. At the time of fieldwork, Solis was still at the Minimum Viable Product (MVP) stage, limiting its adoption and constraining the ability to detect meaningful outcomes with its users. To address this limitation, the evaluation expanded its focus to include output-near and prospective outcomes. However, with Solis deployment only just beginning, no baseline data was available to project its potential further development or assess outcomes with end-users effectively aside from those observed among early adopters (Solis ambassadors). Furthermore, the evaluation was constrained in its assessment of external factors, such as market dynamics and policy shifts, as the engagement with government or private-sector partners regarding Solis were still in their early stages when the evaluation was conducted, and the evaluation team was unable to gather insights from these stakeholders.

In Vietnam, the evaluators would have liked to gain a better understanding of when and why farmers changed their behavior, which however was not possible within the boundaries of this study. For example, while farmers clearly reduced seed usage and the collected outcomes met SMART criteria, a more detailed follow-up would have unpacked the steps leading to these changes and revealed the nuanced steps and relative influence of factors such as training, the FarMoRe app, or peer influence, contributing to their emergence.

4. Theory of Change & outcome domains

During the design process of the OH study, an actor-centered ToC for ATDT was developed through a participatory process with the SSC, drawing on information from various planning and reporting documents as well as interviews. This approach provided a structured framework to: (i) identify the key stakeholders involved in the project and hence relevant as potential interview sources, (ii) ensure alignment with the ATDT team on how these stakeholders were expected to change and/or to contribute to the project, and (iii) map the specific pathways through which the project aimed to achieve its broader goals, such as scaling up and scaling out AE transitions, especially in view of potential prospective outcomes. The participatory process ensured that the resulting ToCs captured, to the best extent feasible, the complexities of the system under study, while fostering a shared understanding between the ATDT project team and the evaluators.

Stakeholder mapping

Through the ToC development process, the SSC identified 13 types of stakeholders that played a role in the ATDT project logic, either as contributor (influencing behavioral change), or as an actor who changed their behaviour, influenced directly or indirectly, in a small or big way by the project (Table 1).

Internal stakeholders (change agents) comprised the ATDT staff at the global and country level, as well as the donors – European Union and International Fund for Agricultural Development (IFAD) – further Alliance partners such as the TRANSITION sibling projects, as well as the "Transformative Partnership Platform on Agroecological Approaches to Building Resilience of Livelihoods and Landscapes" (Agroecology TPP) and its community of practice (https://glfx.globallandscapesforum.org/).

The ATDT project also worked with next users including DTDs, ARBs, AAS, and government bodies at the national and local level.

The project's end-users were men and women extensionists and farmers in Vietnam and Brazil, who were expected to use digital tools to co-create knowledge, innovate, and share climate-informed AE practices. In Brazil, selected farmers were envisaged to act as ambassadors, piloting the digital tool and encouraging their adoption within their communities. Additionally, multi-stakeholder groups, such as the National Brazil Roundtable on Sustainable Livestock and the State-Level Sustainable Territories Platform, were meant to promote collaboration across sectors, aligning the tools with regional and national sustainability goals and fostering widespread uptake.

Finally, the ToC also highlighted the importance of combining specific actor groups in two instances, namely "farmers and extensionists", and "farmer ambassadors and extensionists". This acknowledged that co-creation inherently involved different actor groups working together. For example, changes in the nexus "farmer-extensionist" were expected, reflecting that both groups engaged on equal footing in co-creative knowledge exchange and development, collaboratively addressing local challenges. Similarly,

changes concerning the ambassador-extensionist group would signify an increased exchange or joint efforts in developing solutions. By treating these mixed groups as unified actors, the evaluation captured the project's influence on fostering collaboration and inclusion.

It is important to note that there are overlaps between the stakeholder groups, even though the categorization represents the evaluation team's best effort to organize them. For instance, Solidaridad in Brazil, an ATDT action partner and therefore internal stakeholder, also falls into the categories of a next user and DTD and AAS. Similarly, some AAS stakeholders also belong to the government category. We assigned individual actors to specific stakeholder groups based on the quality – such as internal versus external – that seemed most central to their role in the project.

Table 1: ATDT Stakeholders

Internal stakeholders	
ATDT global	The lead of the TRANSITIONS P2 project at CIAT and University of Vermont
ATDT Vietnam	Action partner IRRI
ATDT Brazil	Action partner Solidaridad (and CIFOR-ICRAF in the first year), the implementing partner organization that also serves as the digital tool developer and extension service provider
Alliance	TRANSITIONS P1 & P3 & TPP partners
Donor	EU, IFAD
Next-users	
Gov	Government representatives at the national, regional or local level, such as the Ministry of Agriculture and Rural Development (MARD) in Vietnam or the State Government of Para; EMATER and SENAR (Brazil).
DTD	Digital Tool Developers at the global and national level, such as TCSoft, AgriTask, Dai Thanh, Agrig8 (also including Brazil action partner Solidaridad)
ARB	Agricultural Research Bodies, also technical institutes / universities who train extensionists, both at the global level (Agri Digital Hub, Agroecology Europe, PATH2DEA) and the country level (EMBRAPA in Brazil)
AAS	Agricultural Advisory Services and extensionists, such as the Global Forum for Rural Advisory Services (GFRAS), National Agriculture Extension Center (NAEC) in Vietnam; Solidaridad in Brazil
NGO	IDH, ICV (both in Brazil)
End-users	
Ambassadors	A subset of farmers in Brazil selected by the project who show higher engagement with digital tools and serve as potential champions for the ATDT project.
Farmers	The primary beneficiaries of the project, Individual smallholder farmers in Brazil and rice farmers in Vietnam
Multi-stakeholder platforms	Such as in Brazil the National Brazil Round Table of Sustainable Livestock and the State Level Sustainable Territories Working Platform

ToC and outcome domains

The expected outcomes that were identified during the ToC process were visualized in three ToCs, one for each of the countries and one for the global level changes (see visuals in annex 7). These outcomes were clustered into meaningful thematic groupings of related changes observed in actors' behaviors, actions, or relationships. The resulting clusters – or outcome domains – allowed individual outcomes to be contextualized within larger patterns of change, and provided a structured lens to assess the project's overall achievements. The four outcome domains outlined below correspond largely to the four EQs developed from ATDT's objectives (section 2) and provide the framework for discussing the empirical outcomes harvested during this study.

Outcome domain 1: Changes affecting co-creation, inclusiveness, local relevance and governance of digital tools for innovative AE practices. The expected outcomes in this domain aligned directly with EQ1, seeking evidence for enhanced farmers' voice, agency, and data rights in digital tool development and use. They showcased behavioral changes of farmers and duty bearers such as field agents, extensionists, tool developers demonstrating inclusiveness, local relevance, and governance improvements of digital tools that will facilitate farmers' role in the co-creation of climate-informed AE practices. Outcomes in this domain could be mapped on the principles of inclusive tool development that were developed by ATDT.[8]

Examples for expected outcomes in this domain included:

- DTDs facilitating a participatory process for tool development
- Farmers and extensionists collaborating for tool co-creation

Outcome domain 2: Changes in co-creation of and innovation for climate-resilient informed AE practices using digital tools. The second domain included results on the participatory generation of innovative, climate-resilient AE practices enabled by the use of inclusive digital tools. The expected outcomes emphasized the role of digital tools in facilitating collaborative knowledge sharing and co-creation among farmers and between farmers and other stakeholders. Put simply, this outcome domain captures all outcomes that deal with behaviors leading to innovative, co-created AE content.

Examples for expected outcomes in this domain included:

- Action partners facilitating a participatory process for the co-creation of AE practices
- Farmers and extensionists collaborating to co-create localized AE knowledge
- Farmers and extensionists using digital tools to co-create and share localized AE knowledge

Outcome domains 3a and 3b addressed results with respect to the implementation as well as the out- and up-scaling of inclusive digital approaches, assumed to create an enabling environment, where

[8] Dittmer, K.M., Burns, S., Shelton, S., Wollenberg, E. 2024. Principles for socially inclusive digital tools for smallholder farmers: A guide [Version 2]. Agroecological TRANSITIONS: Inclusive Digital Tools to Enable Climate-informed Agroecological Transitions (ATDT). Cali, Colombia: Alliance of Bioversity & CIAT. Online: https://cgspace.cgiar.org/server/api/core/bitstreams/49d17f1e-eb5a-4f27-823f-25e20e916e43/content

practices developed and shared through inclusive tools would be adapted at the user level as well as achieving sustained, large-scale impact over time.

Outcome domain 3a: Mainstreaming and scaling out of co-created AE practices. This domain comprised expected results on the integration of co-created AE practices by individual farmers into daily farming operations. This would reflect the utility of the digital tools in making these practices relevant, accessible, and practical for diverse farming contexts. It also depicted the horizontal dissemination of AE practices by farmers sharing innovations with peers, either directly or via digital platforms, amplifying the impact by leveraging social networks and community-based learning.

Examples for expected outcomes in this domain included:

- Farmers adopting sustainable AE practices
- Farmers sharing sustainable AE practices through digital tools

Outcome domain 3b: Scaling up inclusive digital tool approaches through institutional and policy integration driving AE transitions. Domain 3b encompassed results reflecting the vertical scaling of AE practices, embedding them within formal institutional or government frameworks and systems to ensure their adoption is supported by institutional resources and policies. Outcomes in this domain would have the potential to drive sustainable and widespread adoption of AE practices, laying the groundwork for broader AE transitions.

Examples for expected outcomes in this domain included:

- Government partners using inclusive digital tools for data collection and AE advisory on the ground
- Government representatives supporting the use of inclusive digital tools

5. Overall signals and trends in the outcomes data

This section briefly summarizes the outcome evidence harvested in this evaluation for the countries and the global level. It provides an overview of the general signals and trends observed in the outcomes data. More in-depth detail on the outcomes and how they relate to the EQs is provided in the following chapter (section 6).

ATDT's project planning did not prioritize global outcomes, instead focusing on country-specific changes that aligned with its core goal of promoting AE transitions for smallholder farmers using digital tools. Despite this local emphasis, the project in fact produced results at the global level, demonstrating its influence within certain networks and discussions. The analysis in this study therefore does not concentrate on the two country cases but also considers outcomes at the global level. Consequently, the following text consistently discusses outcomes from the three viewpoints: Vietnam, Brazil, and the global level, addressing each in turn.

SMART outcomes. The evaluation identified 71 outcome leads across the two countries and globally. These outcomes warranted follow-up to determine whether they constituted relevant and significant behavioral changes and could be described in enough detail as credible evidence. Further research was conducted to develop SMART outcome descriptions that were specific enough to be verifiable, that highlighted their significance, and provided a plausible explanation of how ATDT had contributed to them.

After several iterative harvesting cycles, nearly half (32) of the outcome leads were found not to represent relevant behavioral changes to which ATDT had contributed and therefore were discarded. Most of these (15) were found in Brazil. A total of 39 notable behavioral changes remained, four of these still outcome leads, for which more interviews and research would have been needed to derive SMART outcomes. Since these were ranked low priority by ATDT staff, they were not researched further.

In sum, as visualized in Figure 2, the evaluation collected 35 SMART outcomes: 23 in Vietnam, eight in Brazil, and four on the global level.

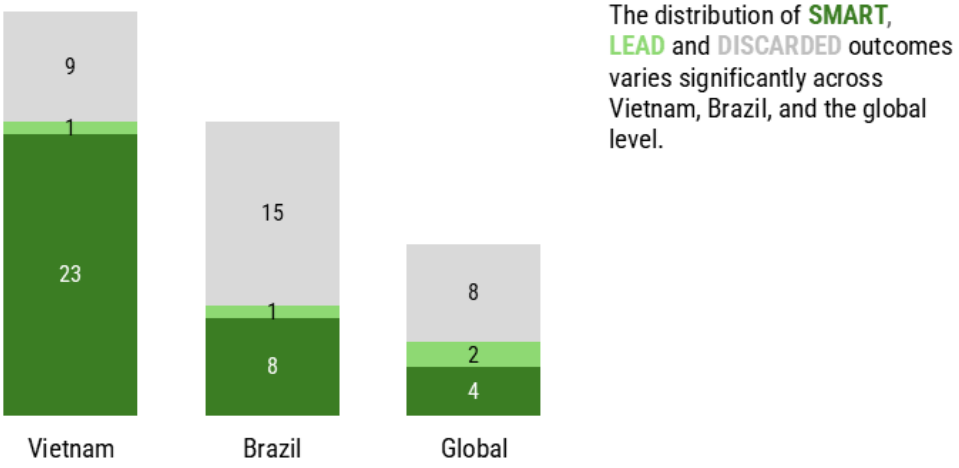

Figure 2: Distribution of SMART, lead and discarded outcomes across the two countries and at the global level.

Several factors contributed to the fact that the evaluation team found fewer outcomes in Brazil than in Vietnam. Firstly, the two country partners set different priorities. While Solidaridad in Brazil put a lot of time and energy into an inclusive tool development process, IRRI in Vietnam focused on scalability and alignment with government priorities. Secondly, even though a soft launch occurred in December 2023, where the tool was demonstrated in a presentation and farmers could test it on extensionists' phones, the tool Solis was made available to the public only in November 2024 (at the time of writing this report) meaning that the timeframe for significant outcomes to emerge was extremely limited, particularly for outcomes in the domains of scaling out and scaling up.

To address these constraints, the evaluation team remained in touch with Solidaridad representatives until the very last minute to work on outcomes. The data collection in the field was postponed as long as possible, until the week in which Solis was supposed to be shared with its users and other stakeholders. Despite these efforts, identifying more behavioral changes directly linked to the project remained difficult due to the late rollout of Solis.

Nature of outcome. As is visualized in Figure 3, most of the outcomes concerned behavioral changes that were observed in the societal actors the ATDT project worked with (31 SMART, 3 leads). Yet, the evaluation also detected five process outcomes (4 SMART, 1 lead) identifying changes in internal ATDT actors (IRRI: 3, Solidaridad: 2). In Brazil, three additional process leads were considered, but all had to be discarded due to insufficient evidence of behavioral change, despite follow-up interviews conducted up until the final stages of writing this report. While evidence was found for structural changes, such as the implementation of AE trainings and the hiring of new staff, no clear link could be established showing ATDT's contribution beyond the provision of funding.

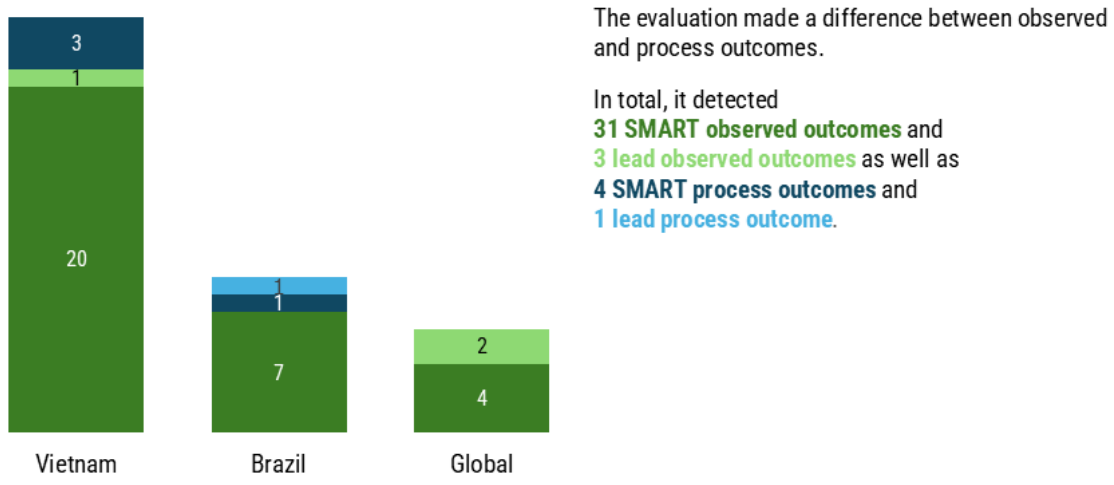

Figure 3: Distribution of outcomes observed in more external stakeholders, and process outcomes relating to internal ATDT actors.

Initially, efforts were made to gather prospective outcomes by the end of the project, i.e., end 2024, in line with Objective 2 of this evaluation. Several leads for prospective outcomes were followed up, however, since data collection was extended to mid-November, and thus much closer to the end of the ATDT project, all of these evolved into outcomes actually observed in ATDT stakeholders.

Type of actors. Changes emerged in many of the stakeholder groups identified during the development of the actor-centered ToC (section 4). As described above, in both Brazil and Vietnam, most of the outcomes concerned changes in farmers; yet, otherwise the type of actors differed largely. Table 2 presents an overview of all outcomes per type of societal actor.

Table 2: Number of outcomes per type of societal actor (outcome leads in parentheses)

Type of societal actor	Vietnam	Brazil	Global	Total
Next users				
ARB			4 (2)	6
iNGO	1			1
DTD	3			3
Multi Stakeholder Platform	1			1
AAS-local	1			1
Government-national	2			2
Government-local	1			1
End users				
Ambassadors		3		3
Ambassadors-extensionists		1		1
Farmers	9	3		12
Farmers-Extensionists	1			1
Process changes in internal actors				
ATDT Vietnam	3 (1)			4
ATDT Brazil		1 (1)		2
Total	24	9	6	39

In Vietnam, changes were observed among various government stakeholders at multiple levels. These included agricultural authorities, such as the Department of Crop Production (DCP) under MARD, who played a critical role in integrating digital tools like FarMoRe into the national agricultural framework. The government actors were instrumental in supporting the implementation of data-driven approaches for sustainable farming, overseeing the integration of farmer-level data into larger Measurement, Reporting, and Verification (MRV) systems. Additionally, extension agents worked together with farmers at the local level acting as key intermediaries, using the data provided by FarMoRe to guide farmers toward more sustainable practices. In addition to these government stakeholders, several DTDs also adopted the FarMoRe tool for their greenhouse gas (GHG) module, enhancing the broader impact of the project.

In Brazil, the project followed a unique approach with its Solis Ambassador program. The Solis ambassadors were farmers who played a special role in the development and out-scaling of Solis including very intensive exchange with Solidaridad extensionists. There were seven ambassadors: five farmers and two extension staff; five men and two women; three were under 30, three between 30 and 40, and one over 40. Given their distinct role, the evaluation team decided to consider them separately from other farmers. Three out of nine Brazil outcomes involved the ambassadors as actors, and one the relationship between ambassadors and extensionists. Three additional outcomes were observed among

farmers who were not involved in the Ambassador program but participated in the co-creation process. Finally, the evaluation team found two process outcomes concerning ATDT Action Partner Solidaridad.

Activities and communication on the global level addressed various stakeholder groups including global partners, multipliers, ARBs, INGOs, and donors, as is depicted in the ToC for the global level (section 4). However, outcomes were observed only in the stakeholder group of ARBs (see section on EQ 3b for discussion of stakeholders on global level).

Observed types of behavioral changes. The analysis of the different types of behavioral changes aligned with trends observed in other parts of the data. Vietnam showed a broad range of changes, reflecting its multi-stakeholder approach. Notably, in Vietnam the most frequent types of change were recorded in areas of tool adoption: eight outcomes suggested that actors were “Improving AE farming practices” and seven dealt with “AE project implementation using digital tools”. This highlights ATDT Vietnam’s strong focus on promoting AE practices at farmer level and facilitating out-scaling.

The types of outcomes observed in Brazil once again signaled its strong emphasis on creating an inclusive tool. Although the total number of observations was smaller than in Vietnam, most outcomes fell within the categories 'Inclusive tool development or AE project implementation' and 'Uptake and/or use of knowledge on inclusive tool development and AE, together recording six outcomes (one lead).

The observations on behavior change at the global level underscored the strategic focus on knowledge dissemination and partnerships. By leveraging networks and fostering collaboration, the global-level activities provided a framework for scaling and sustaining regional successes.

Table 3: Observed types of change per country and global level (outcome leads in parentheses).

Observed Types of Change	Vietnam	Brazil	Global	Total
Inclusive digital program planning	1	1		2
Inclusive tool development or AE project implementation	2	2 (1)		5
Interaction to co-create AE practices	1	1		2
Uptake and/or use of knowledge on inclusive tool development and AE	(1)	3		4
Use of tool for knowledge sharing	1	1		2
AE project implementation using digital tools	7			7
Improved AE advisory using digital tools	1			1
Improved AE farming practices	8			8
AE policy and decision making	1			1
Interest in exploring potential partnerships	1		3 (1)	5
Applying knowledge on inclusive tool development and agroecology			1	1
Participation and engagement in knowledge-sharing activities			(1)	1
Total	24	9	6	39

Time outcomes emerged. The data shows a clear trend of more outcomes emerging during the second half of the project. This does not come as a surprise, as the initial phases of most projects are typically focused on planning, capacity building, and setting up structures, while outcomes often only materialize later in the implementation phase. However, with only 35 SMART outcomes across Vietnam, Brazil, and the global level, the dataset is too small to draw broader conclusions about the timing of outcomes.

For Brazil, the trend was influenced by the slightly delayed entry of the action partner Solidaridad, which began receiving funding in March 2023. This marked the start of its active involvement, resulting in an implementation phase – including digital tool development, farmer engagement, tool deployment, and stakeholder interaction – that lasted only 21 months, from March 2023 to December 2024. Meaningful implementation activities began in June 2023, naturally leading to outcomes appearing later in the project timeline. IRRI's early and sustained involvement, coupled with its embeddedness in national policy processes and strong relationships with MARD, allowed for a smoother and earlier roll-out of activities in Vietnam. This highlights how the timing of partner engagement, along with the strength of institutional relationships, can substantially influence the timeline for outcomes to emerge.

More broadly, the ATDT project was not originally designed to produce new tools but to develop ways of interfacing with existing ones to enhance inclusivity. Tool development was not anticipated given the limited resources and time. Nonetheless, both teams successfully developed new and innovative tools. Timeline issues can therefore also be seen as a reflection of their adaptive efforts to go beyond the project's initial scope.

Relevance to outcome domains. The data revealed distinct patterns across different the four outcome domains, as depicted in Figure 4, reflecting the trends seen in the previous analyses.

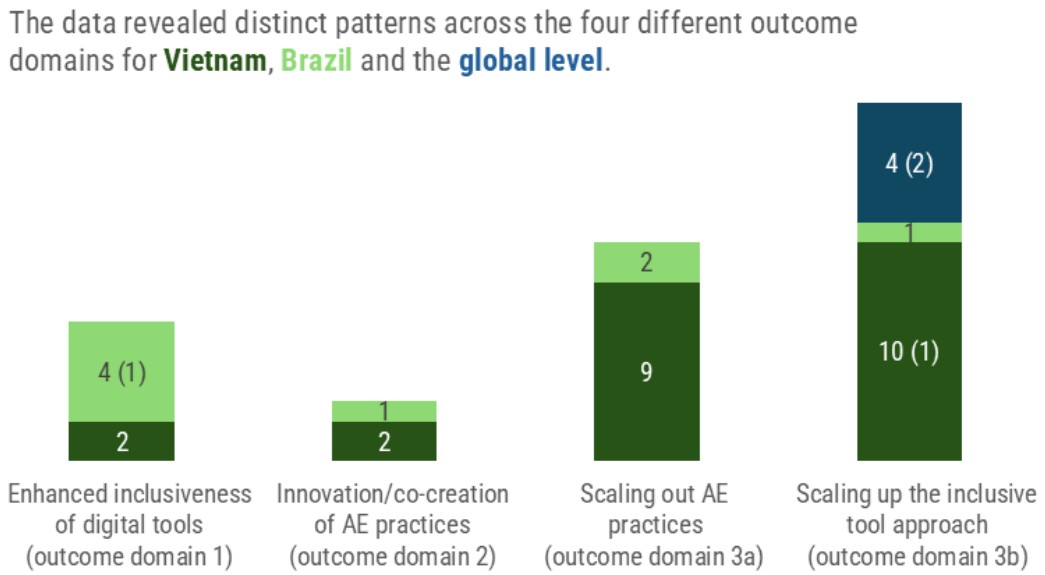

Figure 4: Distribution of country and global level outcomes over the four different outcome domains.

In Vietnam, nine SMART outcomes recorded for scaling out AE practices and 10 for scaling up inclusive tool approaches. This highlighted Vietnam's strong focus on expanding the adoption of AE practices and the up-scaling of the inclusive tool approach.

The majority of outcomes from Brazil concerned the enhanced inclusiveness of its tool, accounting for four of the six SMART outcomes in this domain. This reflects an emphasis on equitable development in its activities. The low count in the domain of scaling AE practices is likely due to Solidaridad's later engagement in ATDT.

Globally, most outcomes were concentrated in scaling up the inclusive approach to digital tool development for AE, reflecting a strategic focus on dissemination and systemic adoption. The absence of global outcomes relating to innovation and co-creation suggests that these efforts were primarily regional in nature.

Overall, the majority of all SMART and lead outcomes (29 out of 39) were related to scaling practices, showing the project's overall emphasis on expanding its impact.

6. Discussion of evaluation questions and conclusions

The presentation of findings and conclusions at the country level was structured around the four EQs outlined in Section 2, corresponding to the four outcome domains identified in the ToC developed during the design phase of this study (Section 4).

The analysis relied on 35 SMART outcomes that were considered credible evidence following thorough examination in alignment with the OH process. In a few cases, the text also refers to the four outcome leads to demonstrate potential further areas of achievement; however, these should only be seen as additional signals in the data.

Each section begins with answering the respective EQ in a short summary. The main text then refers in more detail to individual outcomes. Key conclusions drawn from the data are highlighted to ensure transparency of the analytical process.

Enhanced inclusiveness of digital tools (EQ 1)

Summary of our findings and conclusions for EQ 1:

> In how far do we find evidence at the outcome level for enhanced farmers' voice, agency and data rights in digital tools and digital tool development?

» Evidence at the outcome level indicates that the ATDT project has enhanced farmers' voice, agency, and data rights in digital tools and digital tool development, particularly in Brazil. The Brazil project team placed a strong emphasis on inclusive tool co-creation, resulting in four out of eight SMART outcomes directly relating to this domain. From initial co-creation workshops to the development of Solis and the Solis Ambassador program, Solidaridad progressively adapted its approach to effectively engage farmers, including marginalized groups like women and youth. These efforts demonstrated that successful co-creation requires sustained effort, adaptability, and a deep understanding of stakeholder needs. Innovations like integrating social media features into Solis aligned with farmers' aspirations and increased their agency. The behavioral shifts among Solidaridad staff and Solis ambassadors underline the importance of purpose-driven engagement, where intrinsic motivation and capacity building are prioritized over financial incentives. The experience also highlights that co-creation takes time and commitment: The project's focus on inclusivity led to significant engagement with farmers and the development of a tool that was genuinely relevant to them. However, this intensive approach required considerable time and resources. In contrast, the Vietnam

project made different trade-offs by prioritizing alignment with government needs, which enabled larger scaling potential but limited farmer influence on the tool's design and inclusivity in general terms. While IRRI adapted the FarMoRe tool to address barriers like low digital literacy – making it simpler and more user-friendly – the tool was tailored more toward government requirements and was not specifically designed to enhance farmers' voices. The inclusion of field agents as intermediaries acknowledged their crucial role in the adoption of practices by farmers, but resulted in less direct farmer involvement compared to Brazil.

The ATDT project set out with the purpose of promoting innovations related to digital tools and their interfaces that enhance inclusiveness, integrate climate change resilience and mitigation with agroecological aims, and enable farmers to develop new practices, thereby improving the inclusiveness, local relevance and governance of digital tools. The underlying reasoning is described in various of the projects' own outputs, most prominently in the "*Principles for socially inclusive digital tools for smallholder farmers: A guide*" ("Principles Paper", see Footnote number 8). In a nutshell, empirical evidence shows that inclusive tools enhance social inclusion and empower smallholders, support their agency and participation in climate action, improve relevance of tools to farmers' contexts and needs, bridge gaps between different forms of knowledge and lead to more applicable and sustainable outcomes.

This section describes and discusses all the outcomes the evaluation team found in this domain of inclusive tools and tool co-creation. The co-creation process unfolded quite differently in the two country cases and was supported by activities at the global level. The differences in the countries stem not only from varying local contexts but also from distinct approaches and decisions made by the respective action partners in Brazil and Vietnam.

In Vietnam, the ATDT project achieved a notable number of SMART outcomes (23), but only two were linked to the domain of inclusive tools and co-creative tool development. One outcome concerned the inclusion of field agents as a user group for the FarMoRe digital tool (VN01): In mid-2022, the ATDT action partner IRRI shifted its plan to create a farmer-facing tool to one that also addresses extensionists as a user group, recognizing them as essential intermediaries. This change was prompted by extensive research in the beginning of the project (ATDT baseline study[9]). Findings indicated that extensionists played a crucial role in giving agricultural advice, especially in the Mekong Delta. Another

[9] Barnard, J., Cuong. O.Q., Vu, H.T., Nelson, K.M., 2023. Use of digital tools in sustainable rice production in the Mekong Delta, Vietnam. Agroecological TRANSITIONS: Inclusive Digital Tools to Enable Climateinformed Agroecological Transitions (ATDT). Hanoi, Vietnam: International Rice Research Institute (IRRI).

reason for this shift were the challenges posed by low digital literacy levels among farmers. So in cases when farmers were not able to use the tool on their own phones, they could access the information and comparison functions of FarMoRe through the phones of their extensionists. ATDT contributed to the capacity development of the extensionists by developing a curriculum and training concept which explicitly addressed co-creation.

The second outcome in this domain reflected a strategic internal shift within IRRI, which decided to develop FarMoRe as a new tool specifically for Vietnamese farmers rather than working on existing apps (VN02). This decision was also based on findings from the ATDT baseline study, revealing low digital literacy among farmers, the complexity of existing agricultural apps in Vietnam, and a mismatch between farmers' needs and interests and the business models of app developers. In response, IRRI designed the much simpler and more user-friendly tool, FarMoRe, tailored to the needs and capabilities of Vietnamese farmers. Since it was made available to all farmers at no cost by the Vietnamese government, it was much more inclusive compared to commercial tools. Another distinct feature is that it enables smart monitoring to incentivize adoption of sustainability practices.

> Conclusion C1.1: ATDT Vietnam showed the flexibility required for inclusive tool development.
>
> In Vietnam, IRRI's strategic shift to develop the FarMoRe tool specifically for Vietnamese farmers highlights a commitment to inclusivity by directly addressing the challenges that were found in the ATDT baseline study. The study revealed that low digital literacy among farmers, the complexity of existing agricultural apps in Vietnam, and a disconnect between farmers' needs and the business models of app developers were significant barriers to a wide adoption. Recognizing that the originally planned model might not be practical for all intended users, IRRI pivoted to create a simpler, more user-friendly tool tailored to the local context.
>
> By designing FarMoRe to meet the specific needs and capabilities of Vietnamese farmers and extensionists - and by making it available at no cost through the Vietnamese government - IRRI ensured the tool was more accessible and inclusive compared to commercial alternatives. This approach demonstrates an inclusive mindset by adapting the tool to "meet users where they are," considering their skills and limitations to genuinely serve their needs.

For completeness, it is worth mentioning another interesting digital tool developed by ATDT Vietnam – the WaterIntel Sensor – which is vertically integrated with FarMoRe and RiceMore (VN13). According to reports and interviews, the tool was developed in collaboration with Thanh Loc, a local company, with valuable input from both field agents and farmers, ensuring it met the needs of smallholders. It uses SMS messages to provide daily real-time water level data to farmers without smartphones, significantly improving accessibility for those without advanced technology. This accessibility ensures that smallholders, who might otherwise be excluded, benefit from real-time irrigation management data through a digital tool. For the analysis, the behavioral outcome on farmer level seemed more central than the inclusiveness of the tool; hence, the outcome is discussed in more detail under outcome domain 3a.

In Brazil, facilitating an inclusive tool development process was a top priority. This emphasis was reflected in the outcomes data: Four out of the 8 SMART outcomes harvested in Brazil related directly to this domain.

Chronologically, the first significant behavioral change generated by the project occurred during a series of six co-creation workshops held from June 19th to June 22nd, 2023 (BR04). During these workshops, the project successfully engaged 71 farmers and 20 Solidaridad staff, sparking interest among participants in adopting AE practices and working with digital tools. Several representatives from Solidaridad confirmed that they gained invaluable insights from these events, helping them to guide the tool development. However, the significance in terms of a behavioral or even attitude change in the farmers appeared limited, as many did not even recall participating in these workshops a year later when interviewed during the evaluation.

The only exception was the result of one of these workshops that was held specifically for women in Tuere. After the event, the women continued sharing ideas on the WhatsApp group created during the event. Eventually, this led to the formation of a cocoa and chocolate women cooperative (BR05). Although this outcome did not link directly to ATDT's objective of enhancing the inclusiveness and accessibility of digital tools, it was still considered an unintentional positive result of such efforts. The change represents a significant step in women's empowerment and economic advancement in Novo Repartimento. For years, women in this region struggled to find opportunities to participate in productive activities. The formation of this group has provided a space for them to work together, share knowledge, and achieve economic independence.

The outcome for the Tuere group is directly linked to another outcome (lead) that the evaluation team found in the ATDT Action Partner Solidaridad: ATDT was the first project in over a decade of their work in the region in which Solidaridad organized tailored workshops specifically for women and youth (BR01). This may further signal their commitment to understanding the diversity among farmers and ensuring that groups who may have been marginalized are actively included (see principle 1.1, Dittmer *et al.* 2024, Footnote 8). In an interview, Solidaridad stated that they are continuing to organize women-only workshops in other project contexts beyond ATDT.

> Conclusion C1.2: The ATDT project in Brazil addressed group specific needs rather than one-size fits all approaches.
>
> The ATDT project in Brazil demonstrated that addressing group-specific needs is more effective for fostering inclusivity than relying on uniform approaches. While the general co-creation workshops succeeded in engaging a broad audience and informing Solidaridad's tool development process, they had limited long-term impact on farmers' behavior. In contrast, the women-only workshop in Tuere showcased the transformative potential of tailored initiatives. This event not only led to the formation of a women's cocoa and chocolate cooperative – a groundbreaking step in economic empowerment for the women involved – but also highlighted the untapped potential of marginalized groups when their unique needs are prioritized.
>
> Solidaridad's decision to organize targeted workshops for women and youth, an approach introduced through ATDT, marks a critical shift in their operational strategies. By recognizing the diversity within farming communities and actively including groups often overlooked, Solidaridad has set a new standard for inclusive engagement. Their stated commitment to replicating these tailored efforts in other projects indicates a broader institutional change inspired by ATDT's inclusive principles.

Insights from the above mentioned 2023 co-creation workshops guided the development of the new tool Solis. One of Solidaridad's key takeaways from the workshop was the farmers' keen interest in social media: They clearly expressed a desire for a tool with social media features that would enable direct interaction with peers and local extensionists. While integrating a social media component had not been part of ATDT's original plan, they honored their commitment to inclusive tool development by making this social media feature a reality.

> Conclusion C1.3: The ATDT project in Brazil showed the flexibility required for inclusive tool development.
>
> Projects that engage end-users in a meaningful way often uncover needs, preferences, or contextual challenges that weren't apparent in the initial planning phase. This real-world feedback is invaluable, as it provides tool developers with insights to make their tools more relevant, accessible, and impactful. However, incorporating these new insights requires a willingness to adjust focus and shift project goals as they emerge.
>
> In the case of Solidaridad, a flexible mindset and commitment to an open-ended inclusive approach enabled the team to accept the need for significant changes that potentially make their digital tool more effective for its users, even if it means deviating from the original plan. The inclusive process that unfolded in co-creative workshops revealed quite early that farmers have a strong preference for social media components. Even though this wasn't anticipated, Solidaridad decided to address these requests, fostering a tool with social media features that is potentially better aligned with user needs.

Two additional outcomes in the domain of inclusive tool co-creation are associated with the ambassador group. The Solis Ambassador Program was launched in 2024. It brought five young farmers and two extensionists together for intensive training in São Paulo from July 29 to August 1, 2024. As a result, the ambassadors became actively engaged in digital communication and agroecological practices (BR02). Their growing sense of responsibility in supporting Solidaridad with Solis was evident through their thorough review of user experience, and ongoing communication with Solidaridad to improve Solis (BR03).

> Conclusion C1.4: In Brazil, the ATDT project successfully engaged early users through a co-creation process that built trust and generated valuable input for a tool tailored to its target audience.
>
> The experience with the Solis ambassadors underscores why it is important to approach tool development in an inclusive way. By launching the Ambassador program in 2024, Solidaridad facilitated a deeper engagement with digital communication and agroecological practices of the selected farmers. They developed a strong sense of responsibility toward supporting Solidaridad with Solis, evident through their thorough reviews of the user experience and ongoing communication aimed at improving the tool.
>
> This open approach contributed notably to user engagement and trust. When users witness their feedback leading to tangible changes, they feel more invested in the tool, enhancing adoption rates and promoting long-term sustainability. The creation of a digital tool in a language and context that farmers trust and understand has the potential to be more

impactful. By referring to local tools and materials and adapting Solis to the specific climate and culture of farmers in the Amazon – presented in the farmers' own language – Solis became more accessible and relevant to its users.

All behavioral changes in the context of inclusive tools and inclusive tool development in the case of Brazil emerged progressively throughout Solidaridad's involvement as an action partner, starting in the first half of 2023 and continuing through the end of the partnership.

Conclusion C1.5: Inclusive tool development takes time and often involves trade-offs in terms of scalability

Following each principle of inclusive tools and inclusive tool development is inherently time-intensive and requires balancing competing priorities. In Brazil, the project prioritized developing an inclusive tool, focusing on engaging a diverse range of farmers – including women and youth – through tailored workshops and tools that directly addressed their needs. Farmers requested localized knowledge that could not simply be replaced with generic content, making custom tool development essential.

In line with the ATDT's initial planning, the first steps toward outreach were taken during its implementation (see EQ 3b). However, further efforts to engage stakeholders for scaling out were not pursued within the project timeframe. The time-intensive nature of the inclusive approach meant that broader outreach, the establishment of additional partnerships, and the dissemination of the tool were beyond the scope of what could be achieved during the project. Nevertheless, Solidaridad is planning to build on this foundation after ATDT, with a focus on expanding the tool's reach and engaging a wider range of stakeholders to support broader implementation and scaling efforts.

Innovation/co-creation of agroecological practices (EQ 2)

Summary of our findings and conclusions for EQ 2:

> To what extent do we find evidence at the outcome level for increased knowledge sharing / co-creation using inclusive digital tools for farmer innovation for climate-resilient informed AE practices?

» Evidence at the outcome level suggests that the ATDT project has contributed to increased knowledge sharing and some degree of co-creation using digital tools for farmer innovation in climate-resilient AE practices, with variations between Vietnam and Brazil.

In Vietnam, co-creation involved farmers and extensionists. Although alignment with government programs like "1 Must, 5 Reductions" (1M5R) may have limited opportunities for farmer-driven co-creation, there were still instances where farmers and extensionists utilized the FarMoRe tool to enhance knowledge exchange. For example, farmers like Mr. Phu used FarMoRe to create local groups for discussing rice-growing techniques, and extensionists integrated the tool into their visits to provide data-driven advice, fostering trust and promoting sustainable practices. More outcomes at farmer level could not be detected since the co-creation aspect was not a major focus in Vietnam at this point.

Looking ahead, the new training curriculum, with modules on co-creation, the FarMoRe tool, and improved rice practices, holds potential to advance AE by equipping extensionists to support farmers while aligning with 1M5R.

In Brazil, the project demonstrated evidence of co-creation and innovation among the Solis ambassadors. The Solis ambassadors, after intensive training, began creating and sharing videos on AE practices through the Solis platform, covering topics such as cocoa seedling production and rotational pasture grazing. Solidaridad designed Solis to enable two-way information flow between farmers and extensionists and implemented a structured process for exploring and refining agroecological practices. More outcomes in the domain of knowledge co-creation could not be detected since the tool was only rolled out shortly while writing the report. Therefore, it is still early to fully assess the impact on farmer-extensionist interactions and the co-creation of AE practices using the new tool, but the described efforts are promising steps toward collaborative knowledge development.

Similarly to Vietnam, the ATDT team in Brazil has developed a training curriculum that holds potential to advance AE by using a localized, co-creative approach after phasing out of the project.

As per its second objective, the ATDT project set out to *"Improve inclusive knowledge development in digital tools for technical advisories and farm performance assessment*". Consequently, the OH study

explored behavioral changes among stakeholders, particularly around the co-creation of localized AE practices through the early adoption of the tool.

It should be noted that the concept of co-creating AE practices through digital platforms is relatively new in both Brazil and particularly in Vietnam. This unfamiliar approach means that farmers, extensionists, and other stakeholders may still be in the early stages of adjusting to these forms of collaboration. As co-creation often requires a shift from traditional top-down advisory methods to more participatory and iterative processes, it can take time for stakeholders to feel comfortable and confident in contributing their ideas and experimenting with new practices. Consequently, it's possible that behavioral changes tied to co-creation are still emerging, and the ATDT partners IRRI and Solidaridad might want to invest additional time to observe and document these changes fully after the official phasing out of ATDT.

 In Vietnam, the evaluation team was able to show that at least three farmers not only started comparing their farming practices with those of their peers, but also began to ask more informed questions, suggest alternative methods, and explore innovative practices (VN04). An example involved Mr. Phu, one of the interviewed farmers, who leveraged the information from FarMoRe to create a Zalo[10] group for local farmers, facilitating discussions and exchanges on rice-growing techniques. Inspired by the insights obtained through the data, Mr. Phu tested new methods throughout the growing season, closely monitored his results, and shared his observations with the group, creating a dynamic environment for collaborative learning.

A further outcome described how extensionists and farmers changed the way they were giving and receiving agricultural advice: Field agents were integrating the FarMoRe tool into their on-site visits, demonstrating to farmers how their farming performance compared with local averages (VN03). This data-driven comparison provided farmers with specific insights into key inputs such as seed, water, pesticide, and fertilizer usage, helping to promote the adoption of more sustainable practices in rice production. At the same time, the tool was acting like a "bridge," connecting extensionists, who often have advanced agricultural knowledge, with farmers, who bring valuable hands-on experience but may have limited access to technology. This exchange facilitated learning and fostered trust, enhancing the confidence of farmers in the extensionists' advice. Importantly, FarMoRe was particularly empowering for women extensionists, who gained a stronger basis for their recommendations and now use a more collaborative approach to supporting sustainable practices among farmers. A curriculum developed and implemented by IRRI to train extensionists from the DCP formed a critical foundation for these developments. By providing both the technology and the capacity-building needed to use it effectively, including co-creation principles, ATDT contributed significantly to this outcome.

Besides these two outcomes, the evaluation team was not able to identify behavioral changes that related to the co-creation of AE practices. This does not come as a surprise since alignment with the government program 1M5R was a high priority.

[10] Zalo is a popular social network in Vietnam.

The 1M5R program, widely adopted in Vietnam as a policy for sustainable rice production, aligns with AE practices in some aspects, even though it may not fully embody a comprehensive AE approach. Specifically, the 1M5R program promotes the use of certified seeds (1 Must), and the reduction of fertilizers, water, pesticides, and post-harvest losses (5 Reductions). This directly supports efforts to enhance environmental sustainability, reduce GHG emissions, and conserve natural resources, aligning with the AE principles of biodiversity, resource efficiency, and sustainability.

However, even though the 1M5R program is somewhat aligned with AE principles, particularly regarding resource reduction and sustainable farming practices, it falls short in fostering full co-creation and innovative solutions that could lead to broader AE transitions. Put differently, the emphasis of the tool FarMoRe on achieving specific 1M5R targets, particularly for emissions reduction, prioritizes top-down implementation over community-driven, context-sensitive AE transformations. The lack of room for farmers' involvement in the design and refinement of practices under the current framework reduces the potential for deeper AE change. This makes it challenging to achieve behavioral changes based on local contexts, and limits the scope for farmer-led innovation in the transition process.

> Conclusion C2.1: The top-down approach in Vietnam limited farmer-driven co-creation of AE practices, focusing instead on government-aligned objectives for scalability despite potential for collective innovation.
>
> Following each principle of inclusive tools and inclusive tool development is inherently time-intensive and requires balancing competing priorities. In Brazil, the project prioritized developing an inclusive tool, focusing on engaging a diverse range of farmers—including women and youth—through tailored workshops and tools that directly addressed their needs. Farmers requested localized knowledge that could not simply be replaced with generic content, making custom tool development essential.
>
> In line with the ATDT's initial planning, the first steps toward outreach were taken during its implementation (see section "Scaling up the inclusive tool approach (EQ 3b)"). However, further efforts to engage stakeholders for scaling out were not pursued within the project timeframe. The time-intensive nature of the inclusive approach meant that broader outreach, the establishment of additional partnerships, and the dissemination of the tool were beyond the scope of what could be achieved during the project. Nevertheless, Solidaridad is planning to build on this foundation after ATDT, with a focus on expanding the tool's reach and engaging a wider range of stakeholders to support broader implementation and scaling efforts.
>
> In Vietnam, the co-creation of AE practices faced constraints due to a more top-down implementation approach, as the program's primary focus was on meeting the objectives of its government partners. This structure was a good fit because it took into account Vietnam's

state and governance traditions.[11] On the other hand, the structure also limited opportunities for farmers to contribute their insights or lead on innovations, as the project was tailored largely to the needs of government bodies rather than grassroots engagement. While farmers like Mr. Phu were able to use the tools to initiate their own knowledge-sharing groups, the overall environment in Vietnam was less conducive to farmer-led co-creation compared to Brazil, where there was more room for innovation through farmer-driven content creation and experimentation. The Vietnamese approach, while scalable, ultimately limited the emergence of co-creation outcomes centered on farmer innovation in the area of AE.

However, Vietnam holds potential for co-creation for climate-smart rice production between farmers and extensionists. Vietnamese agricultural traditions are deeply rooted in collective action, with rice production historically being a communal effort. This collective spirit could foster co-creation initiatives, as smallholder farmers are accustomed to working together and supporting community-driven improvements in farming practices. And research underlines that collective adaptation through government intervention remains a viable strategy for Vietnamese rice farmers in their adaptation to climate change.[12]

Looking ahead, there is potential for advancing AE through the newly developed training curriculum, which includes modules on co-creation principles, the FarMoRe tool, and improved rice farming practices. These modules are already being used in trainings for extensionists, equipping them with practical tools, step-by-step guidelines, and knowledge to support farmers in implementing AE practices while aligning with national programs like the 1M5R initiative.

 In Brazil, the evaluation team identified one outcome with the Solis ambassadors in the domain of co-creating AE practices (BR06). Following an intensive training in August 2024, these five farmers started using their mobile phones to film, edit, and post videos on the Solis platform (which was not open to a broader public at that time), covering topics like cocoa seedling production, harvest management, soil coverage, and rotational pasture grazing. Quoting ambassador Edinael Dias do Nascimento: "*I never thought I could be a video producer.*"

On a more general note, Solidaridad has designed the Solis tool in a way that potentially enables the co-creation of AE practice. Information flows in both directions, for example with the Action Plan feature that can be accessed by both farmers and extensionists. Further, Solidaridad has conceptualized and

[11] Voorberg, W., Bekkers, V., Flemig, S., Timeus, K., Tõnurist, P., & Tummers, L. (2017). Does co-creation impact public service delivery? The importance of state and governance traditions. *Public Money & Management*, *37*(5), 365–372. https://doi.org/10.1080/09540962.2017.1328798

[12] Hieu Hong Hua, Minh Anh Nguyen & Thuy Thanh Thi Ngo (2024) Collective and individual adaptation of rice farmers to climatic variability in the Vietnamese Mekong Delta, Cogent Social Sciences, 10:1, 2390181, DOI: 10.1080/23311886.2024.2390181

implemented a structured three-step process to explore and refine AE practices. This process was followed in the co-creation workshops in 2023. First, farmers collectively selected specific practices to work on, followed by field observations and discussions to refine these approaches. Finally, they returned to the workshop venue to validate and document the practices, with the intention of incorporating them into Solidaridad's curriculum. However, it remains uncertain if this collaboration marked a significant change in how farmers and extensionists interact, or if it was indeed the first time such a co-creation approach was employed. Further verification would be needed to confirm any behavioral changes.

Conclusion C2.2: In Brazil, evidence suggested initial farmer's interest to use Solis for sharing and co-creating AE content, yet more concrete evidence for this use in a larger group of farmers was not available within evaluation period.

The findings from Brazil demonstrated promising potential for the co-creation of AE practices through the use of Solis and associated workshops. The active involvement of Solis ambassadors who were producing and sharing educational videos on AE topics highlighted the tool's capacity to empower farmers as knowledge creators. Further, Solidaridad's structured three-step process for refining and validating practices in workshops, combined with features like the Action Plan that facilitated a two-way communication, underscored the tool's design for fostering collaboration between farmers and extensionists.

However, due to the timeline of the evaluation, it was not possible to observe more concrete outcomes that could fully validate this potential. While the workshops and initial engagements demonstrated a framework for co-creation, further verification would be needed to confirm whether these initiatives will lead to significant behavioral changes or a transformative shift not only in the Solis ambassadors, but also in other farmers and more generally in the ways how farmers and extensionists collaborate. With additional time and continued efforts, the Solis tool may have the potential to become a key driver of farmer-led AE innovation.

Scaling out agroecological practices (EQ 3a)

Summary of our findings and conclusions for EQ 3a:

> Is there evidence that AE practices generated through improved digital access and tools were adopted by farmers, have the potential to be scaled out (peer-to peer)?

» Evidence from the ATDT project indicates that improved digital access and tools have led to the adoption of AE practices by farmers, with potential for scaling out, particularly in Vietnam. In Vietnam, farmers have adopted the FarMoRe tool and the WaterIntel Sensor, leading to shifts in farming practices. The FarMoRe tool has enabled farmers to reduce seed and fertilizer usage, improve water management through the Alternate Wetting and Drying (AWD) technique, decrease pesticide applications, and enhance straw management. These changes have resulted in increased yields and reduced GHG emissions. Although currently on a small scale, the adoption demonstrates willingness among farmers to transition to digital tools and adopt more sustainable practices, indicating potential for peer-to-peer scaling.

Additionally, the WaterIntel Sensor has empowered 44 smallholder farmers by providing real-time irrigation data via SMS, accessible even without smartphones. This has facilitated the adoption of AWD, reducing water usage by up to 30% and contributing to environmental benefits. The inclusive co-development process of the tool, involving farmers and extension agents, enhances its relevance and usability, further supporting its potential for wider adoption and peer-to-peer dissemination.

From a perspective that defines AE as a more comprehensive approach, these changes represent primarily optimized conventional practices rather than a fundamental transformation. Following the comprehensive approach, AE emphasizes biodiversity, ecological resilience, and socio-economic equity - elements that go beyond input reduction and efficiency, without significant diversification or integration of ecological processes like nutrient cycling and habitat conservation. However, expecting a full transition within the three-year project timeframe would have been unrealistic and the focus on improving efficiency and sustainability through the 1M5R program serves as an important foundation for moving towards level 2 AE.

In Brazil, the Solis tool was released shortly before the project's conclusion, with 182 smallholder farmers registering within the first eight days. While this initial uptake is promising and essential for the tool's viability and scalability, concrete outcomes in terms of adoption of AE practices are yet to be observed. The platform's future impact will depend on its ability to foster co-creation, ensure content quality, and expand its user base, which could facilitate peer-to-peer scaling in the long term.

In this section, the evaluation team analyzed the implementation and scaling out of inclusive digital tools with its end-users (farmers and extensionists). It explored how end-users were using the inclusive digital tools and the innovative knowledge on agroecological practices that they were receiving through the tools. This differed from the lens in EQ2, which centered on piloting and testing the tools to co-create and innovate AE practices. In contrast, EQ3a focused on progress in mainstreaming, where digital tools were integrated into everyday use to share knowledge and establish best practices for AE.

Due to the differing timelines and priorities with regard to co-creation in Brazil and Vietnam, the findings for each country vary significantly.

 In Vietnam, more than one third of the SMART outcomes harvested (9 out of 23) fell under the domain of scaling out AE practices, with all outcomes naturally involving the stakeholder group of farmers. These outcomes reflect a significant shift in farming practices driven by the adoption of FarMoRe and the WaterIntel Sensor, albeit small scale.

The adoption of digital tools is an important requirement for actual outcomes and an important indicator of their scalability. Farmers have shown willingness to transition from traditional record-keeping and advisory methods to digital documentation, peer comparisons and data-driven insights by using FarMoRe. For instance, as of November 2024, 709 farmers (most of them being leaders of rice production co-operatives) had already adopted the tool (VN05). The adoption process was facilitated by MARD's DCP and the National Agricultural Extension Center in Mekong Delta, which have conducted training sessions to equip farmers with the necessary skills to use FarMoRe effectively, based on the curriculum developed by ATDT, which includes a strong focus on co-creation of practices. Similarly, 44 farmers in the Mekong Delta began using the WaterIntel tool in 2024 (VN13). Since it is using SMS technology, it is available even to farmers without smartphones. This accessibility ensures that smallholders, who might otherwise be excluded, benefit from real-time irrigation management data through a digital tool.

The WaterIntel tool already drove early impact by enhancing irrigation efficiency and facilitating sustainable water management practices (VN13). In 2024, the 44 smallholder farmers received daily SMS alerts with real-time water level data from their fields through the tool. These data enabled the adoption of the AWD technique, helping farmers to reduce their water usage by up to 30%. The adoption of the tool did not only improve irrigation efficiency but also contributed to broader environmental benefits, such as lowering GHG emissions from rice paddies.

However, the potential of the WaterIntel tool to be scaled out to a larger number of farmers appears limited. At present, farmers are reluctant to pay for the tool, which hinders its ability to expand its audience. For the tool to scale, it would likely require integration into larger projects or programs that include subsidies or financial backing from external sources. Another scalable business model did not exist at the time of writing this report.

> Conclusion C3a.1: The adoption of the WaterIntel Sensor in Vietnam highlighted the potential of inclusive and farmer-centered design, but raised questions about sustainability.
>
> The development and implementation of the WaterIntel Sensor highlight the benefits of engaging farmers in co-creation and iterative feedback processes. From initial concept to field

testing, the tool was shaped by collaboration between the local tool developer, farmers and extensionists. This approach ensured that the tool is useful and relevant, allowing farmers to adopt more efficient irrigation practices, such as AWD, which significantly reduced water use.

However, the current model within ATDT in which farmers access the tool for free raises concerns about sustainability, as no market mechanism exists to support its continued operation or expansion. While the tool's immediate impact is clear, its future depends on finding a balance between maintaining accessibility for farmers and establishing a financial framework to ensure long-term availability and support. This underscores the need for ongoing dialogue between developers, stakeholders, and farmers to secure the tool's role in fostering agroecological practices.

The adoption of the FarMoRe tool has contributed to significant behavioral changes among farmers in the Mekong Delta, fostering more sustainable, efficient, and productive agricultural practices. Key changes include:

- Farmers in Vinh Thanh District reduced seed usage by an average of 11.12 kg/ha, while those in Co Do District achieved reductions of 15.31 kg/ha in Winter-Spring 2023 and 21.16 kg/ha in Summer-Autumn 2024. All farmers involved used certified seeds, ensuring quality inputs (VN06).
- Water management practices improved as all 299 participating farmers in both districts adopted the AWD technique, reducing water usage and GHG emissions by allowing fields to dry twice per season (VN12).
- Nitrogen fertilizer usage dropped significantly, with farmers in Vinh Thanh reducing application rates by 18.22 kg/ha, while those in Co Do achieved reductions of 25.19 kg/ha and 17.97 kg/ha across cropping seasons in 2023 and 2024, respectively (VN07).
- Pesticide usage decreased, with farmers in Vinh Thanh and Co Do reducing the frequency of sprays. In Co Do, reductions averaged 1.14 applications per season in 2023 and 1.26 sprays in 2024 (VN08).
- Straw management saw a shift, with 37% of farmers in Vinh Thanh and 33.54% in Co Do transitioning from burning or burying straw to more sustainable practices such as removal (VN09).
- Between the Winter-Spring 2022-2023 and Summer-Autumn 2024 seasons, farmers in Vinh Thanh and Co Do districts adopted practices that significantly reduced GHG emissions from rice production. In Vinh Thanh, 73 farmers achieved an average reduction of 0.38 tons of CO_2 equivalent per hectare. In Co Do, 44 farmers reduced emissions during the Winter-Spring 2023 season, increasing to 67 farmers by Summer-Autumn 2024 (VN10).
- Between Winter-Spring 2022-2023 and Summer-Autumn 2024, farmers in Vinh Thanh and Co Do districts improved yields and reduced post-harvest losses through mechanization and better practices. In Vinh Thanh, yields averaged 8.08 tons/ha, with 61 farmers increasing yields by 0.77 tons/ha. In Co Do, yields averaged 8.75 tons/ha in Winter-Spring 2023, with 55 farmers gaining 0.75 tons/ha (VN11).

In sum, these described noteworthy changes, leading to reduced seed and fertilizer usage, improved water management through the adoption of the AWD technique, decreased pesticide applications, better straw management, and increased yields with reduced GHG emissions.

The focus of these changes has remained on enhancing efficiency and productivity within existing monoculture systems. The FarMoRe tool is currently used primarily by MARD as a survey instrument for the 1M5R program, fulfilling immediate policy needs for monitoring and reporting. Preliminary assessments of Vietnam's rice production using Gliessman's (2016) levels of AE[13], as discussed during an AE TPP workshop in October, rated most rice production in Vietnam at "level 1," indicating a baseline of highly conventional systems. Stakeholders in the workshop identified moving towards "level 2" AE as an appropriate goal for commercial rice production in the Mekong Delta.

> Conclusion C3a.2: In Vietnam, the FarMoRe tool improved farming efficiency in Vietnam, but deeper AE transformation was beyond the project's realistic scope.
>
> The adoption of the FarMoRe tool represents a step towards more sustainable and efficient farming methods, but its impact should be critically assessed from an AE perspective. The observed changes reflect optimized conventional practices rather than a fundamental transformation towards AE, which emphasizes biodiversity, ecological resilience, and socio-economic equity. While input reductions and efficiency improvements are important, they do not encompass broader ecological processes like nutrient cycling, habitat conservation, or system diversification required for a deeper AE transition.
>
> However, in this context, it is important to recognize AE transformation as a spectrum. Expecting a full transition within the three-year project timeframe is unrealistic, particularly given Vietnam's national context of rice production and the political and commercial constraints of monoculture systems. Instead, the focus on improving efficiency and sustainability through the 1M5R program serves as an important foundation for moving towards level 2 AE.
>
> Furthermore, the impact of FarMoRe depends largely on how MARD chooses to integrate it into its broader agricultural agenda. Currently, MARD uses the tool mainly as a survey instrument for the 1M5R program, fulfilling immediate policy needs for monitoring and reporting. While this role is essential, it limits the tool's potential to empower farmers, drive behavioral change, and foster a deeper AE transition - capabilities that remain largely untapped within the current framework.

In Brazil, preparatory work for the ATDT project began in 2022 and implementation started in mid-2023. The tool was launched to the public just weeks before the ATDT project concluded at the end of 2024, coinciding with the drafting of this report. This delay stemmed partly from the open, co-creative approach taken during development, as discussed in outcome domain 1. As a result, outcomes with end-users of the tool Solis were unlikely to be observed before the project's conclusion.

Despite this, initial evidence of progress surfaced shortly after the tool's release. In the days following Solis' launch at an event on November 4th and its release on the Google Play Store on November 12th, 2024, 182 smallholder farmers from Novo Repartimento and Pacajá registered using their mobile phones

[13] Gliessman, S. (2016). Transforming food systems with agroecology. *Agroecology and Sustainable Food Systems*, *40*(3), 187–189. https://doi.org/10.1080/21683565.2015.1130765

(BR08). This initial uptake is significant as registration is the gateway to using Solis. The first wave of users, mainly from the Solidaridad extensionists' network, is expected to catalyze wider adoption, with young farmers anticipated to begin creating and sharing content by the end of 2024.

The out-scaling of Solis is further supported by the five farmers acting as Solis Ambassadors who have started promoting the tool Solis and AE practices not only through sharing of videos via the tool, but also through informal conversations with friends and neighbors who asked about the tool (BR07). Promotional activities were opportunistic, in the sense that they took the opportunity to talk about Solis when family members, neighbors or colleagues asked about their trip to Sao Paulo. The fact that they were awarded a week training in Sao Paulo – very unusual in the region – helped to raise curiosity on their activities and learnings.

Further outcomes in the domain of out-scaling could not be harvested. Solidaridad chose a gradual, organic deployment and upscaling strategy to increase user adoption, rather than aiming for a rapid surge upon launch. This approach focused on expanding circles of users connected through real-life relationships and common linkages, such as those facilitated by Solidaridad extensionists. By relying on these trusted networks, Solidaridad aimed to foster a more sustainable and engaged user base over time. Consequently, a swift increase in user numbers was neither expected nor pursued at the time of Solis's release.

Besides the engagement with Solis ambassadors, the deployment and upscaling strategy envisioned campaigns on social media, radio ads and billboards to reach individual farmers in Pará and Mato Grosso as well as entering partnerships with local organizations providing technical assistance or services to farmers such as other NGOs and government stakeholders.

The long-term sustainability of Solis depends on the viability of its financial model. According to insights from Violaine Laurens (interview on November 8, 2024), farmers are not willing to pay for tools like Solis. Therefore, in the first instance, Solidaridad plans to sell Solis as part of a package together with their tool Extension Solution, targeting farmers' organizations, research institutions, and especially companies, which are seen as the most promising market. While costs are covered for the first half of 2025, the tool's viability will depend on its integration into Solidaridad projects and its appeal to these organizations. Through its outreach activities (see EQ 3b), Solidaridad also aims at public agencies at the local level (municipal or state). They are not targeted as direct clients, but they may become involved indirectly through projects funded by external donors.

> Conclusion C3a.3: In Brazil, the ATDT project has taken a promising first step toward scaling out AE practices through Solis, but significant impact is still to unfold.
>
> The activation of Solis marks an important initial step toward scaling agroecological practices using a digital tool in Brazil. The registration of 182 farmers within the first week demonstrates promising engagement; however, this primarily reflects the tool's initial uptake rather than sustained impact on the daily practices of its users. True success will depend on the platform's ability to foster co-creation, ensure content quality, and expand its user base.

Scaling up the inclusive tool approach (EQ 3b)

Summary of our findings and conclusions for EQ 3b:

> Is there evidence that AE practices generated through improved digital access and tools were scaled up (technology into policy, institutionalization) with the potential to generate large-scale impacts?

The evaluation provided robust evidence that inclusive digital tools responding to local needs were scaled up into policies and institutional frameworks, particularly in Vietnam, with potential to drive large-scale impacts.

The national adoption by Vietnam's MARD of RiceMoRe/FaReMore demonstrated government-level endorsement and the potential for nationwide implementation of digital tools for climate-resilient agriculture. At the local level, the enhanced capacity of over 1,000 AAS officers to use FarMoRe for real-time field data collection and evidence-based recommendations highlighted the transformative influence of the digital approach on local policies and practices. Finally, the integration of ATDT's SECTOR API by DTDs such as AgriTask, Dai Thanh, and AgriG8 marked progress in up-scaling, as it demonstrated how the tool is being adopted and institutionalized by other organizations, potentially facilitating national and global applications for GHG tracking and sustainable rice certification in climate-smart agriculture.

In Brazil, the late launch of the Solis tool in November 2024 resulted in limited scaling outcomes, making it too early for the evaluation to fully assess any outcomes from up-scaling efforts. Yet, the initial adoption by 182 farmers and the promotional activities led by Solis Ambassadors signal important steps towards future scaling. Further, the transformation of Solidaridad Brazil's Digital Unit underpinned the importance of internal capacity-building to facilitate the integration of digital and field expertise, and created a strong basis for inclusive development and eventual mainstreaming. Solidaridad Brazil's strategic engagement with key government bodies toward the end of the project (Nov 2024) and focus on gradual, trust-based user growth throughout the development of the tool further support the potential for long-term scaling.

At the global level, there is some evidence that activities supported scaling of AE practices supported by improved digital tools, despite the fact that outcomes were not a primary expectation of the project. The "Principles Paper" (Dittmer et al., 2024, see Footnote 8) engaged ARB stakeholders, offering a strong theoretical framework and sparking interest from PATH2DEA and Agroecology Europe. However, the lack of practical demonstrations and insufficient focus on the agroecological component seems to have hindered broader adoption and institutionalization, particularly among AAS representatives who sought tangible, field-tested applications. While early partnerships and stakeholder interest suggest potential for future scaling, these developments remain in their infancy, and the

project's global-level impact in driving large-scale adoption of agroecological practices through digital tools was understandably modest. However, the global level played an important supporting role in the country-level work by providing a strong conceptual framework, providing a platform for exchange, fostering international partnerships, and promoting the principles of inclusive tool development, which have the potential to inform and enhance scaling efforts at the national level.

EQ3b dealt with creating an enhanced environment for the adoption of the tools (e.g., through institutionalization) and up-scaling of inclusive digital tools (technology into policy) with the potential to generate large-scale impacts. The outcomes outlined in this section highlight either the adoption of a broader inclusive tool approach or the up-take of a specific inclusive tool by an institutional or policy stakeholder.

 In Vietnam, the evaluation team found a total of 11 changes in behavior (10 SMART, one lead) that mapped onto the up-scaling domain of the ToC.

Three of the outcomes in Vietnam were related to other tool developers who integrated ATDT's SECTOR API of FarMoRe into their own apps. First, AgriTask, a leading provider of agricultural technology solutions in Vietnam, incorporated the API into their app developed under an International Finance Corporation (IFC) project. This addition enabled users to access GHG emissions data for MRV processes and carbon certification, driving the advancement of digital tools for sustainable agriculture in the region (VN14). Second, tool developer Dai Thanh collaborated with IRRI to integrate the SECTOR API into its monitoring tool, enabling a pilot rice carbon project in An Giang province with accurate MRV for GHG estimation (VN15). Third, tool developer AgriG8 connected their CropPal app to the SECTOR API, enabling GHG emissions data access and piloting the app in Dong Thap in 2024 to support SRP scoring for sustainable rice practices (VN16).

For the Vietnam Action Partner IRRI, the ATDT project brought about one unintended positive outcome on the policy level in the up-scaling domain (VN17). Freshfields Bruckhaus Deringer LLP, an international law firm with offices in Vietnam, agreed to take on IRRI Vietnam as a pro bono client to develop its first digital data privacy policy. This initiative aims to strengthen IRRI's institutional capacity in data governance, ensuring that all data collected and processed through the project's digital tools comply with Vietnamese data protection laws.

This was a significant process change in the context of Vietnam, considering that it enacted its first comprehensive data protection law, Decree No. 13/2023/ND-CP on Personal Data Protection (PDPD) just

recently in 2023.[14] While the PDPD provided a general framework for data protection, specific discussions on farmers' data rights have not been prominently featured in Vietnam's public discourse.

> Conclusion C3b.1: Partner adoption and IRRI's digital data privacy policy in Vietnam confirmed the potential for institutionalizing and scaling up digital tools into governance frameworks.
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> The integration of the SECTOR API by AgriTask, Dai Thanh, and AgriG8, alongside IRRI's establishment of a digital data privacy policy, underscored the transformative potential of the digital tools bridging technology with institutional requirements and government regulatory frameworks, with the potential to scale sustainable agriculture.
>
> By aligning IRRI's data practices with Vietnam's regulatory requirements and incorporating EU General Data Protection Regulation (GDPR) principles, this policy enhanced IRRI's ability to manage sensitive data and protect user privacy which is in line with the inclusive approach (see Principle 5 in Dittmer *et al.* 2024).
>
> In the context of recent developments in Vietnam as mentioned above, IRRI's proactive development of a digital data privacy policy was both timely and forward-thinking. By aligning with Vietnam's new data protection regulations and incorporating global best practices, IRRI set a precedent for responsible data governance in the agricultural sector. This initiative not only ensured compliance with legal standards but will also potentially build trust among farmers and stakeholders, promoting transparency and inclusivity in data-driven agricultural projects. Such efforts are essential for fostering a sustainable and equitable digital transformation in Vietnam's agriculture.

Four outcomes in the up-scaling domain described behavioral changes in government stakeholders. The first outcome highlighted the formal adoption of FarMoRe in July 2024 as the designated MRV tool for the "One Million Hectares Program" (VN19). This decision solidified FarMoRe's role in tracking GHG emissions and managing sustainable rice production across Vietnam's largest agricultural initiative. Integrated into RiceMoRe, FarMoRe provides granular field-level data essential for emissions monitoring and sustainable management, ensuring alignment with Vietnam's climate-smart agricultural goals. This integration demonstrated how the tool transitioned from field trials to pivotal roles in policy implementation.

The second key outcome was the adoption of RiceMoRe, including its FarMoRe component for detailed field-level emissions tracking, by MARD for nationwide use (VN18). The effectiveness of RiceMoRe in supporting management and policy decisions was initially demonstrated when piloted in 13 provinces of the Mekong Delta. This success led to the tool's formal handover to MARD's Center for Digital Transformation and Statistics in September 2024 and its official launch for national MRV efforts in October 2024. Incorporating the FarMoRe component for detailed field-level emissions tracking,

[14] See Asia & Data Protection Newsletter by Nishimura & Asai on April 21,2023: https://www.nishimura.com/sites/default/files/newsletters/file/asia_data_protection_230421_en.pdf

RiceMoRe now enables Vietnam to meet its goals for sustainable rice production and climate-aligned policy planning, showcasing its potential to drive large-scale impact.

A third critical development was the enhanced capacity of Vietnam's commune-level AAS officers (VN21). Trained under MARD's directive and using IRRI's curriculum, more than 1,000 AAS officers had the capacity to use FarMoRe for detailed field-level reporting by November 2024. Their shift from basic pen-and-paper reporting to comprehensive data collection using digital tools empowered officers to analyze real-time data on farming practices, enabling evidence-based recommendations tailored to local conditions.

The fourth outcome illustrated how FarMoRe drives policy innovation at the local level. In Can Tho, data from FarMoRe informed the People's Committee's Plan No. 93/UBND-TPCT, issued in May 2024, to promote sustainable, low-carbon rice production (VN20). By incorporating FarMoRe data into its initiatives, the Department of Crop Production supports high-quality, climate-friendly rice programs in alignment with the One Million Hectares Program.

> Conclusion C3b.2: In Vietnam, MARD's adoption of FarMoRe marks significant progress in data-driven agriculture, integrating it into national frameworks to drive large-scale impact, yet, it focused on scaling and regulation rather than inclusive co-creation.
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> MARD's strategic decision to adopt FarMoRe and integrate it into key policy initiatives like the One Million Hectares Program is not just a technological upgrade. It signifies the Vietnamese government's commitment to data-driven, sustainable agricultural practices. By institutionalizing RiceMoRe including FarMoRe, MARD has created a model for scaling digital innovations in ways that directly align with Vietnam's sustainability goals.
>
> However, as said above, the top-down nature of decision-making within MARD could limit the potential for greater farmer involvement in co-creation processes. While MARD's centralized structure facilitates alignment and consistency in policy implementation, it may hinder the active participation of smallholder farmers, as local or farmer-driven initiatives often require approval from higher authorities. Further, from an AE perspective, these changes represent primarily optimized conventional practices rather than a fundamental transformation.

Apart from the outcomes mentioned above relating actors involved in the project (DTDs, government agencies, IRRI), there were three additional outcomes highlighting the potential for scaling up FarMoRe to other contexts or countries.

First, since early 2022, the Sustainable Rice Platform (SRP) explored integrating functionalities from ATDT's tools, including FarMoRe and SECTOR, into its CropPal platform for GHG tracking and rice certification. While limited demand for SRP-certified rice in Vietnam shifted ATDT's focus to government partnerships, SRP continued to show interest, with discussions in 2024 continuing on using FarMoRe for performance assessment under its standards (VN22).

Second, in 2024, Winrock International, a nonprofit organization that implements various USAID-funded projects in Vietnam including on climate resilience, agriculture, and environmental protection, partnered with IRRI. It aimed to integrate FarMoRe into the USAID-funded Climate Resilient Agriculture in the Mekong Delta (CRM) program, replacing standard MRV practices with FarMoRe's precise, real-time data collection

(VN23). This integration supported CRM's objectives to enhance ecosystem management, increase resilience, and reduce methane emissions across several provinces in the Mekong Delta.

Finally, an outcome lead signaled that IRRI had initiated efforts to expand FarMoRe's use beyond Vietnam by engaging stakeholders in countries like Thailand, Laos, and the Philippines. In 2024, Thailand requested a joint workshop to assess the tool's applicability for their rice programs, and Laos expressed interest in leveraging FarMoRe for performance assessment and data collection (VN24). However, this outcome lead could not be turned into a SMART outcome within the time of frame of the study.

In sum, IRRI's engagement with stakeholders highlighted a regional demand for the tool and showcased its proactive approach to scale its application across Southeast Asia.

> Conclusion C3b.3: Outcomes within various external stakeholders highlighted a regional demand for FarMoRe and the inclusive tool approach.
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> IRRI's engagement with various external stakeholders revealed a growing demand for FarMoRe's innovative approach to data-driven agricultural management across Southeast Asia. The tool's ability to enhance precision in performance assessment and align with climate resilience objectives has attracted interest from regional and international organizations. These outcomes underscore FarMoRe's potential as a scalable solution for application across Southeast Asia.

In Brazil, the evaluation harvested only one outcome relating to the up-scaling of the inclusive tool approach, yet an important internal, process change: The Digital Unit of Solidaridad Brazil transitioned from an internal service provider to a proactive cross-sector innovator managing programs like RESAFRA[15] (BR09). This change signified a notable shift in the Unit's role within the organization, allowing it to initiate and lead projects that integrate both digital and field-based solutions. The combination of technical expertise in digital tool development and deep practical field experience enabled them to better understand the timelines required for inclusive digital tool development, foster inclusive principles in tool creation, and maintain transparency throughout the process. This new role made a difference by allowing the Digital Unit to contribute strategically to Solidaridad Brazil's mission. By moving beyond their "official mandate," they can now address broader challenges and drive innovation across sectors. The transformation was influenced by support from ATDT Global, which provided guidance on applying inclusive principles and offered opportunities for international exposure. This, combined with internal decisions to empower the Unit, has fostered long-term shifts in how Solidaridad Brazil develops strategies and proposals, embracing a more digital-centric approach.

[15] See https://imaflora.org/servicos/esg/resafra for more information.

This outcome should be analysed in the context of different studies such as Durugbo and Parawar (2014)[16] and European Commission (2022)[17], which emphasize the critical role of well-equipped teams in successful co-creation initiatives. These studies highlight that the competencies of teams involved are pivotal to the success of co-creation efforts.

> Conclusion C3b.4: In Brazil, the transformation of Solidaridad's Digital Unit demonstrated the importance of empowering teams to integrate digital and field expertise, fostering inclusive development and large-scale impact.
>
> The transformation of the Digital Unit at Solidaridad Brazil represents a substantial advancement in the organization's capability to innovate and manage complex programs like RESAFRA. By evolving from an internal service provider to a proactive cross-sector innovator, the Digital Unit has leveraged its combined technical expertise in digital tool development and practical field experience.
>
> The experience of Solidaridad Brazil is in line with findings from literature on digital tool development that building and empowering teams with specialized expertise is a good investment that enhances the effectiveness of digital tools and their impact on target communities. By cultivating the necessary competencies within their team, Solidaridad Brazil is better positioned to address broader challenges, drive innovation, and contribute strategically to their mission.

No further outcomes were observed in Brazil for the domain of upscaling the inclusive tool approach. This gap was primarily attributed to the late roll-out of Solis in the project cycle and the strategic approach adopted by Solidaridad for this.

Throughout most of the evaluation period, Solis was under technical development, with meaningful implementation activities only commencing in mid-2023. The tool was released to the public just weeks before the ATDT project concluded. Initial discussions with key government bodies occurred in March 2024. According to Mariana Pereira, Environment & Quality Manager at Solidaridad Brazil, these initial discussions indicated that fully developing the digital tool before continuing the engagement process with stakeholders could lead to stronger support from key actors. Also, the concept of AE proved highly politicized due to the strong influence of the conventional agricultural vision promoted by the Brazilian agribusiness sector. The organizations involved in the initial discussions in March 2024 included the Pará Department of Environment (SEMAS), the National Rural Learning Service (SENAR), and EMATER – the state-level agriculture support agency. These entities hold significant political influence and have

[16] Durugbo, C., & Pawar, K. (2014): A unified model of the Co-Creation process. Expert Systems with Applications, 41(9), 4373-4387.

[17] Matti C., Rissola G., Martinez P., Bontoux L., Joval J., Spalazzi, A. and Fernandez, D. (2022): Co-creation for policy: Participatory methodologies to structure multi-stakeholder policymaking processes. Publications Office of the European Union

extensive reach; for instance, EMATER employs several hundred extensionists across over 285 cities in Pará state.

To follow up on the initial interactions in March 2024, the project invited institutional actors to participate in workshops planned for November 2024, with invitations sent in September. These workshops showcased tangible outputs, including the curriculum and Solis 1.1, featuring content developed by the ambassadors. However, given that these engagements were introductory and occurred close to the project's conclusion, there was no realistic possibility of observing changes in these external stakeholders' behaviors or policies within the evaluation period. Any potential outcomes resulting from these interactions would likely materialize after the project's end and thus were not captured during this assessment.

> Conclusion C3b.5: Solidaridad Brazil is now well-positioned to scale out Solis in the next phase, thanks to its gradual adoption strategy and strengthened internal capacity.
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> The limited number of outcomes in Brazil regarding the upscaling of the inclusive tool approach reflected the late roll-out of Solis and Solidaridad's deliberate strategy of gradual, organic adoption. While the timing of Solis's release restricted opportunities to observe outcomes within the project period, the first step to future impact was done by establishing potential user networks and preliminary engagements with influential government stakeholders. These efforts, combined with the internal transformation of Solidaridad Brazil's Digital Unit into a proactive innovator, positioned Solis for sustained growth and broader adoption beyond the project's conclusion.

At the global level, the ATDT team worked to support the adoption and up-scaling for inclusive tools through two major avenues. First, the team most notably researched, published and distributed a paper on principles for inclusive tool development (Dittmer *et al.* 2024, see Footnote 8). During the writing process, the project facilitated workshops to engage key stakeholders. Representatives from ARBs, donors, and AAS-NGOs were invited to participate and share their insights in digital tool development, which contributed to shaping the principles. These workshops provided a collaborative platform, ensuring that diverse perspectives were integrated into the final guidance.

Second, the team focused on the publication and distribution of these principles to external stakeholders. ATDT Global published and distributed a first version of the "Principles Paper" in 2022, and a second version in 2024: the "Principles for Inclusive Tool Development" (Dittmer *et al.* 2024, see Footnote 8). A further baseline report, the "Tool Review"[18], examined digital tools for climate-resilient agroecological transitions, highlighting features that ensure social inclusion and climate adaptation. The communication tools were shared publicly and through events, reaching a wide range of global partners, multipliers, ARBs,

[18] Burns, S., Dittmer K.M., Shelton S.W., Wollenberg E. 2022. Global digital tool review for agroecological transitions. Agroecological TRANSITIONS: Inclusive Digital Tools to Enable Climate-informed Agroecological Transitions (ATDT). Cali, Colombia: Alliance of Bioversity & CIAT. Online: https://cgspace.cgiar.org/server/api/core/bitstreams/b7c88974-be1c-4cfb-af93-d9f25940763a/content

INGOs, and donors. The goal was for stakeholders to adopt, share, and apply the principles, positioning them as multipliers to extend their impact across networks and initiatives.

The writing of the "Principles Paper" included the active engagement of external stakeholders. This engagement was captured in an outcome that could not be made SMART but still provides a learning opportunity (GL06). Various external stakeholders participated in a workshop to discuss the "Principles Paper" and gave feedback. The observed participation reflected an openness to collaboration and a willingness to share insights on inclusive tool development from those involved. It built on ATDT's efforts to foster a space for dialogue and exchange, where participants felt their perspectives were valued and impactful. The engagement was beneficial not only for ATDT, but also for its exchange partners. While ATDT benefited from the external perspectives since it could incorporate them into the principles publication, the external stakeholders reported in interviews with the evaluators that they gained exposure to new ideas and approaches that are relevant to their own activities.

This publication and distribution strategy also led to two SMART outcomes harvested through the evaluation. First, in April 2024, ATDT was invited to join the Digital Agroecology Cluster by PATH2DEA[19], a European initiative promoting digitalization in agroecological farming systems (GL04). Second, during the same year, Vincent Dauby from Agroecology Europe authored an article for FAO's Germinate! series, citing ATDT's inclusive principles and approach as key inspirations for aligning digital innovations with agroecological practices (GL03). Two additional outcome leads were not researched further due to a low priority ranking but should be mentioned here for completeness. One of the leads suggested that during 2022, representatives from different organizations like Digital Green and #DigitAG participated in a virtual workshop to review ATDT's draft "Principles Paper", and provided feedback on phrasing, audience focus, and structure to refine the guide (GL06). Second, in 2024, a representative from Access Agriculture proposed collaborating with ATDT on an IFAD grant for the "Agri Connect" project (GL05). The outcomes reflect stakeholder interest in ATDT's inclusive principles and approaches, evidenced by recognition from key initiatives like PATH2DEA and a researcher from Agroecology Europe, collaborative feedback from organizations like Digital Green and #DigitAG, and emerging opportunities for partnership, such as the proposal from Access Agriculture for a joint project.

Notable was that these global outcomes all involved the same type of actor, namely ARBs, despite the project also targeting representatives from other stakeholder groups (section 4). Partly, this could be explained by the fact that the "Principles Paper" developed within the project proved to be most relevant and applicable to ARB stakeholders. During the interviews conducted for this study, representatives from these organizations expressed a strong interest in the theoretical basis of inclusive tool development.

Other types of stakeholders, particularly the AAS, showed a different focus. AAS representatives are primarily interested in the practical implementation of inclusive principles and insights gained directly from field experiences, particularly after the completion of the entire development process. This preference for practical outcomes rather than theoretical frameworks was echoed by several interview

[19] "*Paving the Way towards Digitalisation Enabling Agroecology for European Farming Systems*", see https://www.path2dea.eu/index.html for more information.

partners. These individuals emphasized that their main interest lay in seeing how the inclusive tools actually performed in real-world applications rather than delving into the underlying theoretical principles. Essentially, while the “Principles Paper” outlined an important theoretical foundation, it lacked a proof of concept at this stage before project completion, which limited its appeal to a broader audience.

Furthermore, dissemination of the “Principles Paper” within the TPP network proved challenging. The AE component, which could have resonated more strongly with TPP stakeholders, was not prioritized in either Brazil or Vietnam to an extent that would be attractive to a research-focused audience. As a result, the project’s influence within ARB and donor organizations seemed to be limited primarily to a few individuals who already had a vested interest in AE practices and inclusive tool development. This select audience recognized the relevance of the paper, but ultimately the paper did not yet reach broader organizational buy-in.

> Conclusion C3b.6: At the global level, the ATDT team advanced the adoption of inclusive digital tools, notably through the "Principles Paper," which proved most relevant to ARB stakeholders.
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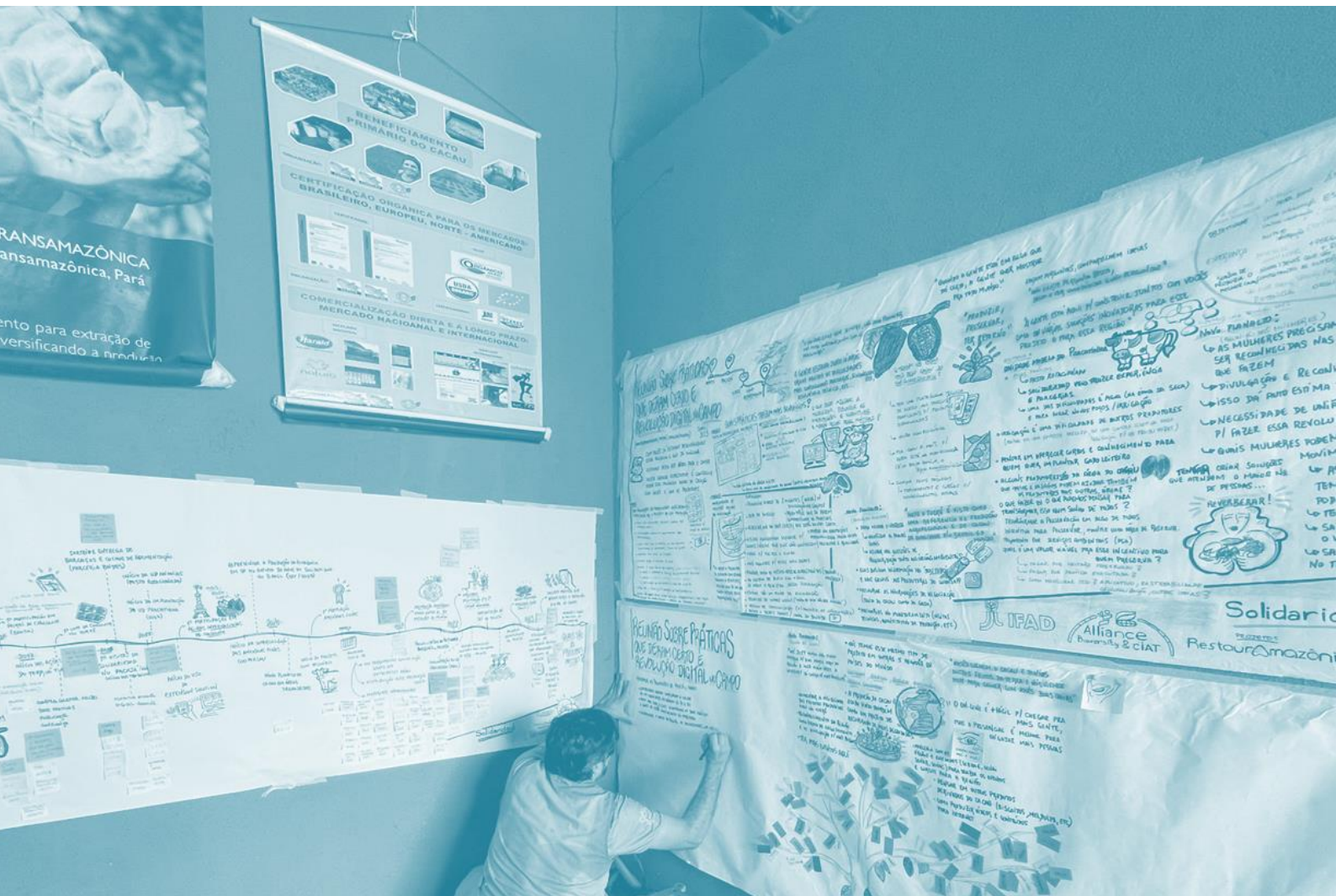
> The ATDT global team made progress in promoting the adoption and scaling of inclusive digital tools by developing and disseminating the “Principles Paper” (Dittmer *et al.* 2022) and its updated version “ Principles for Inclusive Tool Development” (Dittmer *et al.* 2024), and engaging stakeholders through workshops and strategic communication efforts. These principles, shaped collaboratively with input from ARBs, donors, and AAS-NGOs, provided a strong theoretical foundation for inclusive tool development. The distribution of the principles to a global audience aimed to position partners as multipliers and extend their application within relevant networks.
>
> However, the “Principles Paper’s” impact was more limited than anticipated. While ARB stakeholders valued its theoretical contributions, other stakeholder groups, particularly AAS, prioritized practical insights and real-world applications. This mismatch between the paper’s theoretical focus and the broader audience's needs limited its appeal and the extent of its influence, particularly within the TPP network. Moreover, the limited prioritization of the AE component reduced the paper's resonance with research-focused audiences.

Another interesting observation was that four of the six global-level outcomes, three SMART and one lead, fell under one specific type of behavioral change: The interest in exploring potential partnerships (GL01, GL02, GL04, GL05 lead). This category captured instances where stakeholders demonstrated a proactive interest in forming collaborative relationships with ATDT. Such behaviors included reaching out to discuss potential projects, proposing joint activities, and the invitation for ATDT to join an AE network. The nature of this behavioral change was marked by strategic engagement, where the external stakeholders moved beyond passive interest to initiate discussions and formal proposals. This process involved identifying shared goals related to inclusive tool development and AE practices, aligning priorities, and evaluating how a partnership with ATDT could support their missions. Motivated by these shared objectives, stakeholders also saw the opportunity to leverage combined resources and expertise. This behavior underscored ATDT’s credibility, openness to collaboration, and the perceived relevance of its approach to various global contexts and initiatives.

The significance of these outcomes was mixed. In two cases, potential partnerships were explored but not realized due to a lack of strategic alignment. In one case, the interest in exploring potential partnerships led to ATDT being invited to join the agroecological network PATH2DEA (GL04). Since the network's initial meeting was scheduled to occur after completion of the report, this will present an interesting opportunity for ATDT, though the extent of its value and the future of its membership after the project concludes remain uncertain. In the second case concerning Digital Green's engagement with the ATDT global team, the exploration of a potential partnership was still ongoing at the time of report writing and may result in the future collaboration between the ATDT action partners Solidaridad and this ARB (GL01), showing how activities on the global level supported outcomes with an effect on country level.

Conclusion C3b.7: ATDT followed a selective approach to partnerships, reflecting a commitment to its core mission.

In exploring partnerships, ATDT followed a selective approach. The findings highlight that in several instances, ATDT's efforts created curiosity and opened doors for potential collaborations. However, not all potential collaborations progressed, as some did not fully align with ATDT's strategic focus on AE and its target group of smallholder farmers. This selective approach in choosing partners reflects ATDT's commitment to maintaining a clear strategic direction, ensuring that collaborations genuinely support its core mission.



7. Recommended points for consideration

The recommended points for consideration outlined below are drawn from the conclusions presented in the previous chapters, all of which are rooted in empirical evidence. Rather than being organized chronologically, our recommendations are grouped by target audience. They reflect a carefully selected subset of suggestions from the authors, identified by the study steering committee as particularly relevant and valuable.

Conclusion	Recommendation
Internal ATDT action partners	
In Vietnam, MARD's adoption of FarMoRe marks significant progress in data-driven agriculture, integrating it into national frameworks to drive large-scale impact, yet, it focused on scaling and regulation rather than inclusive co-creation (C3b.2).	R1: IRRI should continue to build on the progress made in Vietnam by focusing on fostering inclusive co-creation of agricultural practices alongside scaling and regulation efforts. This could involve offering targeted training programs for AAS officers to deepen their understanding and firsthand experience of co-creative approaches. These trainings could help inspire "aha moments" and demonstrate the value of engaging diverse stakeholders in collaborative tool development and implementation. Additionally, IRRI could invest in further research to explore how cultural dynamics and locally specific strengths can be leveraged to maximize the co-creative potential of communities. Such efforts might extend beyond government initiatives, tapping into grassroots or non-governmental networks to create more adaptable and inclusive solutions. By integrating these practices into their work, IRRI could enhance the sustainability and impact of data-driven agricultural innovations across diverse contexts.
In Vietnam, The FarMoRe tool improved farming efficiency in Vietnam, but deeper AE transformation was beyond the project's realistic scope. (C3a.2).	R2: Research partner IRRI and its tool developer should focus on enhancing FarMoRe's capabilities to support the transition to agroecology by integrating decision-support tools for biodiversity, crop diversification, and ecological resilience. This effort should expand the tool's scope to address broader agroecological priorities, including ecosystem restoration, habitat conservation, and socio-economic equity, making it a more effective platform for sustainable agricultural transformation.

Conclusion	Recommendation
In Brazil, evidence suggested initial farmer's interest to use Solis for sharing and co-creating AE content, yet more concrete evidence for this use in a larger group of farmers was not available within evaluation period (C2.2).	R3: After phasing out of ATDT, Solis managers at Solidaridad should focus on closely monitoring user engagement and content quality as the platform integrates into farming practices to ensure it meets its goals in 2025. As young farmers begin contributing content and the tool becomes embedded in agricultural workflows, the next few months will be pivotal. Regularly tracking usage levels and evaluating the quality of content will help identify early successes and address potential challenges. A proactive approach will ensure that Solis drives climate-informed agroecological practices, reduces environmental impacts, and scales effectively. By maintaining a strong focus on user feedback and platform performance, managers can solidify Solis as a trusted and impactful tool for sustainable farming.
In Brazil, the ATDT project has taken a promising first step toward scaling out AE practices through Solis, but significant impact is still to unfold (C3a.3). Solidaridad Brazil is now well-positioned to scale out Solis in the next phase, thanks to its gradual adoption strategy and strengthened internal capacity (C3b.5).	R4: In the following two years, Solidaridad should 1. Leverage early momentum: Build on the strong initial engagement by focusing on the early adopters and Solis Ambassadors. Provide them with continuous training and support to enhance their roles as champions of the tool, promoting its adoption within their communities; 2. Expand outreach to local and national stakeholders: Strengthen relationships with potential institutional clients, such as farmer-support organizations, AE advocates, research organizations and agribusinesses, by demonstrating Solis's value as a comprehensive tool for AE practices. Additionally, engage with donors and government stakeholders to integrate Solis into larger agricultural programs. 3. Demonstrate value for government stakeholders and donors: Highlight Solis's potential to contribute to sustainability goals through pilot programs and case studies. Use data from these efforts to strengthen Solidaridad's case for continued donor support and government integration.

Conclusion	Recommendation
At the global level, the ATDT team advanced the adoption of inclusive digital tools, notably through the "Principles Paper," which proved most relevant to ARB stakeholders (C3b.6).	R5: IRRI and Solidaridad should continue outreach to ARB and AAS stakeholders, building on the interest expressed during interviews regarding the project's late-stage developments and field-level operational lessons learned. To sustain this engagement, the focal point for interactions should gradually shift from the ATDT global team to country-level partner organizations, who are actively continuing work with the tools developed under ATDT. Future outreach activities at the global level by IRRI and Solidaridad should aim to balance theoretical insights with practical, actionable examples, emphasizing proof-of-concept demonstrations. This approach will enhance the relevance of the "Principles Paper" and other outputs while fostering greater buy-in from a broader audience. Strengthening this bridge between theory and practice will ensure that the lessons and tools developed through ATDT remain impactful and scalable in diverse contexts.
External project managers and digital tool developers	
The ATDT projects in Vietnam and Brazil showed the flexibility required for inclusive tool development (C1.1 and C1.3).	R6: Tool developers should continue to embrace a farmer-centered approach in the design process. Projects that engage end-users in a meaningful way often uncover needs, preferences, or contextual challenges that weren't apparent in the initial planning phase. As was apparent both in the case of Brazil and Vietnam, this real-world feedback is invaluable, as it provides tool developers with insights that can make the tool more relevant, accessible, and impactful. Incorporating these new insights requires a willingness to adjust focus and shift project goals as they emerge - as we have seen in both action partners on the ground.
Inclusive tool development takes time and often involves trade-offs in terms of scalability (C1.5).	R7: Tool developers and planners should balance inclusiveness and feasibility: Inclusiveness is essential in tool development, but it must be balanced with practical feasibility. Core principles to inclusive tool development should be defined early on, allowing flexibility to focus on the most impactful principles without depleting resources. Tool development often requires trade-offs between inclusiveness, scalability, and the available resources, so it's crucial to evaluate which principles will most benefit the specific user context and the demands of the stakeholder groups involved. Prioritize those with the greatest potential impact, recognizing that full adherence to every principle may not be feasible or necessary.

Conclusion	Recommendation
In Brazil, the transformation of Solidaridad's Digital Unit demonstrated the importance of empowering teams to integrate digital and field expertise, fostering inclusive development and large-scale impact (C3b.4).	R8: Project managers should prioritize building and empowering multidisciplinary teams that integrate digital and field expertise in projects that develop inclusive digital tools. Solidaridad Brazil's experience demonstrates that fostering internal capacity is not just an operational improvement but a strategic investment that enhances the relevance and impact of digital tools on target communities. To replicate this success, outsiders should: 1. Invest in team development: Allocate resources to recruit, train, and retain team members with complementary skills, including technical expertise in digital tool development and practical knowledge of field operations. This integrated approach ensures that tools are both technically robust and grounded in real-world applicability. 2. Foster cross-sector collaboration: Encourage collaboration between digital teams, field staff, and external stakeholders to co-create solutions that address community needs effectively and inclusively. Promote proactive innovation: Shift teams from reactive service providers to proactive innovators by encouraging them to take ownership of the development process. This approach can lead to groundbreaking solutions that transcend project-specific goals and create lasting impact.

Conclusion	Recommendation
Donors and funding partners	
Inclusive tool development takes time and comes with significant trade-offs in terms of scalability (C1.5).	R9: Donors and funding partners should acknowledge trade-offs in inclusive development: Recognize that inclusive tool development involves trade-offs between inclusivity, scalability, and resources. Encourage projects to focus on the principles that best align with local needs and to document and communicate the rationale behind their prioritization decisions. Further, recognize that tool development timelines may vary significantly across regions. Plan flexible timelines that can accommodate unique contextual challenges, such as low digital literacy and challenging rural environments in terms of infrastructure.
Outcomes within various external stakeholders highlighted a regional demand for FarMoRe and the inclusive tool approach (C3b.3).	R10: Donors and funding partners should capitalize on the regional demand for FarMoRe by supporting its scaling and further refinement as a flagship tool for data-driven agricultural management in Southeast Asia. Investments could focus on expanding pilot programs to additional countries in the region, emphasizing its alignment with climate resilience objectives and precision agriculture. To maximize impact, donors should also encourage IRRI and its partners to develop capacity-building initiatives that enhance the ability of local stakeholders, including farmers, extension officers, and policymakers, to effectively use FarMoRe. Furthermore, funding should prioritize research and development to adapt the tool to diverse regional contexts and ensure it meets the specific needs of various agricultural systems, thereby strengthening its scalability and sustainability across Southeast Asia.

ANNEX A

1. Call for EOI

Outcome study on Agroecological Transitions: Inclusive Digital Tools

Call for expressions of interest

February 2024

The Agroecological Transitions: Inclusive Digital Tools (ATDT) Project seeks a consultant to conduct an outcome study in September-October of 2024, with a final product to be delivered by 15 November 2024.

The TRANSITIONS' Inclusive Digital Tools (ATDT) project promotes innovations related to digital tools and ecosystems to support co-creation of farm practices and their assessment for agroecological outcomes. Our applied and impact-oriented research focuses on rice systems in Vietnam's Mekong River Delta and livestock landscapes in the state of Pará, Brazil. The three-year project was initiated in January 2022 and will be completed in December 2024.

The overarching goal of the ATDT Project is to support more inclusive digital tools for farmer technical advisories and performance assessment to enable climate-informed agroecological transitions at scale for rice systems in the Mekong Delta of Vietnam and livestock landscapes in Pará and Mato Grosso States, Brazil, with lessons for major tools globally and the potential to reach at least one million farmers by 2024. ATDT's objectives are:

1. Improving the inclusiveness, local relevance and governance of digital tools to enable farmers' voice, agency and data rights in tool application and in the co-creation of climate-informed agroecological practices;

2. Supporting inclusive knowledge development in digital tools for farmer innovation for climate-resilient informed agroecological practices; and

3. Evaluating the benefits that farmers derive from improved digital access and tools and their potential to generate large-scale impacts.

Leverage points for achieving these objectives are:

- Identification of best practices for digital tool inclusiveness and farmer co-design of practices with local stakeholders.

- Development of partnerships with digital tool developers and farmer support or advisory organizations to implement more inclusive use of tools. Where relevant, farmer support or advisory organizations will facilitate knowledge transfer between the tool and farmers, for example where farmers lack literacy or digital access. The relationship will be based on demand by farmers and tool developers. In some circumstances tool developers may contract such services. In others, farmer support or advisory organizations may initiate the relationship.

- Providing evidence to policy makers and private sector decision makers about the extent to which digital tool inclusivity improves benefits to farmers and environmental outcomes of farming, including impacts to reduce climate change.

Our expected outcomes are:

- Technical and institutional innovations in the Mekong and Pará-Mato Grosso sites increase the relevance of digital tools to smallholder farms and enable at least 50% more men and women farmers to access and have input to tools.

- Farmers have access to at least one digital tool in both the Mekong and Pará-Mato Grosso sites, enabling evidence-based co-creation of knowledge and assessment of outcomes for climate-informed, low-emission agroecological practices.
- Famers have access to at least one digital tool in both the Mekong and Pará-Mato Grosso sites that integrates climate-informed agroecological practice and holistic metrics.
- At least 24,000 men and women smallholder farmers in Vietnam and Brazil engage with improved digital tools for management practices on at least 100,000 ha across all sites and supply chains.
- Two major digital tool developers have the capacity to make further improvements in inclusivity, farmer co-design of knowledge, holistic metrics and climate-informed agroecological considerations in digital tools for rice, livestock supply chains in Vietnam and Brazil.

In Vietnam, the ATDT project is led by IRRI in partnership with the Ministry of Agriculture and Rural Development. The Vietnam team focuses on the development and improvement of digital tools for performance assessment of national policy for sustainable and low-emission rice production in the 12 provinces of the Mekong Delta. The tool supports assessment of Vietnam's "1 must-do, five reductions policy" and the national One Million Hectare Rice program to be implemented this year. Outputs include 1) a performance assessment app, FarMore, and 2) a digital field-level water monitoring SMS application, MoreWater, to meet the needs of farmers to access new markets and support outcomes related to climate change and agroecological transitions, and 3) the government system for monitoring and reporting farming practices, RiceMore, at the national scale through the integration of the other tools into the larger digital ecosystem. Experimental testing of the tools and evaluation of behavior change started in Q4 of 2023 and will continue through 2024 through season-long experiments with 300 farmers. Outreach will take place in all 12 provinces of the Mekong Delta and through the 1 Million Hectare Rice Program with the aim of reaching 20,000 farmers by 2025.

In Brazil the goal of the ATDT project led by Solidaridad, with input from CIFOR-ICRAF, is to support use of digital resources and citizen science to empower farmers to co-create, adapt and innovate practices for climate-resilient agroecological outcomes in livestock landscapes along the Amazon agriculture frontier of the state of Pará. Efforts have focused on engaging farmers and local technical staff in a process of co-creation to improve existing digital tools and design new features to increase farmers 'agency and encourage sharing of knowledge for the adoption of climate-smart and agroecological practices. This process resulted in the development of a new farmer-facing interface, called Solis, enabling smallholder farmers to identify and prioritize the necessary steps to improve their management and production practices towards climate-resilient agroecological outcomes, while facilitating seamless communication with extension staff. Another pivotal feature of this tool is to enable users to share valuable content about agroecological practices in diverse formats, fostering the exchange of experiences and promoting widespread engagement with the application. The tool will be tested in mid 2024 in partnership with ICRAF and final results shared through stakeholder and policy engagement in Pará and Mato Grosso states in Q3 and Q4 of 2024 with the aim of reaching 4000 farmers on 100,000 ha by 2025.

See a summary of our project and outputs here: https://agledx.ccafs.cgiar.org/about/atdt/

This should be a desk study based on interviews with key informants and requiring about 20 days. We expect the methodology to be an outcome harvesting approach. The study should also articulate prospective impacts based on the impact pathway. As the project will not be fully complete at the time the study is conducted, the report should also reflect likely progress by December 2024.

Prospective consultants should submit a one-page expression of interest, budget and CV. The expression of interest should indicate the proposed general approach, experience of the consultant with similar outcome studies, and any outstanding questions that would aid the consultant in designing the study.

Please send your expressions of interest to Lini Wollenberg Lini.wollenberg@uvm.edu by 15 April, 2024. We will review interest on a rolling basis, as expressions of interest are received. Early submissions are therefor encouraged.

2. Evaluation management and evaluator biographies

The primary users of this evaluation comprised the ATDT project management staff at the global and the country levels. The findings of the evaluation were presented and discussed with the global and country ATDT focal points and shared with the complete team at regular ATDT meetings. Although the current project ends in 2024, ATDT will use the findings for future management decisions on similar projects and strategies, as well as accountability towards their funder. Also, the partners in the countries (IRRI, Solidaridad) will use the evaluation as an opportunity for participatory learning that may influence future decision-making processes on the country level.

A joint committee of primary users and consultants was established to participate in the Outcome Harvest and coordinate the evaluation (Study Steering Committee, SSC). This committee was led by Lini Wollenberg on behalf of ATDT project, who served as the first line of contact with the overall team lead and focal point for the lead consultants, Evelyn Funk and Kornelia Rassmann. The SSC consisted of:

- Lini Wollenberg, ATDT Global
- Kyle Dittmer, ATDT Global
- Trang Vu, ATDT Vietnam
- Katie Nelson, ATDT Vietnam
- Violaine Laurens, ATDT Brazil
- Evelyn Funk, consultant, Germany, co-leading the external evaluation team with a focus on analysis and reporting.
- Kornelia Rassmann, consultant, Germany, focal point external evaluation team and overall lead of the project.

Short biographies of the evaluators

Evelyn Funk Evelyn Funk is a political scientist and evaluator with over 12 years of experience in monitoring and evaluation (M&E), particularly within the field of development cooperation. She holds a Magister degree in Political Science from the University of Cologne and is an alumna of the Postgraduate Program at the German Institute of Development and Sustainability (IDOS). Throughout her career, Evelyn has worked as a research associate at institutions such as the Centre for Evaluation (CEval) and IDOS, where she contributed to various evaluation projects, including the final evaluation of SCAMPIS—Scaling up Micro-Irrigation Systems in India, Madagascar, and Guatemala—on behalf of the International Fund for Agricultural Development (IFAD) and the evaluation of RIIICE (Remote sensing-based Information and Insurance for Crops in Emerging Economies) for the Swiss Development Cooperation. Evelyn is recognized for her expertise in participatory evaluation methods and her commitment to enhancing the scientific rigor and usability of evaluations.

Kornelia (Konny) Rassmann is an independent consultant with a multi-disciplinary background in monitoring, evaluation and learning, strategy/ business development, and academic research, based in Germany. She was co-leading this evaluation together with Evelyn being responsible for overall management, OH design and quality control. She is highly experienced in participatory, actor-focused, qualitative evaluation approaches such as Outcome Mapping (OM) and OH. She has led teams on large international, OH or mixed methods evaluations, and her thematic experience included areas relevant to

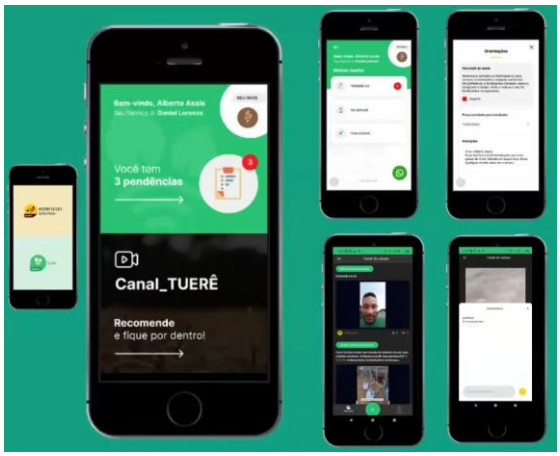
this evaluation (e.g., assessment of CCAFS's climate tools; Shared Resources, Joint Solutions OH study). With her academic background she has excellent data analysis skills, communication and writing skills in English, and experience to draw from qualitative data to obtain valid and realistic conclusions and points for discussion.

Marcelo Sette-Mosaner, founder of Track Impact (trackimpact.net), a global PMEL consulting practice based in Brazil, supports international donors and nonprofits to design MEL systems and impact evaluations since 2015. Marcelo holds a Master of Public Administration degree from John F. Kennedy School of Government at Harvard University and a MSc in Political Economy from the Pontifical Catholic University of Sao Paulo, focused on measurement of well-being and multidimensional poverty.

Vu Van Tuan is the founder and CEO of T&C Consulting, one of Vietnam's leading management consulting firms. His company specializes in advising businesses, public organizations, and international donors such as the World Bank, ADB, and the European Union. Mr. Tuan has extensive experience in project design, management, and evaluation across various sectors, working with a wide range of donors. He is particularly knowledgeable and skilled in applying the OH methodology in development projects, bringing valuable insights into assessing and understanding the outcomes of complex initiatives.

3. Timeline of Solis development and implementation

Solis is a mobile app developed by Solidaridad in Brazil as part of the ATDT project. It was designed in an inclusive way to assist smallholder livestock farmers in adopting and innovating agroecological practices by creating and sharing content from the ground, fostering a digital learning community. It also facilitates direct communication between farmers and extension staff. Empowering farmers to co-create and multiply community-driven knowledge, the tool aims to enhance productivity and promote sustainable agriculture.



Additional info see
https://www.youtube.com/watch?v=87dVWnHS7JU&t=432s

The development of Solis in Brazil exemplifies a collaborative, farmer-centric approach to digital innovation. Under the ATDT project, Solidaridad led the co-creation process, engaging over 80 extension technicians, producers, and IT developers through workshops in the municipalities of Novo Repartimento, Pacajá and Anapu in Pará (Amazon region). These sessions gathered insights into local communication channels, farmer-technician interactions, and effective agroecological practices, ensuring the tool's relevance and usability. The resulting Solis app integrates features such as tailored action plans, direct communication with extension staff, and a platform for sharing agroecological content, all designed to empower smallholder livestock farmers in the Brazilian Amazon to adopt sustainable practices.

Baseline work for the Brazil ATDT project (2022)

The first year of the ATDT project in Brazil was focused on laying the groundwork and understanding the landscape, rather than implementing project activities or seeing significant outcomes. Ciniro Costa Junior, Science Officer at the Alliance of Bioversity International and CIAT, was the ATDT country coordinator for Brazil during this first year. Solidaridad was a key partner organization that ATDT Brazil worked with to engage farmers and extensionists. As part of the preparatory work, the team conducted workshops and interviews with farmers and agricultural extensionists to understand the current practices and needs around digital tools, and a baseline paper was produced documenting the baseline conditions and digital tool usage in the target region.[20]

In addition to the work with farmers, there was also engagement with selected government entities, but there was no progress or concrete outcomes from these interactions and there were no major changes or impacts observed during the first year.

[20] https://resilient-landscapes.org/mf_publication/livestock-practices-use-of-digital-tools-and-co-design-and-flow-of-information-brazil-baseline-assessment-in-the-region-of-novo-repartimento-para-state-brazil/

Preparatory work to start field activities (early 2023)

In March 2023, Solidaridad became the action partner of the ATDT Brazil project. Solidaridad is a global non-profit organization with over 50 years of expertise in fostering inclusive and sustainable value chains. It operates through a network of seven regional offices across five continents: Latin America, North America, West Africa, Central and East Africa, Southern Africa, Europe, and Asia.

By the time Solidaridad joined ATDT, it had already built a ten-year track record of developing and implementing digital tools for small-scale agriculture to support their programming. Some of the key tools developed by Solidaridad in Brazil before the ATDT project include:

1. Extension Solution: A mobile application for field workers designed to improve the efficiency of advisory services to rural farming families. Launched in 2019, it provides online and offline data collection, integrated with farmer portfolio, calendar of field visits and registration of interactions with farmers, to reduce the burden of record-keeping and facilitate the organization of daily activities. It generates individual assessments and work plans for every farmer, making it easier to set priorities and track progress. Extension Solution can also be used to facilitate verification of compliance, including collection of evidences (pictures and documents). The app with this set of functionalities is ready and stable for Android and iOS, in English, Spanish and Portuguese.
2. Farming Solution: A mobile application designed for individual farmers. Launched in 2018, it enables farmers to self-assess their practices, plan adjustments, track their progress and find the information they need to improve their production system and better connect to markets. It has been deployed in several projects in South America, but its usage remained limited outside project contexts, and it is being gradually phased out.
3. AgroLearning: Agrolearning is Solidaridad's educational platform that offers resources and tools for free agricultural training, promoting the development of skills to implement sustainable practices across all aspects of the agricultural value chain. Launched in 2020, it includes a web platform and a mobile application. (https://agrolearning.org/en/home/)
4. Rural Horizons: Launched in 2012, this web-based platform was Solidaridad´s first digital endeavour to support continuous improvement of farmers. It has been deactivated in 2020 and was replaced by the combination of Farming Solution and Extension Solution.
5. Agroprestamo: A fintech tool used to help farmers access loans tailored to the needs of their production. AgroPrestamo uses artificial intelligence for the digital administration of the credit cycle, allowing real-time traceability of the associated risks. It serves as a credit scoring tool that integrates the data of agronomic and sustainability assessments provided by Solidaridad´s Farming and Extension Solution, information on collaterals, and the calculations of household-level cash flow repayment capacity. It has only been used in Colombia so far.

At the start of the ATDT project, Extension Solution was already used in Pará. The use of this app enabled Solidaridad to increase the number of farmers supported and the quality of data collected, but the team identified a huge opportunity to go beyond the conventional top-down approach of agricultural extension and use digital innovation to increase farmer agency.

One of the criteria of ATDT was to build on existing resources. The project therefore agreed to use Extension Solution as the back-end for the development of digital tools for ATDT and then develop a

farmer-facing app integrated into this platform. A main point of integration of the two apps was built when Solidaridad chose to enhance the "action plan feature" of Extension Solution by enabling extensionists to select priority tasks for transitioning to agroecological production systems and to send this action plan to farmers via WhatsApp or via the new farmer-facing tool. With the "action plan feature", extensionists can generate individual action plans for farmers and track progress by updating the status of tasks and uploading documents or photos to register the improvement. Through the new farmer-facing tool, farmers are enabled to share implementation updates on these plans with the extensionists through photos and documents and receive extensionist feedback.

Co-creation design workshops with multiple stakeholders (June 2023)

After further preparatory work in the first half of 2023, field activities started in June 2023. Adhering to the "Principles Paper" (Dittmer *et al.* 2022) developed by ATDT Global team, Solidaridad held six co-creation workshops in Pacajá and Novo Repartimento, facilitated by the Conectividades consultancy. Over 91 participants attended, including farmers, extensionists, and IT developers, with dedicated workshops for women and youth. Farmers contributed insights into communication channels they use, their communication with extensionists, and their needs for a digital tool. A significant number of challenges raised by farmers centered around the accessibility of locally tailored information. Farmers, overwhelmed by information not relevant to their local reality, emphasized the need to connect with the source and share their own content for social recognition among peers. These insights shaped the requirements for the new farmer facing app.

The development team at Solidaridad took farmers' feedback seriously, recognizing the need for genuine co-creation and building on past learnings from farmer-facing tools that had limited uptake (such as Farming Solution). Consequently, a social media element was added to the new tool, even though this wasn't part of the original plan.

Start of inclusive Solis development (July-October 2023)

Based on all the insights generated in the co-creative workshops, the Digital Solutions Unit of Solidaridad then started the development of Solis in July 2023. In several rounds of iteration, the development team shared screenshots of the tool and information on the workflow with Solidaridad extensionists in online meetings.

In October 2023, the development team organized work sessions in Pará with extensionists and a small group of farmers in Pará. The first version of Solis was introduced to participants during a meeting, but they could not yet install it on their own. Two farmers were invited to produce videos with Solidaridad´s team for the publication of the first contents on Solis.

Activation / launch of Solis MVP (November-December 2023)

In late November to early December 2023, Solidaridad held two activation events for Solis, presenting it to a total of 40 farmers in Novo Repartimento and in the Tuerê settlement. The purpose of the activation

events was to get more feedback from the intended group of users.[21] Farmers received an installation ("magic link") via WhatsApp, allowing them to easily install Solis with a single click. While this Progressive Web App (PWA) approach made installation quick and intuitive (as no registration is required), it relied on farmers' WhatsApp contacts, which could limit scalability beyond Solidaridad´s own network.

During the activation event, some producers tested the app by sharing videos from other platforms on Solis.

Developing Solis 1.0 (February-June 2024)

Feedback from the activation events showed that the access and use of Solis MVP was still too complex for the intended users. The development team therefore made two major changes to the tool:

1) Content hosting: Instead of embedding content from platforms like YouTube and asking users to share links on Solis, Solidaridad opted to host content directly, simplifying video publishing for users.
2) App expansion: The second significant change was rather technical. To improve scalability, Solis was developed as both a PWA and a standard app, available for download from app stores.

This updated version was shared with extensionists for feedback and further refinement between February and June 2024, but not yet with farmers. The initial videos produced with farmers from the end of 2023 to June 2024 were focused on practices that Solidaridad's rural extension program had been working on and on personal stories about life in the countryside. From the beginning, Solidaridad identified the need to provide training and support for production and curation of content to be published on Solis. Since the app was still under development, the initial videos produced by farmers were shared in internal Solidaridad WhatsApp groups.

Also, in January 2024, Solidaridad took over the leadership of the ATDT Brazil project from CIFOR-ICRAF and Violaine Laurens, Digital Solutions Manager for Solidaridad Latin America, officially became the lead.

Reactivation of Solis and engagement of farmers to identify Solis Ambassadors (June 2024)

At the end of June 2024, Solidaridad team organized field visits and workshops in Pará (municipalities of Novo Repartimento, Pacajá, and Anapu) with the objective of producing content for Solis and of training extensionists and a group of farmers in the use of Solis.

A group of 78 people (36 people in Novo Repartimento and 42 in Pacajá) visited three model farms that implemented rotational grazing and livestock production intensification practices, aimed at reducing land use and increasing productivity in line with agroecology principles. This visit was part of content

[21] https://cgspace.cgiar.org/server/api/core/bitstreams/6bc3e236-b93a-48ec-9a39-244802e4adbb/content

production for Solis, including farmer testimonials about the perceived benefits of adopting these practices and a presentation by an agroecology expert technician on how to implement them.

Following these field visits, two workshops were held in the municipalities of Novo Repartimento and Pacajá to train a total of 14 extensionists and 26 farmers on the use of Solis and creation of content focused on good practices to disseminate local knowledge and experiences. These workshops were also the opportunity to present the Ambassador initiatives and select 5 young farmers (3 men and 2 women) for the training week in São Paulo.

The video production activity resulted in 27 videos published on Solis.

Co-creating agroecological practices for Solis (July-August 2024)

At the end of July 2024, Solidaridad, with support from an agroecology expert, organized field days in Pará and a training focused on agroecology for the full team of Solidaridad extensionists and interested farmers.

The field days, held at farms supported by Solidaridad, were structured in four parts: (i) defining key discussion topics, (ii) detailing these topics into practices through a visit to productive areas where producers and technicians shared experiences and suggested adaptations, (iii) validating the proposed adaptations, and (iv) identifying six new key topics for future technical assistance (Best practices in livestock farming, tropical soil management, forage legumes, silage, silvopastoral systems, environmental legislation, and public policies). The insights gathered from these visits were used to develop the training curriculum, that includes methodology for cocreation of practices with farmers, extension staff and experts, learning card about each key practice adapted to the local context and guidance regarding the use of Solis to support dissemination of these practices.

Training Solis ambassadors for out-scaling (July-August 2024)

In July-August 2024, Solidaridad launched the Solis Ambassadors program. This initiative aims to train local farmers to champion agroecological practices within their communities. By leveraging their firsthand experiences with the Solis app, the ambassadors serve as credible advocates, demonstrating the tangible benefits of agroecological farming techniques.

Five farmers from Novo Repartimento and Pacajá (3 men and 2 women) were invited to São Paulo to participate in a one-week training focused on the production of audiovisual content for social media, use of Solis and agroecology. At the end of the week, ambassadors and the Solidaridad team agreed upon activities to promote Solis among the rural communities and support farmers from the community in the use of Solis and production of video.

Since August 2024, ambassadors have participated in biweekly meetings with the Solidaridad team to share feedback, suggestions of improvements for Solis and results achieved so far.

Official launch of Solis 1.1 (November 2024)

In November 2024, Solis 1.1 was officially launched in the Google Playstore, enhancing accessibility and scalability for a broader farmer audience. Farmers now receive a link to the Google Playstore. To continue

facilitating access, account creation is simplified. Instead of the conventional email registration process, the user enters their name and a phone number (WhatsApp number). The system sends an authentication code, and the producer simply enters the code to create the account. No additional data is required for account creation.

Solidaridad extensionists sent an invitation to all the farmers participating in Solidaridad´s WhatsApp groups (around 600) in the first week of November. By mid November, 182 users had registered. The first posts by 'indirect' users, who are not part of the group of producers supported by Solidaridad, were published.

Outreach workshops – November 2024

In November, Solidaridad organized three workshops with local stakeholders in Pará (Novo Repartimento – 04/11/2024 and Marabá – 07/11/2024) and Mato Grosso (Alta Floresta – 26/11/2024). First step of the outreach strategy, the objective of these workshops was to introduce the training curriculum and Solis to institutional actors at municipal and state level (secretariats of environment and agriculture at municipal and state levels, farmer organizations, NGOs, private sector actors and academia) and request their feedback. A final version of the curriculum incorporating this feedback will be published and shared to these actors in December. All of them had access to Solis via a QR code.

Until the end of the project, several key activities will be carried out to further promote Solis. Blogs and articles about the workshops with local stakeholders will be published on Solidaridad's channels, highlighting the main learnings and providing links to access the final version of the curriculum and to download Solis. Follow-up meetings will be organized with the most engaged stakeholders, with bilateral meetings with IOV (Instituto Ouro verde), ICV and IFPA (Federal Institute of Education, Science, and Technology of Pará) already planned, a direct outcome of the workshops. As of mid-November, promotion campaigns and targeted ads on social media will also kick off, aiming to expand awareness and engagement.

4. Timeline of FarMoRe development and implementation

The RiceMoRe system, co-developed by DCP, DTS, and IRRI, is a comprehensive digital platform designed to standardize and record time-series data on rice production and the adoption of low-emission practices. This tool, crucial for managing and directing rice production amid challenges from climate change and market fluctuations, features two core components: RiceMoRe for monitoring activity data at the communal level and FarMoRe (https://ghgmitigation.irri.org/resources/mrv-toolbox/farmore) for tracking farming practices at the field, farm, or cooperative level. Together, they provide essential data to establish baselines and monitor mitigation progress over time. The beta version of the platform is accessible at https://ricemore.org, and mobile app versions of RiceMoRe, which includes the FarMoRe functionality, are available for Android and iOS systems. This platform emphasizes inclusive digital tool development and co-creation between farmers and field agents, ensuring that sustainable practices are farmer-led and context appropriate.

Initial concept and stakeholder engagement

The implementation of the FarMoRe tool in Vietnam reflects a concerted effort by multiple stakeholders, with the ATDT project serving as the central facilitator and initiator of change.

The project began with consultations among farmers, agricultural experts, and local authorities to identify challenges in rice production, particularly regarding climate change impacts and low-emission practices. Workshops were held to gather insights directly from farmers, ensuring their voices shaped the design of the digital tools.

The International Rice Research Institute (IRRI), managing regional work under ATDT, has led the design, testing, and adaptation of FarMoRe to ensure it meets the unique needs of rice farmers in the Mekong Delta, where climate resilience and sustainable practices are particularly critical. IRRI's role also involved creating the tool's technical infrastructure, such as integrating the SECTOR rice carbon calculator, which allows farmers to track inputs like seeds, fertilizers, and water use, aligning with Vietnam's sustainability goals.

Key stakeholders of the FarMoRe app are:

- International Rice Research Institute (IRRI)
- The Department of Crop Production (DCP) as part of the broader structure of Vietnam's Departments of Agriculture and Rural Development (DARDs)
- Center for Agricultural Digital Transformation and Statistics (DTS) of Vietnam's Ministry of Agriculture and Rural Development (MARD)
- Field agents and farmers in Vietnam (through co-design process)
- New Zealand government (as a funding partner)
- European Union (through funding of the ATDT project)
- International Fund for Agricultural Development (IFAD, as manager of the EU-funded project)

Sustainable rice cultivation prior to RiceMoRe (2013-2018)

In 2013, the Vietnamese government certified the sustainability package "1 Must Do, 5 Reductions" (1M5R) as a national approach to promote best practices in lowland rice farming. This package, aimed at reducing seed use, water, fertilizers, pesticides, and post-harvest losses, laid the foundation for the sustainability assessments later integrated into FaReMore.

The emphasis on sustainability from the beginning highlights the importance of environmental considerations in Vietnamese rice production and set the groundwork for RriceMore and FaReMore as tools for monitoring and evaluating these practices.

Development and piloting of RiceMoRe (2018-2021)

In 2018, the development of RiceMoRe began through a collaborative effort led by the IRRI and MARD. Key players included MARD's Department of Crop Production (DCP) and the Center for Agricultural Digital Transformation and Statistics (DTS), with technical and financial support from the New Zealand Government as part of the Global Research Alliance on Agricultural Greenhouse Gases. Together, these organizations worked to create a digital platform to enhance rice production management, align with sustainability goals, and reduce GHG emissions in the rice sector. The platform was piloted and continuously improved over the next years.

Baseline work for the FarMoRe ATDT project (2022)

The year 2022 saw the planning, initial research, and needs assessments for the development of FarMoRe. In October and November 2022, the project conducted a baseline study to assess digital tool usage and farming practices as a crucial step in understanding the local context and farmer needs[22] The survey took place in Can Tho Province, Mekong Delta, and involved 181 rice farmers and 30 field extensionists.

Based on the survey results, the project team began conceptualizing and planning the development of FarMoRe as a component of RiceMoRe. The initial design phase focused on creating a farm management reporting smartphone app that could assess farmers' performance over time.

Piloting the RiceMoRe / FarMoRe app in Mekong Delta (2023)

In 2023, RiceMoRe with the integrated FaReMore component was piloted in Vietnam's Mekong Delta region, with the web platform being accessible via https://ricemore.org and mobile apps being available for Android and iOS systems. Expanding the pilot project to additional regions validated the system under various conditions and facilitated the collection of further data.

[22] https://cgspace.cgiar.org/server/api/core/bitstreams/bb3e2929-7b7a-4e9a-87a5-c2b825e04f5d/content

Farmers actively participated in testing the platform and providing feedback on its functionality. Adjustments were made based on user experiences, demonstrating a commitment to iterative development that prioritizes farmer input.

Evaluation and validation (April 2024)

In April 2024, IRRI and members of the software development team conducted several participatory evaluations and iterative feedback sessions with FarMoRe users over multiple events, including agricultural field agents (22), farmers (300), and provincial agricultural officers (5), to adapt the design features and results benchmarking for improved use. The team learned how farmers and field agents would use the results to discuss which management practices could be improved and to co-create solutions. These sessions revealed insights into how the tool could be used to better respond to needs and to share information between farmers.

IRRI together with the DCP and DTS held a workshop in Hanoi in April 2024, to evaluate RiceMoRe and FarMoRe and obtain critical insights into the platform's usability, data quality, and impact, which could be used for further optimization. The workshop included representatives from DCP, DTS, provincial DARDs (Departments of Agriculture and Rural Development), and other participants.

The evaluation revealed successful pilot implementations in several provinces in the Mekong River Delta and Red River Delta regions. Representatives from DARDs highlighted how RiceMoRe facilitated timely decision-making for various stakeholders, including ministry leaders, local officers, and farmers. They emphasized the importance of the data collected by RiceMoRe for government databases used in statistics and forecasting.

The workshop participants discussed strategies for rapid implementation and scaling of RiceMoRe for various crops across Vietnam. The discussions also addressed challenges like capacity building, staff retention in the extension sector, and integration with existing systems and programs.

The Director of DTS, Mr. Nguyen Quoc Toan, highlighted that RiceMoRe and FarMoRe were chosen for presentation at the "*Promoting digitization in the agriculture sector*" conference in May 2024., suggesting strong government support for these digital tools.

Public presentation (May 2024)

In May 2024, RiceMoRe and FarMoRe were presented at the online conference "*Promoting Digitization in the Agricultural Sector*."(https://binhdinh.gov.vn/en/news/news-news/online-conference-on-promoting-digitalization-of-the-agricultural-sector-.html). This step enhanced the visibility of the platform and fostered knowledge exchange among agricultural stakeholders. Presenting at a professional conference highlights the growing interest in digital solutions for agriculture and the role of RiceMoRe and FarMoRe as pioneers in this field.

Official launch (October 2024)

On October 3, 2024, RiceMore, including FarMoRe, was officially launched by the DCP and the DTS at a conference on Digital Transformation in Agriculture in Ho Chi Minh City, Vietnam. The official launch of

RiceMoRe and FarMoRe signifies the Vietnamese government's commitment to modernizing agriculture and leveraging digital technologies to enhance productivity and sustainability.

Implementation and training

The full implementation of RiceMoRe and FarMoRe commenced in September 2024, supported by training sessions for field agents, farmers, and private companies on how to utilize these digital tools effectively. IRRI partnered with the National Agricultural Extension Center (NAEC) and DCP to provide a training of master trainers to provincial extensions agents from 12 provinces in the Mekong Delta, and these trainers went on to train agricultural officers across all 12 provinces that collectively reach 120,000 farmers ensuring marginalized communes are prioritized and strong participation of women extensionists (at least 40%). Additionally, emphasis was placed on building digital literacy among farmers to ensure equitable access to technology.

Contributions to AE practices

By enabling field agents to record, monitor, and share farmer practices digitally, FarMoRe is intended to foster a culture of data-driven decision-making. This empowerment is meant to encourage the adoption of AE practices tailored to local conditions. The platform facilitates knowledge sharing by providing the results benchmarked against fellow peers, allowing farmers to learn from each other's experiences. The data generated through these tools can support local and national policy goals related to sustainable agriculture and climate adaptation. By providing evidence-based insights, farmers can advocate for policies that support AE practices.

Scalability of Innovations

The implementation in initial pilot areas demonstrates potential for scaling RiceMoRe and FarMoRe across other provinces in Vietnam and regionally. Adaptations can be made based on local agricultural contexts. As these tools align with Vietnam's broader agricultural policies, there is potential for integration into national monitoring systems for sustainable agriculture. Incorporating ongoing feedback loops from users could provide an opportunity for continuous improvement of the platforms, potentially helping them adapt to changing agricultural landscapes and farmer needs over time.

Future development

MARD plans to integrate RiceMoRe into the "One Million Hectares Program" using it to support the measurement, reporting, and verification (MRV) of Vietnam's program to sustainably develop one million hectares for the specialized cultivation of high-quality, low-emission rice, in conjunction with green growth in the Mekong Delta by 2030. Integrating RiceMoRe into this program would emphasize the platform's importance in achieving the Vietnamese government's sustainability goals.

In the future, it is also planned to expand RiceMoRe into a digital platform for managing agricultural production activities for various other crops. This expansion would significantly increase the platform's utility for Vietnamese agriculture and could further promote sustainable farming practices.

5. Definitions

Social change outcomes, i.e., the results gathered in this study	Observable changes in the behavior, relationships, actions, activities, policies or practices of the individuals, groups and organizations influenced by an intervention in a small or large way, directly or indirectly, intentionally or not, negatively or positively. This corresponds to the definition in Outcome Harvesting as defined by Wilson-Grau & Britt, 2013.
SMART outcome	Outcome Harvesting outcomes where the descriptions need to be SMART: Specific (formulated in sufficient detail), Measurable (providing objective, verifiable quantitative and qualitative information), Achieved (establishing a plausible relationship between the outcome and contribution), Relevant (presenting a significant step towards the impact that is strived for), Timely (emerging within the time period being evaluated). Adopted from https://outcomeharvesting.net/wp-content/uploads/2016/07/SMART-ME-Outcomes.pdf
Outcome lead	Brief statements describing ATDTresults that potentially can be turned into SMART outcomes, but where specific, verifiable, plausible information is still missing.
Observed outcomes	Behavioral changes that emerged during the evaluation period from Jan 2022 to mid-Nov 2024
Process outcomes	Behavioral changes emerging in internal actors such as the ATDT action partners IRRI and Solidaridad. In a systemic approach such as OH, change agents not only influence other actors but are also affected themselves through their involvement in the project.
Prospective outcomes	Outcomes drafted as projections of likely future behavioral changes by the end of 2024, based on observed evidence and trends, using the same formal structure as “observed outcomes”, including outcome, significance, contribution descriptions as formulated in OH, adhering to the OH SMART criteria. This study abandoned harvesting prospective outcomes.
Upstream, output-near outcomes	Outcomes that are more activity/output-near, i.e., occur ‘earlier’ in the impact pathway and/or are more directly influenced by the ATDTproject
Downstream, impact-near outcomes	Outcomes that are more impact-near, i.e., occur ‘later’ in the impact pathway and/or are indirectly influenced by the ATDT project (e.g., through other outcomes in the causal chain).
Unintended outcomes	Positive or negative behavioral changes that were not purposefully planned by the ATDT project.

Negative outcomes	Changes encompassing adverse effects, such as disruptions to practices, economic impacts, or resistance from stakeholders unwilling to embrace change.
Significance	Importance or value of an observed outcome in relation to the goals, priorities, or context of the initiative, organization, or stakeholders involved, often considering its relevance, scale, and potential impact.
Contribution	The role or influence an actor has had in bringing about a specific observed outcome, without claiming sole causation. (Who did what, when and where).
Societal actor	The target audiences, i.e., the individuals, groups, organizations, institutions, who did something differently (partly) influenced by the activities, research outputs or outcomes of interventions to which the ATDT project contributed to.
Contributor, change agent	Individuals, groups of individuals or organizations who influenced in a small or large way the results (mostly the behavioral changes) of the societal actors.
Next user	Actors such as national research institutions, extension organizations, NGOs and others, who access CGIAR products directly and can help CRPs reach end-users. https://marlo.cgiar.org/glossary.do
End user	The final population that ultimately makes use of and is intended to benefit from the results of an intervention. https://marlo.cgiar.org/glossary.do

6. OH SMART criteria

The OH evaluation followed the OH SMART criteria specified below in a slightly adapted form to those originally defined by Ricardo Wilson-Grau: http://outcomeharvesting.net/outcome-harvesting-smart-me-outcomes/.

Specific: Each outcome and contribution component is formulated in sufficient detail so that a reader without specialised subject or contextual knowledge will be able to understand and appreciate what is described. Who has changed, in what way, when and where; and ii) who did what, when and where to help bring about the change.

Measurable: The description of outcome and contribution provide objective, verifiable quantitative and qualitative information, independent of who is collecting data. For example:

- How much, many, big, far, fast?
- What size, weight, age, shape, colour?

Achieved: This relates to the plausible relationship, a logical link between outcome and contribution. The outcome was achieved by the change agent's activities, albeit perhaps not fully attributable to these alone, but the activities have contributed to this outcome. What was done, when and where that contributed — wholly or (probably) partially, directly or indirectly, intented or unintented?

Relevant: The outcome represents noteworthy progress towards a program's ToC, or, other, more specific objective (the overarching goal in the respective key evaluation area , i.e. the theme/sector relevant to MFA's goals). It has to represent a distinctive, intended or unintended, positive or negative change (progress or regress) with respect to this goal.

Timely: The outcomes have emerged within the evaluation period, after the influence (activities, outputs other outcomes) took place. The outcome may have occurred months or even years after the activities but not before.

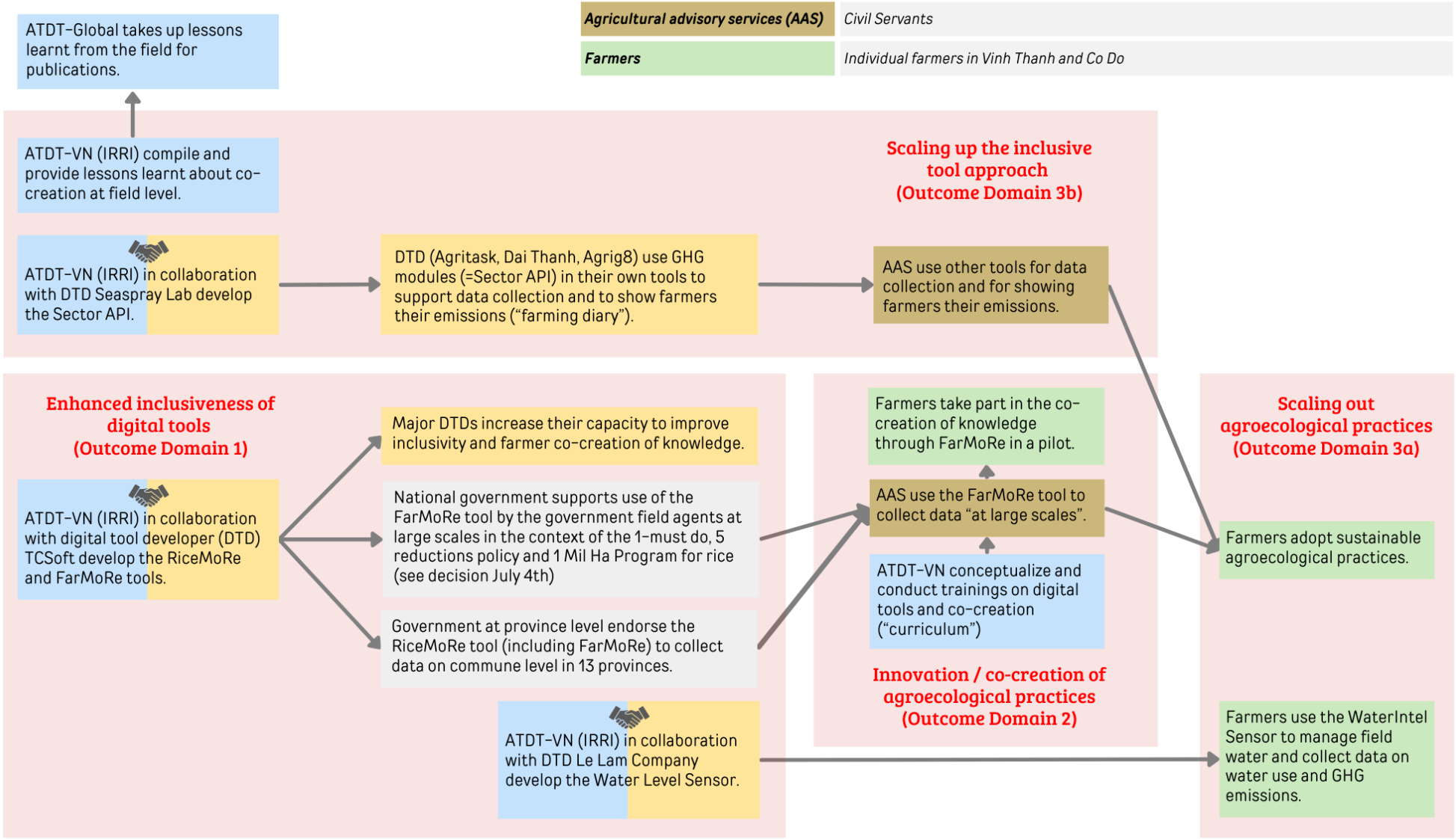
7. Actor-centered Theory of Changes

During the study design phase, three stakeholder-centered ToCs were developed. These ToCs illustrate hypotheses about behavioral changes among different stakeholder groups, including both internal and external stakeholders, as shared by ATDT project implementers through interviews and written inputs. The ToCs were maintained in a shared file and continuously adapted throughout the study.

For more information on how the ToC were used, please see Section 3: Approach and methods.

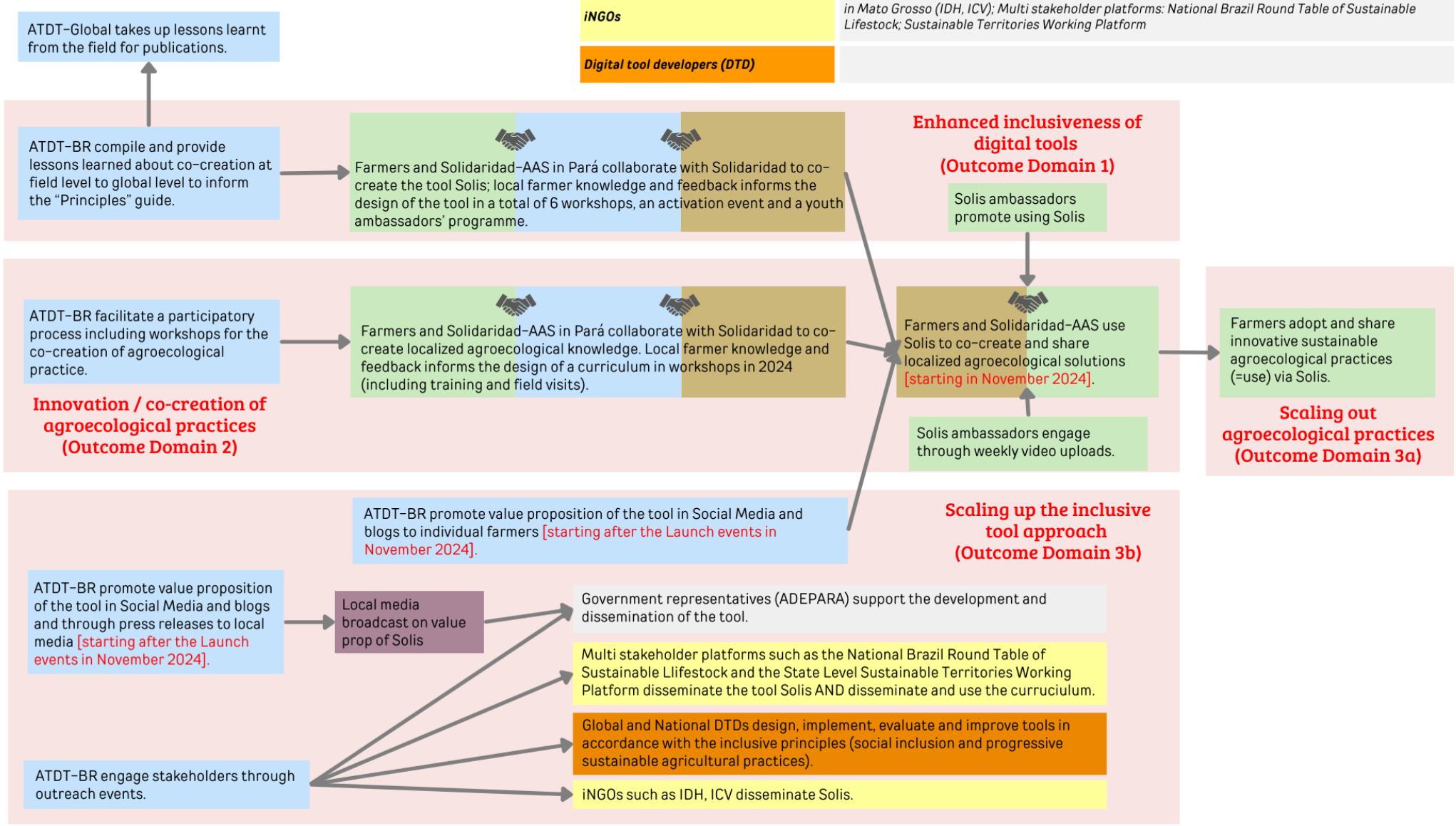
ToC Vietnam

ATDT partner organisation	*IRRI*
Digital tool developers (DTD)	*TCSoft, Agritask, Dai Thanh JSC*
National governments / ministries	*Department for Crop Production (DCP), DTS (Center within MARD), National Agriculture Extension Center (NAEC), province Sub-DCP; IAE Institute for Agriculture and Environment (institute under MARD)*
Agricultural advisory services (AAS)	*Civil Servants*
Farmers	*Individual farmers in Vinh Thanh and Co Do*



ToC Brazil

ATDT partner organisation	*Solidaridad (also Digital tool developer)*
National governments / ministries	*Secretary of environment & agriculture in state of Pará and at municipality level*
Agricultural advisory services (AAS)	*Solidaridad officers*
Farmers	*Smallholder farmers in Pará (Novo Repartimento, Pacajá and Anapu) / Mato Grosso*
iNGOs	*in Mato Grosso (IDH, ICV); Multi stakeholder platforms: National Brazil Round Table of Sustainable Lifestock; Sustainable Territories Working Platform*
Digital tool developers (DTD)	



ToC Global

ATDT Global	*Solidaridad (also Digital tool developer)*
Global partners	*Internal, CGIAR (digital inclusion work programme), Agroecology TPP partners*
Agricultural advisory services (AAS) - NGOs	*GFRAS, CIMMYT, Access Agriculture*
Donors	*EU, IFAD (IC4D)*
Agricultural research bodies (ARB)	*Agri Digital Hub, Agroecology Europe, PATH2DEA*
Global multipliers	*FAO, GSMA*
Farmer facing groups	*GFRAS*

ATDT Global facilitate a participatory process including working groups, webinars and different expert conversations in a co-creative way.

AAS-NGOs: Global actors start engaging with ATDT and support the development of the inclusive principles sharing their knowledge.

Donors engage and share insights informing the inclusive principles.

Global ARBs engage with ATDT and inform the principles.

ATDT-BR and ATDT-VN compile and provide lessons learned about inclusive tool development at field level.

ATDT Global: research and develop principles for inclusive digital tool use, integrating lessons learnt from the field and input from global actors.

ATDT Global identify value proposition for improved tools and incentives for practice transitions (identify exemplary features, types of DTs, usability, type of info farmers are receiving) (=tool review).

ATDT Global publish and communicate / distribute principles and Tool Review to global partners, global multipliers, global ARBs, NGOs, donors

PROCESS/internal: Solidaridad & (IRRI) MARD taking up inclusive principles to tool creation.

ATDT Global partners
i) acknowledge principles of inclusive tool development,
ii) disseminate principles, i.e. in workshops.

Global multipliers take up co-creation principles and Lessons Learnt in their research agenda.

Global ARBs
i) acknowledge Solis and FarMoRe,
ii) acknowledge inclusion principles,
iii) help promote tools and principles,
iv) acknowledge research on digital tools and agroecology/CC.

AAS-NGOs global
i) acknowledge and refer to co-creation and inclusion principles.
ii) approach tool development in a co-creative way

Donors refer ATDT to other stakeholders.

Farmer facing groups and multipliers to reach farmer facing groups are familiar with principles and tool features that would enable farmers to have more say in co-creation of agroecological practices.

A series of outputs https://agledx.ccafs.cgiar.org/about/atdt/

- *Global tool review*
- *Principles for socially inclusive tools*
- *plus more reports and briefs...*

Scaling up the inclusive tool approach (Outcome Domain 3b)

8. List of interview partners

Name	Gender	Function and/or institution	Interviewed by, when, how
Global			
ATDT staff			
Lini Wollenberg	F	ATDT Team lead	16.07.2024 by EF and KR (remote interview); Further interviews and frequent interaction between June and November 2024
Kyle Dittmer	M	Research analyst	30.07.2024 by KR (remote interview); 12.09.2024 by EF (remote interview)
Sadie Shelton	F	Communications officer and research assistant	31.07.2024 by KR (remote interview)
ATDT consultants			
Sessie Burns	F	Digital expert consultant for year 1	27.09.2024 by EF (remote interview)
Global, other stakeholders			
Vincent Dauby	M	Researcher at Agroecology Europe	3.10.2024 by EF and KR (remote interview)
Guy Faure	M	Senior policy officer at the European Commission	4.10.2024 by EF (remote interview)
Viviane Filippi	F	International development expert at IFAD	30.09.2024 by EF (remote interview)
Matthias Geck	M	Coordinator of Agroecology TPP and ATDT sibling project METRICS at CIFOR-ICRAF	27.09.2024 by EF (remote interview)
Alesha Miller	F	Chief strategy officer at Digital Green	4.10.2024 by EF (remote interview)
Ingrid Oliveira	F	Communications Coordinator & Project Officer at GFRAS	3.10.2024 by EF and KR (remote interview)
Vietnam			
ATDT VN team at IRRI			
Katherine Nelson	F	ATDT Vietnam Coordinator, IRRI	23.07.2024 by EF (remote interview); 13.09.2024 by VVT
Cuong Ong	M	ATDT project staff	23.07.2024 by EF (remote interview); 15.09.2024 by VVT
Trang Vu	F	ATDT project staff, associate scientist	19.07.2024 by EF (remote interview); 13.09.2024 by VVT

VN government (national and local)			
Mr. Tung	M	Deputy Director General at the Department of Crop Production, MARD	7.10.2024 by VVT (in person interview)
Hoang Phuong	M	Head of training division at National Agricultural Extension Center	1.10.2024 by VVT (in person interview)
Mr. Nguyen Minh Phuong	M	Center for Agriculture Digital Transformation and Statistics, MARD	4.10.2024 by VVT (in person interview)
Pham Thi Minh Hieu	F	Can Tho Sub-Department of Crop Production and Plant Protection	17.09.2024 by VVT (in person interview)
VN government AAS			
Nguyen Thi Bich Tran	F	Field agent, Co Do Station of Crop Production and Plant Protection	16.09.2024 by VVT (in person interview)
Nguyen Quoc Hai	M	Field agent, Vinh Thanh Station of Crop Production and Plant Protection	16.09.2024 by VVT (in person interview)
Dang Nhat Truong	M	Field agent, Vinh Thanh Station of Crop Production and Plant Protection	16.09.2024 by VVT (in person interview)
Tran Thi Bich Tram	F	Field agent, Co Do Station of Crop Production and Plant Protection	16.09.2024 by VVT (in person interview)
VN DTD			
Trinh Quang Thai	M	Programmer at TC Soft	1.10.2024 by VVT (remote interview)
Ms. Marta Bogdanic	F	Senior operations officer at IFC	27.09.2024 by VVT (remote interview)
Nguyen Duc Trung	M	MEL manager, Winrock International	27.09.2024 by VVT (remote interview)
Wyn Ellis	M	Executive Director at SRP	10.10.2024 by VVT (remote interview)
VN farmers			
Nguyen Cong Tranh	M	Farmer in Co Do district	16.09.2024 by VVT (in person interview)
Tran Van Phu	M	Farmer in Co Do district	16.09.2024 by VVT (in person interview)
Nguyen Van Tre	M	Farmer in Co Do district	16.09.2024 by VVT (in person interview)
Hoang Van Tho	M	Farmer in Co Do district	17.09.2024 by VVT (in person interview)
Pham Thai Hung	M	Farmer in Co Do district	17.09.2024 by VVT (in person interview)
Nguyen Cao Khai	M	Farmer in Vinh Thanh district	17.09.2024 by VVT (in person interview)
Nguyen Thi Thanh Thuy	F	Farmer in Vinh Thanh district	17.09.2024 by VVT (in person interview)
Lam Thanh Loc	M	Farmer in Vinh Thanh district	17.09.2024 by VVT (in person interview)

Brazil			
ATDT BR team			
Violaine Laurens	F	ATDT Brazil Coordinator, Regional Manager LATAM - Digital Solutions at Solidaridad; ATDT Brazil coordinator in 2024	16.07.2024 by EF and KR (remote interview); 5.09.2024 by MM (remote interview); 8.11.2024 by EF (remote interview)
Denis Oliveira	M	Business and field coordinator at Solidaridad	16.07.2024 by EF and KR (remote interview); 3.09.2024 by MM (remote interview)
Ciniro Costa Jr.	M	Lead, CGIAR Hub for Sustainable Finance, and Scientist, Multifunctional Landscapes and Tropical Forages Program(ATDT BR project lead in 2022 and 2023, i.e. first two ATDT project years in BR.	31.07.2024 by KR (remote interview)
Mariana Pereira	F	Program manager; ATDT outreach lead at Solidaridad	2.08.2024 by EF (remote interview); 13.09.2024 by MM (remote interview)
Pedro Santos	M	Amazon program supervisor at Solidaridad	9.10.2024 by MM (remote interview)
BR Solidaridad extensionists			
Elton Gonçalves	M	Extensionist and Solis ambassador	04.11.2024 by MM (focus group in Novo Repartimento)
BR External consultants			
Elias Santos	M	External consultant in social media	14.10.2024 by MM (WhatsApp Audio Messages)
BR Farmers-ambassadors			
Alaion de Jesus Lacerda Sousa	M	Solis ambassador (Novo Repartimento)	09.10.2024 by MM (WhatsApp Audio Messages); 04.11.2024 by MM (focus group in Novo Repartimento)
Irivelton da Silva Tavares	M	Solis ambassador (Novo Repartimento)	09.10.2024 by MM (WhatsApp Audio Messages)
Edinael Dias do Nascimento	M	Solis ambassador (Pacajá)	09.10.2024 by MM (WhatsApp Audio Messages)
Kelly Santos Souza	F	Solis ambassador (Pacajá)	09.10.2024 by MM (WhatsApp Audio Messages); 04.11.2024 by MM (focus group in Novo Repartimento)
Marciana Pardim Souza	F	Solis ambassador (Anapu)	04.11.2024 by MM (focus group in Novo Repartimento); further informal talks during fieldtrip

BR Farmers			
Lucileide Braga de Santana	F	Farmer; Leader of Pacaja Women Cocoa and Chocolate; Novo Planalto village, Tuere Settlement in Novo Repartimento City	15.10.2024 by MM (remote interview); 5.11.2024 by MM (in person interview in Tuere)
Paulo Henrique	M	Smallholder in Novo Planalto village, Tuere Settlement in Novo Repartimento City	5.11.2024 by MM (in person interview in Tuere)
Jose Edinael	M	Smallholder in Novo Planalto village, Tuere Settlement in Novo Repartimento City	5.11.2024 by MM (in person interview in Tuere)
Ailton Carneiro dos Santos	M	Smallholder in Novo Planalto village, Tuere Settlement in Novo Repartimento City	5.11.2024 by MM (in person interview in Tuere)
Francisco Claudio Rio dos Santos	M	Smallholder in Novo Planalto village, Tuere Settlement in Novo Repartimento City	6.11.2024 by MM (in person interview in Tuere)
Rogerio Rio dos Santos	M	Smallholder in Novo Planalto village, Tuere Settlement in Novo Repartimento City	6.11.2024 by MM (in person interview in Tuere)
Joao Rios de Souza	M	Smallholder in Novo Planalto village, Tuere Settlement in Novo Repartimento City	6.11.2024 by MM (in person interview in Tuere)

9. Mapping of ATDT objectives, evaluation questions, domains and observed outcomes

ATDT objective	Evaluation question	Outcome domain	ATDT observed outcomes -
O1: Improve the inclusiveness, local relevance and governance of digital tools to enable farmers' voice, agency and data rights in tool application and in the co-creation of climate-informed agroecological practices.	EQ1 - inclusive tools: In how far do we find evidence at the outcome level for enhanced farmers' voice, agency and data rights in digital tools and digital tool development?	OD1: Behavioral changes affecting co-creation, inclusiveness, local relevance and governance of digital tools for innovative AE practices.	VN01, VN02 BR02, BR04, BR05 , BR03 BR01
O2: Support inclusive knowledge development in digital tools for farmer innovation for climate-resilient informed agroecological practices.	EQ2 - AE practices: To what extent is there evidence at the outcome level for increased knowledge sharing or co-creation using inclusive digital tools for farmer innovation for climate-resilient informed agroecological practices?	OD2: Behavioral changes in co-creation of and innovation for climate-resilient informed AE practices using digital tools.	VN03 VN04 BR06
O3: Evaluate the benefits that farmers derive from improved digital access and tools and their potential to generate large-scale impacts.	EQ3a - scaling out: Is there evidence that AE practices generated through improved digital access and tools were considered useful, integrated in daily farming routines and scaled out peer-to peer?	OD3a: Changes in mainstreaming and scaling out of co-created AE practices.	VN05, VN13, VN06, VN12, VN07, VN08, VN09, VN10, VN11 BR08, BR07
	EQ3b - scaling up: Is there evidence that the inclusive approach or AE practices generated through improved digital access and tools were scaled up (technology into policy, institutionalization) with the potential to generate large-scale impacts?	OD3b: Changes in scaling up inclusive digital tool approaches through institutional and policy integration driving AE transitions.	VN14, VN15, VN22, VN18, VN16, VN21, VN17, VN20, VN24, VN23, VN19 BR09 GL01, GL02, GL03, GL04, GL05, GL06

10. List of short titles of outcomes

No. of outcome	Short title	Observed / Process[23]	SMART / Lead
OD1: Enhanced inclusiveness of tool			
Vietnam			
VN01	In mid-2022, ATDT Vietnam staff decided to include field agents as a target group in the project	Process	SMART
VN02	In 2022, IRRI decided to change its approach by creating a simpler, more user friendly tool tailored specifically for Vietnamese farmers.	Process	SMART
Brazil			
BR01	In June 2023, Solidaridad started to facilitate tailored workshops exclusively for women and youth participation.	Process	LEAD
BR02	In Jul/Aug 2024, ambassadors in Para State joined the ATDT program and started to engage actively in digital communication on AE practices	Observed	SMART
BR03	From Aug 2023, ambassadors in Para State contributed to Solis technical development with a focus on user experience	Observed	SMART
BR04	In June 2023, 71 farmers from Pará State participated in the ATDT co-creation process, some expressing interest in adopting AE practices and digital tools	Observed	SMART
BR05	In June 2023, Women from Tuere Settlement formed a self-organized group for cocoa & chocolate production	Observed	SMART
OD2: Innovation & co-creation of AE practice			
Vietnam			
VN03	Beginning of 2023, five AAS field agents in Co Do District started using the FarMoRe app for performance comparisons, allowing them to "bridge" farmer practical experience with advanced technology.	Observed	SMART
VN04	In the first half of 2024, farmers and extensionists in Co Do district accessed data and info through FarMoRe stimulating exchange on farming practices among farmers.	Observed	SMART
Brazil			
BR06	After training in Jul/Aug 2024, the five ambassadors in Para State started to produce and share videos on Solis.	Observed	SMART

[23] In this project, “observed outcomes“ referred to changes that were identified in the more external stakeholders involved with the ATDT project, while “process outcomes” were behavioral changes in internal ATDT actors.

OD3a: Scaling out AE practices			
Vietnam			
VN05	By November 2024, 709 farmers across 13 provinces in the Mekong Delta actively used the FarMoRe tool to document key farming practices, transitioning from traditional paper-based records to digital documentation.	Observed	SMART
VN06	By spring 2024, participating farmers had reduced their average seed usage per hectare (Vin Thanh: 87/200 farmers, reduction by 1.1 kg/ha; Can Tho: 55 /99 farmers; 15.31 kg/ha).	Observed	SMART
VN07	By spring 2024, participating farmers had reduced their nitrogen fertilizer usage per hectare (Vin Thanh: 74/200 farmers, reduction by 1.8 kg/ha; Can Tho: 41 /99 farmers; 25.19 kg/ha).	Observed	SMART
VN08	By spring 2024, 14 of the 99 participating farmers in Co Do district had reduced pesticide sprays by an average of 1.14 applications.	Observed	SMART
VN09	By spring 2024, participating farmers had started to remove straw from their fields instead of burying or burning it resulting in cleaner air and better soil health (Vin Thanh: 37% of farmers: Can Tho: 33.5%).	Observed	SMART
VN10	By spring 2024, participating farmers had reduced emissions in rice production (Vin Thanh: 73/200 farmers, emission reduction by 0.38 tons/ha)	Observed	SMART
VN11	By spring 2024, participating farmers had increased their productivity and started to use mechanization and combined harvesters resulting in reduced post-harvest losses (yield increases in Vin Thanh: 61/200 farmers, 0.77 tons/ha; Can Tho: 55/99, 0.75 tons/ha).	Observed	SMART
VN12	By spring 2024, all participating farmers in Vin Thanh (200) and in Co Do (99) consistently managed water efficiently by applying the Alternate Wetting and Drying (AWD) technique	Observed	SMART
VN13	In early 2024, 44 smallholder farmers in the Mekong Delta began using the WaterIntel tool leading to notable changes in irrigation management.	Observed	SMART
Brazil			
BR07	In August 2024, the five ambassadors from Para State started promoting the tool Solis	Observed	SMART
BR08	182 smallholder farmers in Pará State registered in SOLIS by Nov 12th 2024	Observed	SMART
Global			
GL01	In September 2024, Digital Green began exploring options to use agroecological content co-created by Solidaridad	Observed	SMART
OD3b: Scaling up AE practices			
Vietnam			
VN14	By December 2023, the tool developer AgriTask successfully integrated ATDT's SECTOR API into their app allowing users to access the GHG module of FarMoRe.	Observed	SMART
VN15	In July 2023, the agricultural input company Dai Thanh company engaged with IRRI and in 2024 integrated the GHG module of FarMoRe into their tool	Observed	SMART

VN16	In December 2023, the tool developer AgriG8 successfully connected their CropPal app to the SECTOR API enabling use of the GHG module of FarMoRe	Observed	SMART
VN17	In June 2024, IRRI mandates Freshfields Legal to develop a Digital Data Privacy policy for IRRI at no-cost.	Process	SMART
VN18	In October 2023, MARD officially launched the performance management tool RiceMoRe Ho Chi Minh City for national for policy evaluation.	Observed	SMART
VN19	In July 2024, MARD officially adopted FarMoRe as the designated MRV tool for the demonstration fields under the One Million Hectares Program.	Observed	SMART
VN20	The Local Department of Crop Production in Can Tho utilized real-time, detailed data from the FarMoRe tool in project areas to inform Plan No. 93/UBND-TPCT, issued by the People's Committee of Can Tho on May 3, 2024.	Observed	SMART
VN21	By November 2024, 1025 trained commune-level AAS officers are reporting to their vertically managing agencies using the FarMoRe tool, following MARD's official mandate outlined in Decision (No: 2170/QĐ-BNN-TT).	Observed	SMART
VN22	Early 2022, in the first year of implementing ATDT in Vietnam, the Sustainable Rice Platform (SRP) expressed interest in adapting their digital tool CropPal to incorporate rice certification functionalities.	Observed	SMART
VN23	In the first half of 2024, Winrock International decided to partner with IRRI and use the FarMoRe tool for measurement, reporting, and verification (MRV) at the farm level in a project funded by USAID in Mekong Delta.	Observed	SMART
VN24	Early 2024, Thailand became interested in RiceMoRe/ FaReMore and requested a joint workshop to assess the tool.	Observed	LEAD
Brazil			
BR09	By the end of 2023, the Digital Unit of Solidaridad Brazil transitioned from an internal service provider to a proactive cross-sector innovator managing programs like RESAFRA.	Process	SMART
Global			
GL02	In February 2024, Vincent Dauby, representing Agroecology Europe, approached ATDT, expressing his interest in the project's inclusive approach to tool development and exploring options for collaboration.	Observed	SMART
GL03	Early 2024, Vincent Dauby from Agroecology Europe was inspired by ATDT's publications and approach to author an article on "agroecologizing digital tools" for the FAO Germinate! series.	Observed	SMART
GL04	In April 2024, PATH2DEA, a European initiative funded by Horizon Europe and SERI, invited the ATDT project to join the Digital Agroecology Cluster	Observed	SMART
GL05	In July 2024, Access Agriculture suggested a collaboration with ATDT on IFAD's Agri Connect proposal call.	Observed	LEAD
GL06	In Nov. 2023, several global ARBs including Digital Green and #DigitAG contributed to development of co-creative principles presented at a virtual workshop.	Observed	LEAD

ANNEX B

Published internally (Alliance Biodiversity International and CIAT), see separate files.

OH-Database with code book (Excel)

Study Design (Powerpoint)