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TRANSITIONS

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Digital inclusion in agroecology

Closing digital divides beyond access barriers such as availability and affordability.

10 December 2024, in collaboration with the Agroecology coalition

Alliance Bioversity & CIAT

Agroecology TPP

Solidaridad

IRRI

CIFOR

World Agroforestry

THE UNIVERSITY OF VERMONT
GUND INSTITUTE FOR ENVIRONMENT

TRANSITIONS

Inclusive Digital Tools

Event purpose

Enhancing farmer's agency in the use of digital tools for scaling up agroecological practices

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Event agenda

- Share the Inclusive Digital Tool Project's findings related to digital inclusion, agency and empowerment;

- Discuss practical examples of agroecology knowledge co-creation;

- Exchange experiences with knowledge co-creation (how has it been done?), barriers to the use and impact of digital technologies, and barriers to social inclusion when using digital resources in agriculture;

- Strengthen capacity to consider capacity building needs, agroecology impact, and co-creation efforts when using digital resources to achieve agroecological impact.

About TRANSITIONS and ATDT

- TRANSITIONS: Agroecological Transition Program for Building Resilient and Inclusive Agricultural Food Systems

- ATDT: Agroecological Transitions Inclusive Digital Tools Project: Looked at how farmers benefit from using improved digital tools and their potential to generate **large-scale impacts for climate-informed agroecology**

Agroecology principles

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Central values are:

Co-creation

Empowerment

Agency

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Digital resources

- Are changing how food is produced and **inclusive digital tools can transform agriculture at scale**;

- **Can boost inclusivity and empower farmers** to co-create sustainable practices;

- But, **agriculture specific tools are not widely used by smallholder farmers** in practice;

- Inequalities and therefore **digital divides** remain a challenge;

- The is limited evidence of the **benefits for producers**

# Added value of digital technical assistance and performance assessment

Performance assessment examples

Forecast and prediction	weather and climate forecast, prediction optimal harvest time, harvest quantity
Detection	crop pests & diseases diagnosis, livestock pests & diseases diagnosis
Differentiation	size and quality of produce selection
Optimization	irrigation, nutrient application, feed distribution
Capturing and interpretation and/or evaluation	global weather patterns, individual farm management decisions, traceability systems, land use mapping

Technical assistance examples

Decision-making	best-fit crop variety based on individual farm and household properties, seed choice
Communication	bridging (distance, resource) gaps between stakeholders, equal access to information and knowledge, general extension advisory
Knowledge creation	gather individual data and intelligence on farm production practices, create collective intelligence on regenerative agriculture
Learning	create opensource spaces for individual and joint learning on agro-ecology practices

Digital divides the classical way
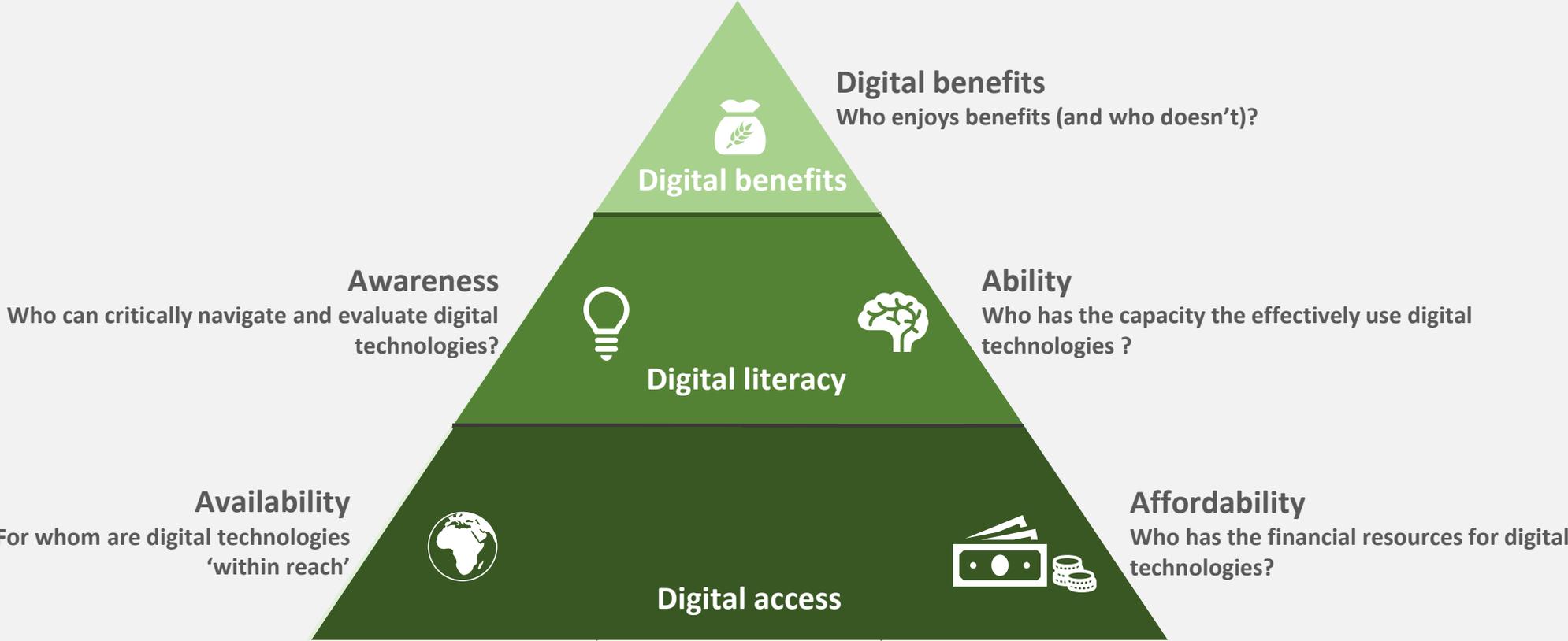
A key principle is missing...

- **Co-creation of knowledge is a key principle** of agroecology.

- If digital platforms are to be a major driver for scaling up agroecology, it is **essential to support inclusive tool use**

- Farmer **co-design of agroecology practices enables more farmer agency**, supporting more relevant, contextualized solutions

© 2016 CIAT/NeilPalmer

Principles for inclusion

Dittmer, K.M.; Burns, S.; Shelton, S.; Wollenberg, E. (2024)

Key principle: Co-creation of knowledge

- **Collaboration** between farmers, scientists, and local and indigenous communities, is a core principle of agroecology.

- Co-creation enables an **integration** of traditional, locally accepted and embedded practices with novel insights from science and technology.

- Jointly **create contextualized solutions** that are **relevant**, and socially, environmentally, and economically **sustainable**

- Fosters **technological innovation**, but also **community agency and empowerment**, and improved **adaptation to environmental challenges.**

Alternative terms for co-creation:

- **Co-production of knowledge**
- **Co-development of knowledge**
- **Participatory**
- **Mutual learning**
- **Co-learning**
- **Community-driven knowledge**
- **Adaptive knowledge**
- **Context relevant knowledge**

Presenting an updated model, where agroecology values are central

Digital benefits
Will this digital resource benefit me? Does its use involve risks for me?
Choose digital resources that add value and give users tangible benefits. Monitor not only effectiveness and impact but also potential adverse impacts.

Digital resource co-creation
How can I influence the UX and UI design?
Create space for diverse users to influence the digital resource's design and implementation.

Knowledge co-creation
Is my knowledge represented by this digital resource?
Co-create knowledge and practices with diverse stakeholders, including minority groups, and build collective intelligence.

Awareness
Which resources do I know and trust?
Build on solutions that farmers already know and use. Facilitate information flow between stakeholder groups. Adhere to good data governance standards.

Relevance
Is this digital resource relevant for me and my farm?
Offer real solutions that help solving real problems and match with users' real-time needs and demands.

Availability
Is this available in my region, for my crops, etc.?'
Provide open access software, tools, data, that can easily be adapted to new contexts.

Affordability
Can I afford the hardware, software, and data?
Implement business models that give farmers affordable long-term access to the digital resource.

Ability
Can I understand the tool's content and use terms?
Choose digital resources with high usability. Invest in (digital) literacy and skills and support systems.

Impact objectives

Participation

Digital divides

Supporting farmer agency

Benefits

Co-creation

Digital resource Knowledge

Digital barriers

Awareness Relevance

Availability Affordability Ability

Figure developed based on work by: van Dijk & Hacker, 2003; van Deursen & Helsper, 2015; Springer et al. 2023; Opola et al. 2023; Dittmer et al. 2022; 2022

A digital agency-based model for social inclusion

Digital benefits
Will this digital resource benefit me? Does its use involve risks for me?
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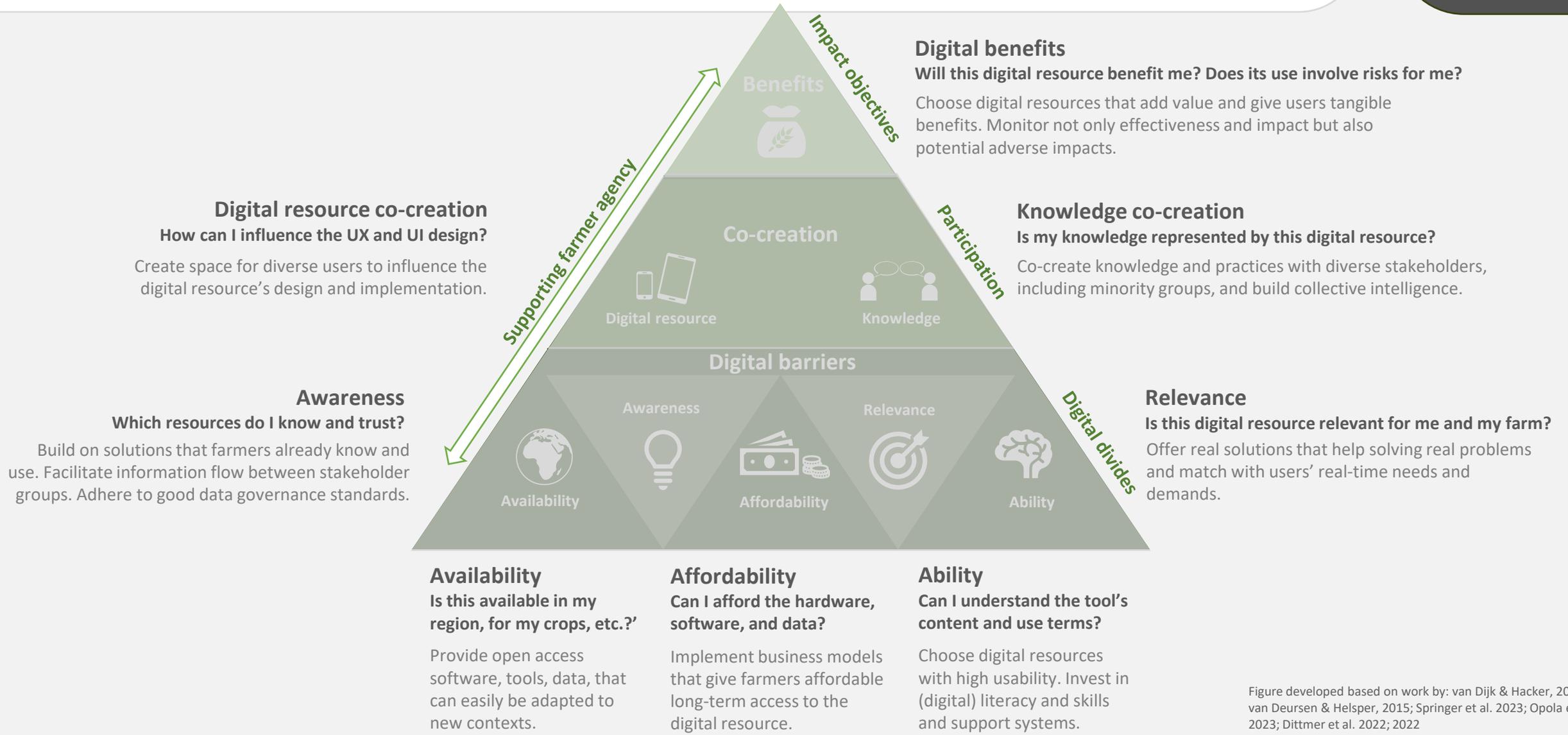Offer real solutions that help solving real problems and match with users' real-time needs and demands.

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Figure developed based on work by: van Dijk & Hacker, 2003; van Deursen & Helsper, 2015; Springer et al. 2023; Opola et al. 2023; Dittmer et al. 2022; 2022

In summary: Why co-create knowledge?

[...] involving members of the community that is most directly affected by a design process is crucial, both because justice demands it and also because the tacit and experiential knowledge of community members is sure to produce ideas, approaches, and innovations that a non-member of the community would be extremely unlikely to come up with.
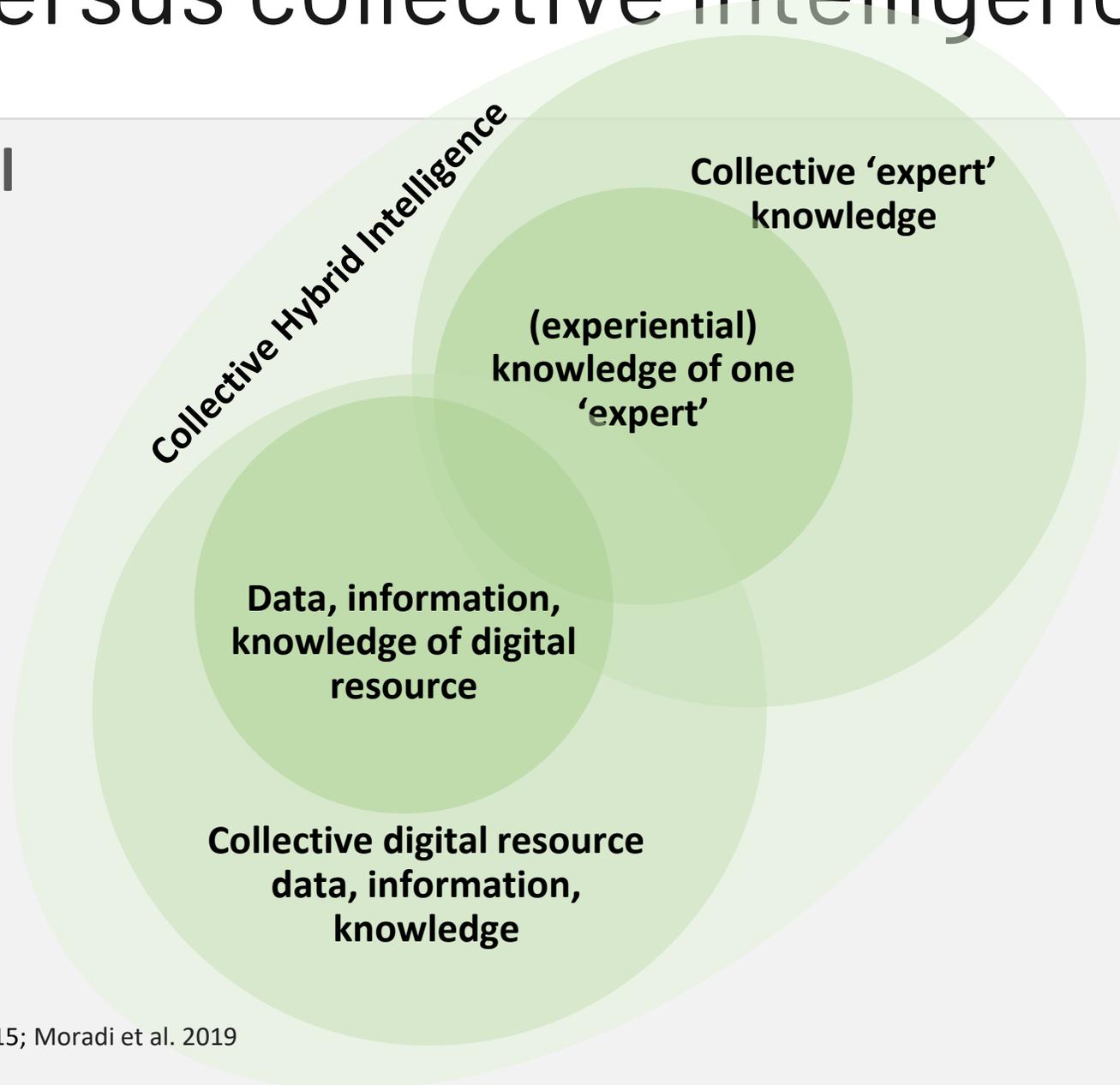
(Costanza-Chock, 2023)

- Shift power to local communities, i.e. community-based organizations, farmers, increasing their agency to speak for and protect their interests, empowering voices that often are excluded.

- Prioritize community needs and priorities

- Develop models for creating and exchanging knowledge and perspectives will benefit all stakeholders involved.

- **A continuous, iterative process: Stop iterating and the power likely shifts back to developers.**

Individual versus collective intelligence

Adding the digital component: Bringing human knowledge and digital resource knowledge together

Collective Hybrid Intelligence

Collective 'expert' knowledge

(experiential) knowledge of one 'expert'

Data, information, knowledge of digital resource

Collective digital resource data, information, knowledge

From one person, to many persons. From one digital resource, to many digital resources

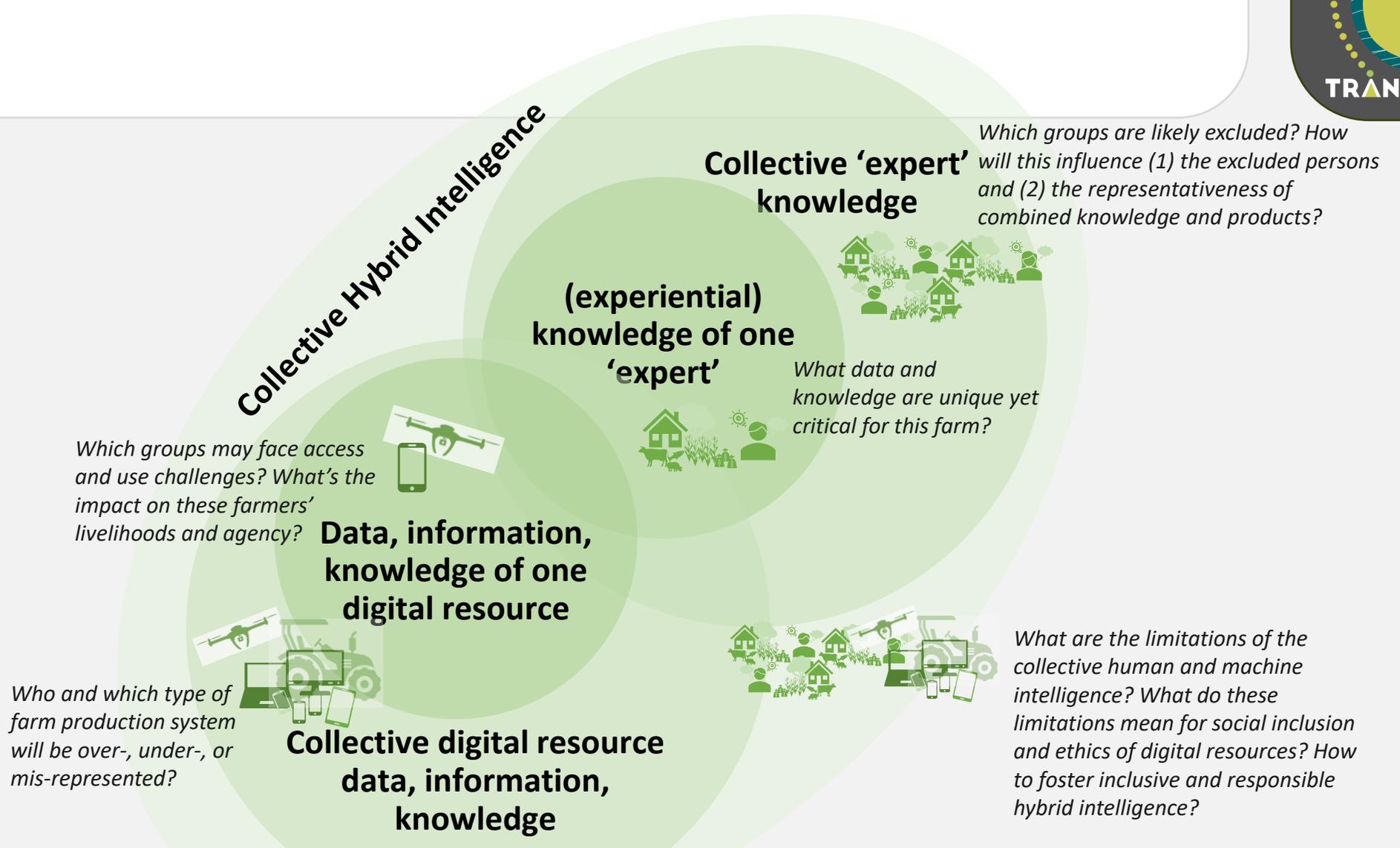...To hybrid = a network of many persons and many machines contributing data, information, and knowledge

Figure based on: Millenium project/Glenn, 2015; Moradi et al. 2019

Collective Hybrid Intelligence

Collective 'expert' knowledge

(experiential) knowledge of one 'expert'

Data, information, knowledge of one digital resource

Collective digital resource data, information, knowledge

Which groups are likely excluded? How will this influence (1) the excluded persons and (2) the representativeness of combined knowledge and products?

What data and knowledge are unique yet critical for this farm?

Which groups may face access and use challenges? What's the impact on these farmers' livelihoods and agency?

Who and which type of farm production system will be over-, under-, or mis-represented?

What are the limitations of the collective human and machine intelligence? What do these limitations mean for social inclusion and ethics of digital resources? How to foster inclusive and responsible hybrid intelligence?

Figure based on: Millenium project/Glenn, 2015; Moradi et al. 2019

Remember: Digital resources are only one piece of the puzzle

How can digital resources add value to scaling technical assistance for and performance assessment of agroecology practices?

- Digital technologies are never the solution itself, but a means to an end. Jointly:
    - **Step 1:** Define the problem + who is affected by it
    - **Step 2:** Formulate the intended change = intervention impact
    - **Step 3:** Identify a best-fit technical assistance and/or performance assessment solution
    - **Step 4:** Identify the roles of digital resources (digital intelligence) and human intermediaries (human intelligence)

Problem	**Affected agents**	**Solution**	**Digital resource**	**Human intermediary**	**Agroecological impact**
Few extension agents need to build capacity about aflatoxin and answer questions of many farmers	Extension agents (work overload), farmers (poor access to reliable information), consumers (risk of consuming toxic food)	Record the questions and answers so that they can be reused	Ushauri: An automated hotline that farmers can call using a basic mobile phone	Extension agent listening to questions and recording correct answers	More farmers have direct access to information about dangerous aflatoxin and are controlling on their farm

Let's look at some practical examples of tools developed by CGIAR centers

Solis – Farming practice co-creation

- **What** Offers farmers and field technicians a way to interact, learn, teach, and share. The Extension Solution App can be used to generate information on agroecological practices in different formats, based on agricultural knowledge that is culturally sensitive, socially fair, economically viable and preserves natural resources.

- **Where** Deployed on livestock farms in Brazil's Transamazônica Pará region

- **Who** Developed by Solidaridad, with support from Alliance of Bioversity and CIAT ATDT project.

- **Digital tech. used:** Smartphone, mobile app, video-based learning community where producers can post videos

- **Why**
1. Tailored guidance and learning on agroecological practices and adoption of these practices. More efficient communication with extension staff.
2. Fostering responsible production and consumption, and agricultural transformation, reducing environmental degradation.

- Continuously co-develop knowledge and practices
- Co-create the tool with farmers
- Provide tailor-made advisory
- Respond to immediate needs, foster long-term change
- Link with a form of 'sharing' that works for producers (video)

© Solidaridad Latin America

RiceMoRe + FarMoRe – Knowledge co-creation

- **What** RiceMoRe is a digital data platform providing near-real-time tracking and streamlined reporting across multiple management levels. FarMoRe is a performance assessment application to track and assess performance and progress on sustainability and agroecological transitions (including low-emission practices) at both farm and cooperative levels. Field-level data contributed by a network of local officials at community level, and combined with data from geographic information systems and other information layers.

- **Where** Rice production systems in Vietnam's Mekong River Delta and Red River Delta regions. Potential for scaling to other crops and across Vietnam.

- **Who** International Rice Research Institute (IRRI), Climate and Clean Air coalition, DCP (Department of Crop Production), DTS (Center for Digital Transformation and Statistics), and Vietnam Ministry of Agriculture and Rural Development.

- **Digital tech. used** Smartphone, mobile app (FarMoRe), and a webapp (RiceMoRe).

- **Why**
1. Helps with production planning and response to natural disasters and pests.
2. Fostering effective management in rice production systems in a context that is challenged by climate and market uncertainty.
3. Reducing environmental degradation, supporting climate change mitigation through adoption of low-emission practices which would contribute to the sector's sustainability and resilience.

- Use a variety of data sources
- Assess performance against peers and best practices
- Co-create tailored solutions iteratively
- Enable collaboration, innovation, co-creation of sustainable practices

© RiceMore IRRI
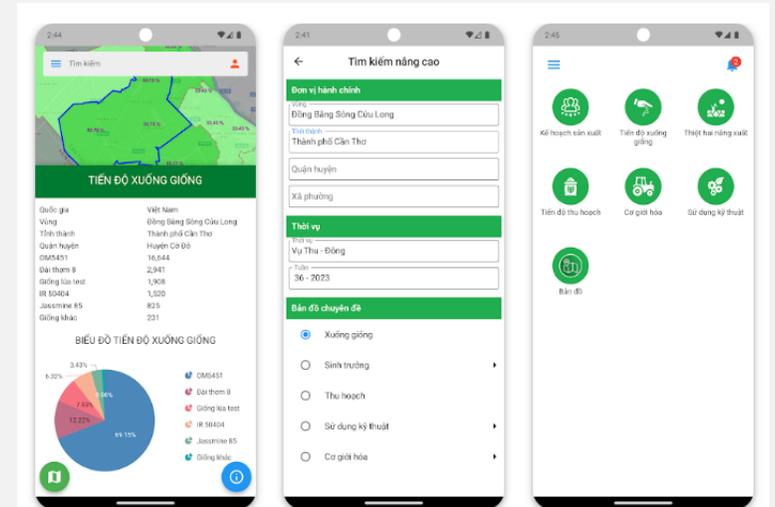
GeoFarmer – Tool and knowledge co-creation

- **What** A geo-spatial, cloud-based smart-monitoring system for agricultural projects. Users can collect data, run surveys, ask questions, and share knowledge. The digital resources provide a decision support system and info on best agronomic practices on seed selection, tree planting, maintenance, and it includes community-led tree-based restoration of degraded landscapes.

- **Where** Deployed in tree production agro-forestry systems in Kenya and Cameroon

- **Who** Alliance of Bioversity and CIAT

- **Digital tech. used** Progressive Web Application (integration with geocitizen framework), smartphone application, SMS push notifications (beta), IVR calls (through the third party Viamo). Integrating M-Pesa, Orange Pay for small grant and payment access

- **Why**
1. Improving crop specific knowledge and poor agricultural practices, combined with fostering communication of information and experiences between farmers and farmers and experts that can inform decision-making.
2. Reducing environmental degradation.

- Human Centered Design
- Participatory process, meeting needs and demands of users
- Two-way communication, support co-innovation of knowledge

© Geofarmer Alliance Bioversity and CIAT

Cocoa traceability tool - Benefits

- **What** Cocoa traceability tool is a traceability system that allows digital documentation of indicators linked to e.g. conservation practices, working conditions, economic performance, origin and destination, following international cocoa certification standards and agroecology principles.

- **Where** The tool was developed for one cocoa producers cooperative in Peru

- **Who** Alliance of Bioversity and CIAT

- **Digital tech. used** Digital form which is built on top of the trusty.id traceability solution

- **Why**
1. The tool helps the cooperative to (1) digitize their traceability system, (2) to comply with standards of international certification schemes, (3) gain insight in current compliance with agroecology principles, and (4) Bioversity and CIAT to collect data and gather insight about compliance with agroecology principles in the cocoa sector.

2. The tool could support a transition to more responsible production and consumption, reduced environmental degradation, and improved farmer livelihoods.

- Respond to interests of multiple stakeholders
- Adopt existing frameworks
- Tailor-made product, contextualized to one users
- Scalable tool development process

© Cocoa Traceablity Tool Alliance Bioversity and CIAT

Melisa Chatbot – Digital barriers

- **What** Chatbot for farmers and rural communities who need to access and understand weather and climate forecasts and their impact on crop production decisions. The chatbot gets input from an AI system (Démeter) that offers long-term weather forecasting, and predicts potential crop yields for rice and corn. Démeter obtains climate forecasts from the Aclimate Colombia service.

- **Where** Colombia for maize and rice crops, scaling to other LAC countries

- **Who** Alliance of Bioversity and CIAT, IRRI

- **Digital tech. used** AI chatbot, Natural Language Processing, mobile messaging apps such as Telegram

- **Why**
1. Helps farmers to make the best decisions for crop sowing. Farmers and rural communities become empowered to understand weather and climate forecasts and their influence on crop production and markets.

2. May contribute to farmers' and extension agents' adaptation to climate change, global food security, farmer livelihoods, and responsible production.

- Minimizing access barriers through design choices
- Frugal on the user side, advanced on the developer side
- Solve immediate problems, foster long-term change

© Melisa Chatbot Alliance Bioversity and CIAT
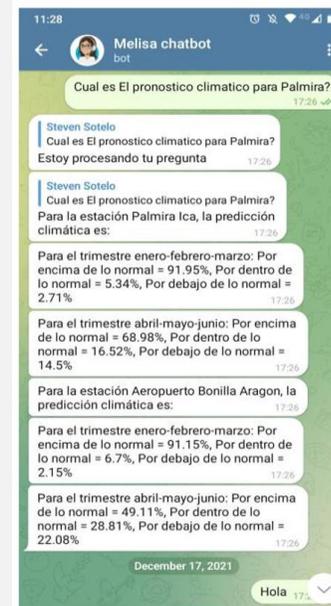
Q&A – Agroecology Coalition

1. What activities have you undertaken to co-create knowledge about agroecology practices together with small-scale producers? What has this resulted in? What challenges were experienced?

2. What barriers to the use and adoption of digital resources have you experienced up-close in your work? How did you cope with these barriers?

3. What sustainable agroecological impacts have diverse groups of small-scale producers (e.g. women, youth, perennial crop producers) benefitted from as a result of the use of digital tools?

   a. Which groups benefitted most? (i.e. were most included)

   b. Which groups benefitted least? (i.e. were most excluded)

   c. Were there any negative consequences of the use of digital tools, and who was affected by them?

Thank you for your participation

Want to follow up?

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Learn more about ATDT

Sign up for updates

Find the guide for these principles & more information about the Inclusive Digital Tools Project (ATDT)
https://bit.ly/ATDT_Principles

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